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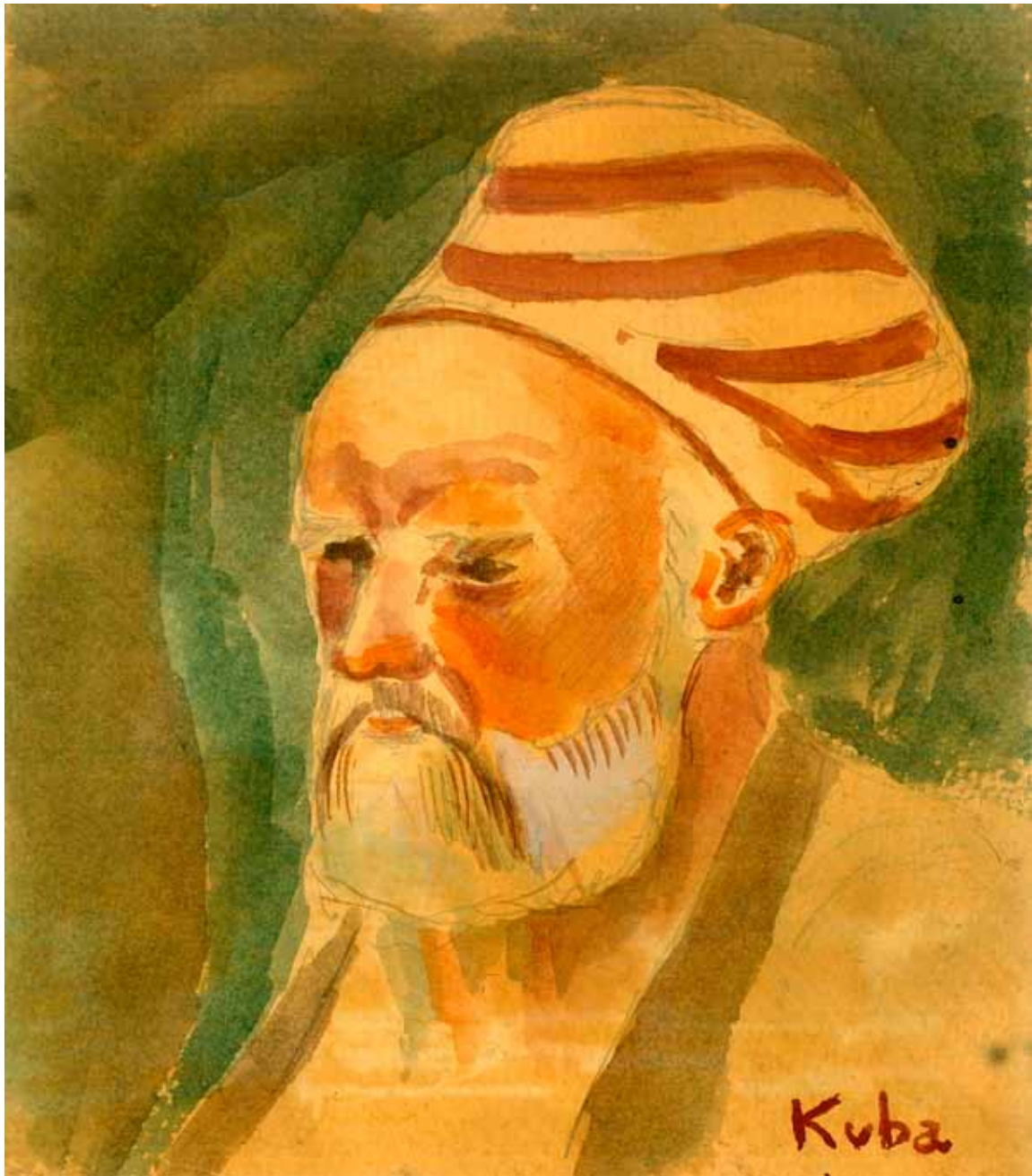
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EDITORIAL

Sixty-five Years of the Journal Medical Archives

Izet Masic

Academy of the Medical Sciences of Bosnia and Herzegovina, Sarajevo, Bosnia and Herzegovina

This year journal Medical Archives celebrates 65 years of continuing publishing. It was one of the oldest medical journals in former Yugoslavia (established in the year 1947).

The first Editor-in-Chief of the Medical Archives was a academician Vladimir Cavka. That was a happy circumstance, because the professor Cavka at that time was one of the most famous world experts in ophthalmology. The high level of the journal Medical Archives issues from the very beginning, thanks to professor Cavka, was critical for inclusion in Index Medicus. It was a high award, which this journal carries even today. First Editorial board was consists of professors: Vladimir Cavka, Blagoje Kovacevic, Bogdan Zimonjic and Ibro Brkic (1947-1957), and that period was the golden years of Medical Archives. Articles were coming mostly from the clinics and institutes of the Faculty of medicine in Sarajevo, as well as by medical experts from the other cities in B&H (1). Also, Medical Archives accepted and published articles from other medical centers in former Yugoslavia. All this is clearly speaking about the great reputation of the Medical Archives in B&H and larger.

In the last war (1992-1995), in the middle of the aggression on B&H, at the time the great scarcity, misery and poverty and severe threat to the lives of all of us, the journal showed his toughness, perseverance and indestructibility. As Editor-in-Chief, by myself and with help of some other professors and physicians in Sarajevo I tried to continue printing this important journal as "window to the world" from sieged Sarajevo. It was one of the Sarajevo miracles - Medi-

cal Archives spread out "the medical truth" from Sarajevo and under these conditions and circumstances continued publishing "wartime articles" in the journal which were very interesting of experiences of war medicine used without normal conditions. Publishing house AVICENA provided continuous publication of the journal during wartime. So the Medical Archives, despite everything, is still regularly published, and some copies of journal published in Sarajevo during wartime are sent to PubMed/Medline, who confirmed his regular rise despite war actions.

We think that on this occasion we should thank to all the colleagues who were engaged in the Association of doctors and the publication of this journal, as well as those who give financial support. Special thanks belong to my predecessors, previous the Editor-in-Chiefs, good, honorable and honest people who have led this journal and contributed to its reputation, and who today are no longer alive, except prof Mirko Grujic. We need to mention

their names: Vladimir Cavka, Blagoje Kovacevic, Bogdan Zimonjic, Milos Aranicki, Jakob Gaon, Midhat Prcic, Seid Hukovic, Milorad Tomasevic, Irfan Zulic and Mirko Grujic. Four of them were academicians, one of them also the president of the Academy of Sciences and Arts of B&H - Seid Hukovic.

Today in the Medical Archives are published articles by all doctors from B&H, and not only outstanding teachers and researchers. Young doctors in our country have no other place to publish their work, but facing their journal and send the articles whose publication they require in the advancement of the profession or the choice of teaching and associate vocations. On Figure 1 is presented the list of published papers in Medical Archives (July 2011) - it is impressive number of 3477 articles. So many academics and researches started their academic or scientific career with references from published articles in Medical Archives. They are now famous professors in B&H, also at universities in abroad.

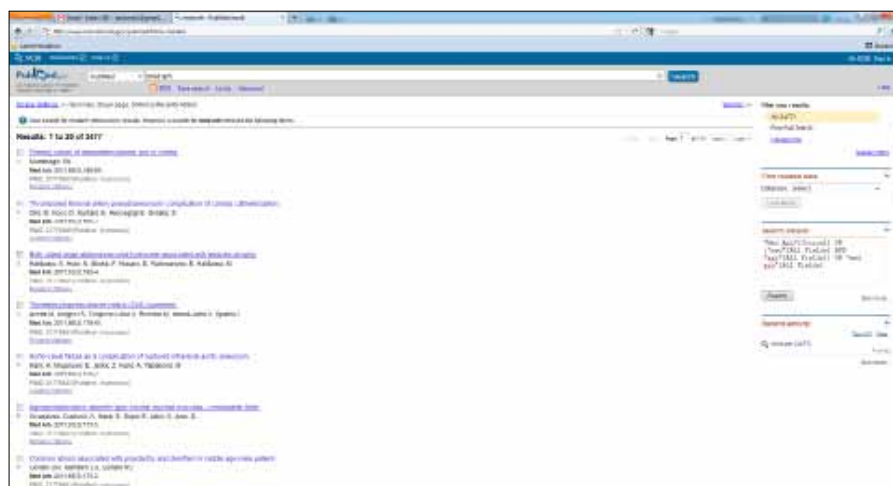


FIGURE 1. Total number of published papers in Med Arh, August 2011

But, in the former Yugoslavia first medical journal was „Domestic physician“ (Domaci ljekar): journal for cherishing and safeguarding public health, published in Pancevo 1971-73 and the first scientific journal was the Serbian archives for all physicians (established in Belgrade, 1874). In Croatia was established in 1877 the Medical News Journal (Medicinski vjesnik), as part of the Association of physicians in Slavonia and the Croatia Kingdom. In Ljubljana in 1929 was published Health News (Zdravstveni vestnik), and in Sarajevo in 1947 the Medical Archives (Medicinski arhiv), Journal of the Society of B&H physicians. The oldest medical journal in B&H was Jahrbuch des Bosnian-herzegowinischen Landesspitaales in Sarajevo - Annual of the National Hospital in Sarajevo which was established in 1897 (published in German language).

In 1987 in the former Yugoslavia 140 scientific and professional journals was published in the field of medicine and similar disciplines, of which in Bosnia and Herzegovina 39. From this number only 30 of them were involved in secondary and tertiary indexed publications (from B&H only Medical Archives and Folia Anatomica Jugoslavica). According to ISI in Philadelphia, which each year publishes the publication „Who is publishing in science - WIPIS“ in 1979 from former Yugoslav countries, was registered more than 60 authors who have their works published two or three times in the indexed journals, and in Garfield list of 1000 most cited authors until 1984 there was not an author from the former Yugoslavia. Also, out of 1000 researchers was about 0.18 journals or one journal on 5000 researchers, while the number in developed countries was 1.2 journals on 1000 researchers. In December 2009 within the databases of indexed biomedical literature were recorded

Name of journal	ISSN number	Publisher	Editor-in-Chief	Web site	Founded	Per year	Peer reviewed	Type of journal	Language	Indexed in
Acta Informatica Medica	0353-8109	Avicena Sarajevo	Izet Masic	www.amn.ba	1993	4x	Yes	Scientific	English	EBSCO, IC
Acta Medica Academica	1840-1848	ANUBIH	Berislav Topic	www.anubih.ba	2008	4x	yes	Scientific	English	EBSCO, IC, CAB Abstracts
Acta Medica Salmiana	0350-364X	UKC Tuzla	Harun Brkic	www.ukctuzla.ba	1972	4x	Yes	Scientific	Bosnian/English	EBSCO, IC
Bosnian Journal of Basic Medical Sciences	1840-4812	Association of Basic Medical Sciences of FBiH	Bakir Mehic	www.unsamf.ba	1998	4x	Yes	Scientific	English	PubMed, EBSCO, IC
Folia Medica Facultatis Mediciniae Universitatis Saraviensis	0352-9630	Faculty of medicine Sarajevo	Nedžad Mulabegovic	www.mfuns.ba	1966	2x	Yes	Scientific	Bosnian/English	IC
Health Med	ISSN 1840-2291	Faculty of Health Sciences Sarajevo	Mensura Kudumovic	health_med@yahoo.com	2007	4x	Yes	Scientific	Bosnian/English	SCI, ISI Web of Science, EBSCO, IC
Materia Socio Medica	1512-7689	Avicena, Sarajevo	Izet Masic	www.amn.ba	1978	4x	Yes	Scientific	English	EBSCO, IC
Medicinski Arhiv	0350-199X	Avicena, Sarajevo	Izet Masic	www.amn.ba	1947	6x	Yes	Scientific	English	Medline, EBSCO, IC
Medicinski Glasnik	1840-0132	Medical Association of Zenica-Doboj Canton	Selma Uzunovic-Kamberovic	www.ljkzedo.ba	2004	4x	Yes	Scientific	Bosnian/English	Medline, EMBASE, SCI
Medicinski zurnal	1512-5866	Clinical center of University of Sarajevo	Mirza Dilic	institutnir@bih.net.ba	1995	4x	Yes	Professional	Bosnian/English	EBSCO
Medicinar	1840-3697	Medical Association of SBK, Travnik	Nedžad Hadzic		2004	2x	NO	Professional	Bosnian	NO
MediCom	0480-2551	MediCom, Banja Luka	Momir Pusac	www.medicom.com	2004	4x	NO	Professional	Serbian	NO
Pedijatrija Danas	1840-2968	Pediatric clinic of University of Tuzla	Husef Tahirovic	Husef.tahirovic@untz.ba	2005	4x	Yes	Professional	Bosnian/English	EBSCO, CAB Abstracts
Pharmacia	0480-2551	Association of Pharmacists	Miroslav Sober	Miro.sober@gmail.com	1990	1x	NO	Professional	Bosnian/English	NO

TABLE 1. Indexed journals in Bosnia and Herzegovina in 2011

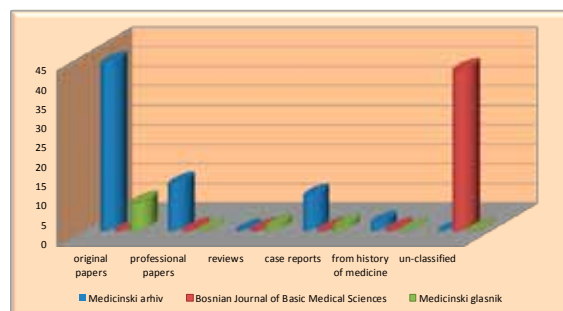


FIGURE 1. Published papers in indexed journals in Medline in 2010

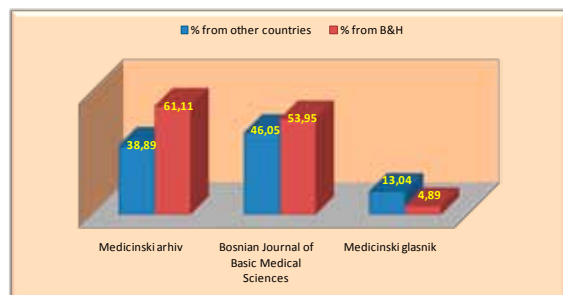


FIGURE 2. The ratio of published papers in B&H and other journals

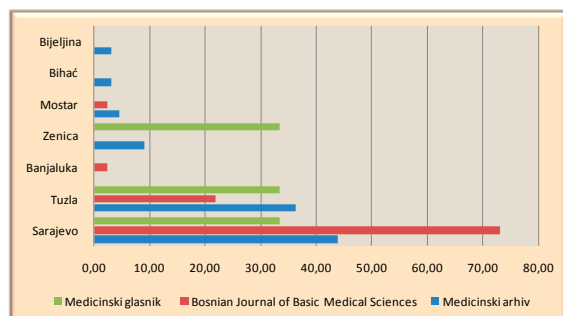


FIGURE 3. The ratio of authors from different B&H health centers

19.3 million cited papers (2). From the cities of the former Yugoslavia was cited the articles of scientists and researchers in the following figures: Zagreb - 5002, Ljubljana - 4097, Beograd - 2598, Nis - 959, Rijeka - 687, Split - 609, Sarajevo - 563, Skopje - 332, Maribor - 301, Osijek - 297, Tuzla - 240, Kragujevac - 231, Subotica - 93, Pristina - 75, Mostar - 70, Banja Luka - 20, Podgorica - 9, Bihac - 5. So it means, from the following cities: Sarajevo, Tuzla, Banja Luka, Mostar and Bihac - five university centers in B&H, in PubMed/Medline database in late 2009 there was 898 cited articles from the primary scientific journals, which is 7.3 times less than in Croatia, 4.9 times less than in Slovenia and 4.3 times less than in Serbia. Currently in B&H is published 14 scientific and professional journals and to 3 are indexed in PubMed, 3 in ISI Web Knowledge, 1 in EMBASE, 9 in EBSCO database, 8 in Index Copernicus - IC database, 2 in CAB abstracts, etc. (Table 1).

During 2006 in the oldest, Sarajevo School of Medicine, worked 32 full time professors (they had 543 articles cited in PubMed, of which 508 were published in local languages and 35 in English and international journals, which is in average 16 papers in domestic or 1.1 articles in international journals (2). Associate professors of the Medical Faculty

Faculty of medicine in:	Number of authors	Total No. in MEDLINE	Total No. in Med Arh	% of papers published in the Med Arh	Published papers in Med Arh as author	Published papers in Med Arh as co-author
Banja Luka	45	425	19	4,47	6	13
Foca	11	236	4	1,69	2	2
Mostar	12	289	72	24,91	47	25
Sarajevo	24	683	491	71,89	236	255
Tuzla	48	736	332	45,11	85	247
Europe/USA	11	961	25	2,60	14	11
Total	151	3330	943	28,32	390	553

TABLE 2. The ratio of published papers in indexed journals in Medline in Med Arh and other journals

in Sarajevo published during the same year 495 scientific and professional articles, cited in PubMed, of which 31 in international journals. Assistant professors (33 of them) published 374 articles cited in PubMed, of which 15 published in international journals. Analyzed are three B&H journals indexed in MEDLINE in 2010 (2): Medical Archives (Medicinski Arhiv), Bosnian Journal of Basic Medical Sciences and Medical Gazette (Medicinski Glasnik). As shown in Figure 1 the largest number of original papers was published in the Medical Archives (Chi square - 130.646, DF 10, significance level $p < 0.0001$).

there is a statistically significant difference in the number of papers published by local authors in relation to international journals in favor of the Medical Archives (Chi-square - 11.644, DF-2, Significance level - $p = 0.0030$). True, the Journal BJBMS does not categorize the articles and we could not make comparisons. Journal Medical Archives and BJBMS by percentage published the largest number of articles by authors from Sarajevo and Tuzla.

Social networks, especially scientific social network of experts provide significant opportunities to researchers, scholars and professors at medical faculties. Although scientists are by nature not inclined to social interaction, rather hide in their labs trying to find some next great discovery, there are numerous scientific social network. Some of them are specific to the biomedical sciences, the most famous among them is BioMedExperts. BioMedExperts is an

online community of biomedical scientists, which shows the essential features related to their work, cooperates on projects and areas of interest. It is these characteristics are of great help

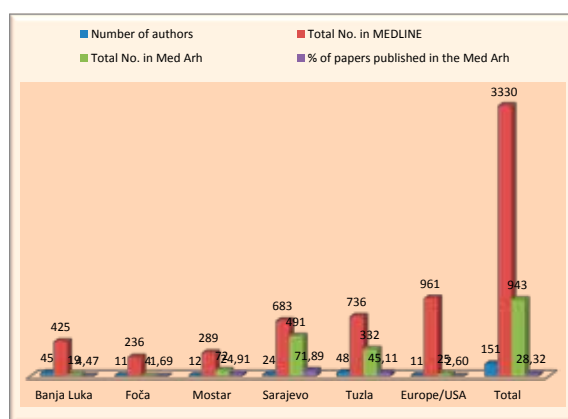


FIGURE 4. The ratio between authors and coauthors in Med Arh

to analyze the use of social networks by biomedical scientists with 5 faculties of medicine in B&H, and their comparison with a group of eminent Bosnian-Herzegovinian medical scientists who are now working around the world.

In July 2011 we analyzed randomly 151 (Table 2) full and part time professors from 5 medical university centers in B&H, which published their papers in journals indexed in Medline including also papers published in Medical Archives. The same study group was analyzed their participation within other social network base. We have sought the Facebook profile of teachers and found that only 14.6% of domestic scientists use Facebook, while this percentage is significantly higher for those who work outside of B&H (54.5%). Profiles of scientific workers in B&H are generally not public, are available to certain members of the network. On BioMedExperts 72 scientists (47,7%) have pro-

file, and there is a significant difference among the faculties. Most of them who have the profile are from the Medical Faculty in Sarajevo, and the least number from the Medical Faculty in Banja Luka. The specificity of this scientific social network is that it provides a number of collaborators on the research presented, and the number of research areas that deal with the scientists. Average values of these parameters showed no significant differences among the faculties. On average the least associates on research projects have had professors from Banja Luka, and most professors from Sarajevo. It should be noted that in all faculties there are professors who did not have associates for the published research projects, but there are rare cases that they even had 79 associates. Unlike professors who work in B&H, a group of scientists who work outside the B&H are significantly more likely to use scientific social network. They have the in 90.9% of cases profile on the BioMedExperts network, have on average considerably more associates in research projects (55.18), and on average significantly more papers published on Medline (83.36). Number of published papers of scientists working in B&H, indexed to the greatest international database of biomedical literature Medline shows no significant differences among the faculties. The least average number of papers is published by the Banja Luka Medical faculty, and most from Sarajevo Medical Faculty. We should emphasize here that all faculties have laid down rules on the number of papers published in indexed databases for the promotion of professors. But looking at the relevant bibliography 32% of professors does not meet these criteria. The vast majorities of them is from the Medical Faculty in Banja Luka, but present also at all other faculties. As we see on Table 2 most of professors in Sarajevo and Tuzla published their papers in Medical Archives if we compare it with other indexed journals in Medline.

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ORIGINAL PAPER

Serum Lipids and Lipoproteins Among Students of the University of Sarajevo

Jasenko Karamelic¹, Jozo Coric², Tomislav Jukic³, Mirsad Panjeta², Oggi Ridic⁴, Goran Ridic⁵

Department of Clinical Immunology, Clinical Center of Sarajevo University, Sarajevo, Bosnia and Herzegovina¹

Department of Clinical Chemistry and Biochemistry, Clinical Center of Sarajevo University, Sarajevo, Bosnia and Herzegovina²

Medical faculty at Osijek University, Scientific Department of Biomedicine and Health, Osijek, Croatia³

Albertus Magnus College, New Dimensions, Masters of Science in (Health Care) Management (MSM) Program, New Haven, CT, USA⁴

Northeastern University, Doctorate Program in Public Policy and Law, (Health Care Management) Boston, MA, USA⁵

Introduction: This study researched the distribution of desirable, borderline and high-risk values of certain lipid status parameters in healthy young individuals. **Aim:** The purpose of this study was to research the statistical distribution of desirable, borderline and high-risk values of certain lipid status parameters in healthy young individuals (i.e. medical university students). **Material and methods:** In this research we tested 112 students studying at the University of Sarajevo, of both genders and 20-30 years of age. **Results:** Total serum cholesterol was minimally elevated in 7,1 % of tested students, elevated with high risk in 2,7 % and triglycerides were minimally elevated in 1,8 %. Presence of elevated LDL cholesterol was found to be 2,7% minimally and 1,8 % with high risk. HDL cholesterol was minimally decreased in 1 tested student. **Discussion:** Standard biochemical methods were used to determine the values of total cholesterol, triglycerides and HDL-cholesterol. The level of LDL cholesterol was also calculated. **Conclusion:** Our results point to the need for performing gradual laboratory diagnostic procedures for routine check-ups of university students. **KEY WORDS:** STUDENTS, LIPIDS, LIPOPROTEINS.

Corresponding author: Prof Jasenko Karamelic, MD, PhD. Department of Clinical Immunology, Clinical Center of University of Sarajevo, Bosnia and Herzegovina. E-mail: karamelicjasenko@hotmail.com

1. INTRODUCTION

Serum lipids and lipoproteins, especially serum cholesterol, triglycerides and LDL cholesterol are major independent risk factors for coronary heart disease. High-density lipoprotein (HDL cholesterol), on the other hand, is the ameliorating factor in coronary heart disease. Atherosclerotic disease of the heart and blood vessels is the most common cause of morbidity and mortality and it is characterized by the gradual development; so that the first changes in blood vessels normally occur in the first or second decade of life and clinical manifestations usually occur in the elderly patients (1). Atherosclerosis af-

fects medium and large arteries, and includes a series of events that results in thickening of vascular walls, by changing its quality, reducing the elasticity and the corresponding obstruction in the lumen of affected arteries (2).

Observations showed that the danger to develop an ischemic heart disease is in close correlation with the lipid concentration. If a person has hyperlipidemia for long periods of time, this can lead to atherosclerosis, accompanied by complication(s), including myocardial infarction and vascular diseases. Coronary artery disease is primarily a consequence of the accumulation of fatty deposits in the walls of coronary arteries,

leading to the formation of fibrous tissue in the wall of blood vessels (3). It was found that in patients who were 80 years old, about 60% of arteries were covered with atheroma plates. In conclusion, in the presence of risk factors, age moves towards the younger age group (4, 5, 6).

Lipid metabolism disorder, in particular elevated levels of total cholesterol (TC) and LDL-cholesterol (LDL-C) is one of the leading risk factors for atherosclerosis and its undesirable consequences. Rare are disorders, in which the lipids accumulate in tissues and are raised in serum (7, 8).

This proved the possibility of regression of already formed arteriosclerosis lesions after long-term reduction of blood lipid levels and lipoproteins. According to the recommendation of the European Atherosclerosis Society, lipid values of the parameters are classified as desirable, borderline and high risk increased. However, a single recommendation on lipid values in young people does not yet exist, although the implementation of preventive and therapeutic measures is desirable since the early age (9).

Laboratory diagnosis of lipid abnormalities includes the determination of the concentration of triglycerides, total cholesterol HDL-cholesterol and LDL-cholesterol. Determinations of serum lipids and lipoproteins are valuable in the diagnosis and management of hyperlipoproteinemia and also in assessing the risk of developing a coronary heart disease (10).

2. AIM OF THE STUDY

The purpose of this study was to research the statistical distribution of desirable, borderline and high-risk values of certain lipid status parameters in healthy young individuals (i.e. medical university students).

3. MATERIAL AND METHODS

For purposes of this investigation, we used blood samples of 112 healthy students (64 women and 48 men) ages 20 to 25 years. The process of taking blood samples for determination of a lipid status is an important step in the preparation of the patient(s). This procedure, among other steps consists of the practice in which the researched students-patients should be normally fed, in the period of more than two weeks, before taking the sample to avoid changes in the body weight. In addition, researched students were instructed to avoid physical activity, alcohol consumption, while at the same time consuming the usual and not too fatty meals. Students were prohibited to eat any food 12 hours before taking the sample, not to drink alcohol or coffee and not to smoke 48 hours before taking blood samples. The serum was separated within 2 hours.

Serum cholesterol, triglycerides and HDL-cholesterol were measured with standard methods. The LDL-cholesterol levels were calculated by using the Friedewald formula. Total cholesterol was measured by the cholesterol oxidase method. Serum triglycerides were assayed, after enzymatic hydrolysis, by a simultaneous enzymatic determination of glycerol. HDL-cholesterol levels were determined by a direct homogeneous enzymatic method. Lipid parameters were determined on the Dimension analyzer called "RxL" manufactured by the firm Siemens (AG or Inc.).

The study was approved by the Ethics Committee and was conducted in accordance with the ethical principles described by the Helsinki Declaration.

4. RESULTS

We determined the minimum, maximum and mean value(s) and the results are shown in table 1.

The mean values and the range(s) for total cholesterol, triglycerides and LDL-cholesterol were higher for men than for women. Concentration of HDL-cholesterol was higher for women than for men.

In the study group of students, we have investigated the frequency deviation values of the parameters of lipid status of the recommended desirable levels (Table 2).

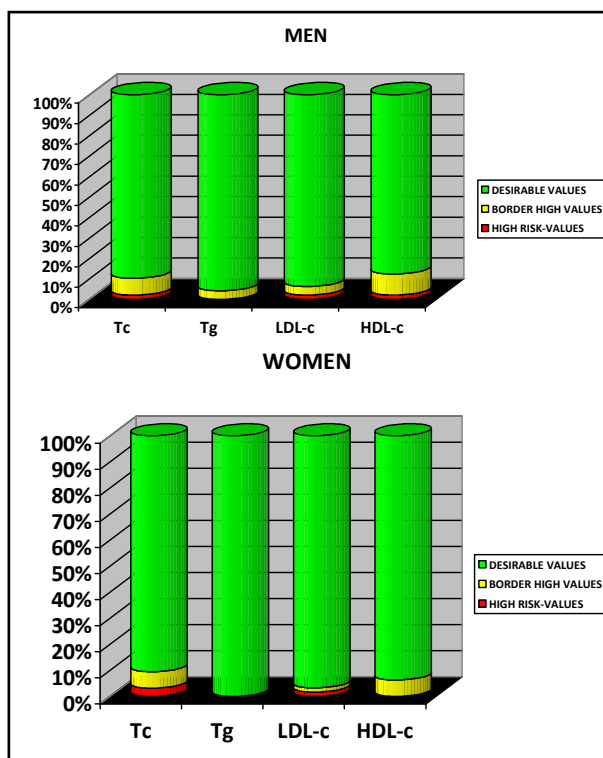
Distribution frequency of desirable, borderline high and high risk values of certain parameters of lipid status is

Parameter		Minimum value	Maximum value	Mean value
Cholesterol mmol/L	m	3,6	7,4	4,5
	f	3,2	6,7	4,2
Triglycerides mmol/L	m	0,47	2,22	1,15
	f	0,27	2,16	0,93
HDL- cholesterol mmol/L	m	0,89	2,20	1,39
	f	0,94	2,25	1,42
LDL cholesterol mmol/L	m	1,20	4,7	2,81
	f	1,06	4,5	2,41

TABLE 1. Values of examined lipid parameters in examinees

Parameter		Desirable values	Borderline High values	High-risk elevated values	Total
Cholesterol	m	43	4	1	48
	f	48	4	2	64
Triglycerides	m	46	2	0	48
	f	64	0	0	64
HDL-cholesterol	m	42	5	1	48
	f	60	4	0	64
LDL-cholesterol	m	45	2	1	48
	f	62	1	1	64

TABLE 2. Lipid parameters distribution



GRAPH 1. Distribution of desirable, minimally elevated and high risk values of examined lipid parameters in healthy students

shown in Graph 1.

By examining the frequency of desirable, borderline and high values of certain parameters of lipid status, we found that the desirable cholesterol values were present in 90% of healthy young individuals, while marginally elevated levels were observed in 7.1% of respondents, roughly equally in both sexes (8.0 % of males and 6.4% of females). High-risk values were found in 2.7% of respondents (slightly more common in women (3.2% vs. 2%)). Serum triglyceride values were within the desirable range for 98.2% of the sampled examinees, except for two males (1.8%) where they were marginally higher. LDL-cholesterol was observed in the range of desirable values for 95.5% of students, the limit values of 2.7% (4% of men and 1.6% of women) and high-risk values were found in 1.8% of tested university students. The values of HDL-cholesterol levels were below 0.9 mmol/L with only one male subject.

5. DISCUSSION

Of all the states, which are so often associated with the abnormal lipid metabolism, the atherosclerosis is the most significant. It is a chronic disease of medium and large arteries, while the myocardial infarction and stroke pres-

ent the most common clinical complications. The researchers reviewed a lot of evidence about the relationship of blood lipids and coronary heart disease atherosclerotic (11, 12). The existence of fat lines in the walls of the aorta was found in children, three years of age, while a fatty streak and fibrous plaques were present in the coronal arteries of the researched subjects who were in the second decade of life (13, 14).

Our environment is characterized by the multitude of often irrational diets and increased numbers of overweight and obese people, all of which induced us to take a look at the research specificity of the lipid and lipoprotein status of the healthy young adults in our community. During our investigation it was noticed that the subjects with a minimum concentration of cholesterol (of 3.6 mmol / L in men and 3.2 mmol / L in women). Maximum values of 7.4 mmol / L in men and 6.7 mmol / L in women were found. The mean value of cholesterol in men was measured to be 4.5 mmol / L and in women 4.2 mmol / L. This study found the minimum concentration of triglycerides with 47 mmol / L in men and 0.27 mmol / L in women, the maximum concentrations of 2.22 mmol / L in men and 2.16 mmol / L in women, while the mean value was 1.15 mmol / L in men and 0.93 mmol / L in women.

The minimum value for LDL-cholesterol was 1.2 mmol /L for men and 1.06 mmol / L for women, the maximum value was 4.7 mmol / L for men and 4.5 mmol / L for women and the mean value was measured to be 2, 81 mmol / L for men and 2.41 mmol / L for women. Obtained mean values for HDL-cholesterol of 1.39 mmol / L for men and 1.49 mmol / L for women were found. The minimum values for HDL-cholesterol of 0.89 mmol / L for men and 0.94 mmol / L for women and the maximum values of 2.2 mmol / L for men and 2.25 mmol / L for women were measured. Compared to the similar tests of students in neighboring countries, mean cholesterol, triglycerides and LDL-cholesterol levels were slightly lower in our patients (15).

When we compared this study with the examination of healthy people in other countries, we found that students

in Japan, Spain and Finland had a more favorable lipid profile in relation to our students and lower levels of cholesterol and LDL-cholesterol (16, 17, 18, 19).

According to the U.S. recommendations and the expert group that made the guidelines for diagnosis and treatment of hypercholesterolemia in adults, the basic idea of this program was based on the measurement of the concentrations of cholesterol and HDL-cholesterol and the exclusion of individuals with varying degrees of risk for atherosclerosis. Research should be conducted in healthy subjects who are 20 years or older and it should be modified depending on degree of risk in order to apply more or less aggressive therapeutic measures. It is desirable that the concentration of cholesterol in serum are less than 5.2 mmol / L, because for all the concentrations mentioned above, the risk of atherosclerosis is beginning to grow. Limit values for cholesterol were 5.2 to 6.2 mmol / L and a higher risk of increased disease incidence for the examinees who had measured concentrations higher than 6.2 mmol / L. For triglycerides concentrations are desirable to be within 1.7 mmol / L, limit 1.7 to 2.25 mmol / L and elevated above 2.25 mmol / L. Target LDL-cholesterol levels were found to be at 3.4 mmol / L, the limit value of 3.4 to 3.9 mmol / L and high values are above 4.1 mmol / L. Limit value for HDL-cholesterol were 0.9 to 1,29 mmol/L (20).

By researching the frequency of desirable, borderline and high values of some parameters of lipid status, we found that among 112 respondents preferred value of cholesterol was found in 101 (90.1%), triglycerides 108 (96.4%), LDL-cholesterol 102 (91%) and HDL-cholesterol 111 in (99%) of students. The frequency deviation values of measured parameters of lipid status of the recommended desirable levels in our patients was relatively high, due to the fact that our researched subjects were chosen among the healthy young persons with a negative personal history in the direction of metabolism of lipids and lipoproteins.

6. CONCLUSION

Our research project study found a high incidence of metabolic disorders

of lipids and lipoproteins in healthy students of the University of Sarajevo. These results suggest the need to include laboratory diagnosis of lipid and lipoprotein disorders in a routine test as part of regular systematic examinations required of students.

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ORIGINAL PAPER

Role of Laboratory Diagnostic Medical Biochemistry Services -analysis of Requirements for the Laboratory Test in the Laboratory of Primary Health Care Center

Lejla Zunic¹, Armin Skrbo², Adlija Causevic², Besim Prnjavorac², Zekerijah Sabanovic³, Haris Pandza⁴, Izet Masic⁴

Faculty of pharmacy, University of Tuzla, Bosnia and Herzegovina¹

Faculty of pharmacy, University of Sarajevo, Bosnia and Herzegovina²

Faculty of medicine, University of Tuzla, Bosnia and Herzegovina³

Faculty of medicine, University of Sarajevo, Bosnia and Herzegovina⁴

Introduction: Laboratory diagnosis of medical biochemistry activity plays a significant role in the Primary Health Care Center (PHCC), dominated by Family medicine and diagnostic services. Medical biochemical diagnosis has a visible place at all levels of health care, which shows the number of requests for laboratory diagnosis, number and type of required laboratory tests. **Materials and methods:** The study included 1000 requests for laboratory tests at the PHCC in Gracanica in primary health care units. We made an analysis of the most common laboratory tests in the requests by doctors from primary health care based on requests for laboratory diagnosis. **Results:** The requests of primary health care units in PHCC laboratory tests are required at all levels of service: urine, WBC, SE, glucose, total bilirubin, ALT, AST, AF, CK, cholesterol, HDL cholesterol, triglycerides, creatinine, urea, uric acid, CRP, fibrinogen, calcium and phosphorus. The following requirements are the most common laboratory tests with 94% representation: urine, WBC, glucose, cholesterol, triglycerides, aminotransferases, creatinine, and urea. In 1000 requires was required total of 5333 laboratory tests. Test requirements of a general practice make 44, 1%; FM doctors account for 40% and the requirements of other specialists (pediatricians, gynecologists and specialists of occupational medicine) are 15, 3%. The doctors in family practice most often required: glucose, urine, WBC, SE, TGL. , Chol., ALT, AST, creatinine and urea. General practitioners are demanding more cholesterol and triglycerides, a family medicine doctors are demanding lower cholesterol and triglycerides and higher CRP, fibrinogen, total bilirubin, ALT, AST, and other specialists the most demanded urine and WBC. **Discussion:** Laboratory diagnosis is a common diagnosis, which shows the representation of required number and type of laboratory tests. In requirements of PHC units in PHCC laboratory tests are required at all levels of service: urine, WBC, SE, glucose, bilirubin, ALT, AST, AF, CK, cholesterol, HDLchol., triglycerides, creatinine, urea, uric acid, CRP, fibrinogen, calcium and phosphorus. The following requirements are the most common laboratory tests at the primary level: urine, WBC, glucose, cholesterol, urea, and found the secondary level of triglycerides, aminotransferase, creatinine that is not an adequate distribution of the

index levels and did not clear the number of searches required by the standards and norms of PHC. **KEY-WORDS:** LABORATORY DIAGNOSIS, DISEASE MANAGEMENT, ECONOMIC ANALYSIS.

Corresponding author: ass. Lejla Zunic, PhD. Health center Gracanica. E-mail: tema.in@bih.net.ba.

1. INTRODUCTION

Medical biochemical diagnosis is software that allows useful information to assist in understanding, selecting and interpreting laboratory tests. It has a useful role in identifying health problems. But has a great impact on the operations, efficiency and organization of laboratory. Due to the fact that the laboratory diagnosis is always available and provides many services to large numbers of service users of different status, it is in the interest of the user that the laboratory diagnosis provides a greater range of search and the number of unnecessary tests is reduced to a minimum. In organization of family medicine, medical-biochemical laboratory (MBL) diagnosis is defined as a branch of diagnostic services and primary health care to FM and the MBL acting as a team in providing health care users for which there must be constant communication. Basically the require-

ment for laboratory testing methods and means of communication by doctors and the results of laboratory tests of MBL. But making the results of laboratory tests is a series of actions: a) preparation of preanalytical includes reception and identification of users and their required laboratory tests, collecting and sorting material by testing. b) Analytical processing of biological material samples for laboratory tests to ensure the preparation of daily activities: to provide and prepare the equipment, reagents, and appliances. Routine analytical results precede the development of: calibration and control of apparatus, method, process and quality control in laboratory. Only satisfied after review of the procedures followed index of control samples. After validating the results of daily quality control in the laboratory and satisfied these criteria can be an analytical review of laboratory samples of user services that require specific expertise, effort, and unappreciated risk. For all are needed great financial resources (1, 2). This is evident in the economic analysis where laboratory tests are valued with a score of: Search by type and material resources expended for analytical examination. These technical, financial and technical performances of laboratory medicine are not appropriately classified as blatant as that in other industries, technology and other primary health care (PHC) and family medicine (FM). World Health Organization (WHO) in its key action program "Health for All" in the 21 century, as necessary to emphasize the education of health personnel (3, 4, 5, 6).

Assessment of medical laboratory technology to be implemented within the interdisciplinary team including: manufacturers of laboratory technology, employees in the laboratory, financiers of health care, patients, doctors by using an explicit analytical index (7).

This contributes to improving health care, especially in supporting development and regeneration of a wide range of standards, guidelines and other aspects of health care (8, 9, 10).

2. MATERIAL AND METHODS

The study included a total of 1000 respondents. All subjects were users

Doctor	General practice	Family medicine	Specialists
No. of requests	422	375	203

TABLE 1. The number of required laboratory diagnosis by doctors

of primary health care at the PHCC Gracanica (Tuzla Canton) in primary health care units have received requests for laboratory diagnosis. This paper is an analysis required for the laboratory diagnosis by physicians, analysis of laboratory tests in the representation of the requirements for the laboratory diagnosis by doctors in the PHCC MBL. We made an analysis of the most common laboratory tests on the basis of requests for laboratory diagnosis by doctors from primary health care. For the statistical analysis used the Student t test and Chi square test.

3. RESULTS

General practitioners and family medicine doctors have a great need for laboratory diagnostics, which shows frequent request for laboratory diagnostics, or the number and type of laboratory tests by physicians.

3.1. The share of requirements for the laboratory diagnosis by doctors

Users of medical and biochemical diagnostics (patients) requests (referrals) for laboratory tests obtained from a doctor of family medicine (FM), general practitioner (GP) and other specialists in the PHCC: pediatricians, gynecologists, and specialists in occupational medicine. Family Medicine doctors have residency in family medicine or another specialty with additional training in family medicine. Family Medicine doctors referred for laboratory diagnosis 375 (37.5%) patients. General practitioners referred 422 (42.2%) patients. Pediatric specialists, gynecologists and specialists in occupational medicine referred 203 (20.3%) patients for laboratory diagnosis.

If we take into account the diversity of doctor of education we see that the largest percentage of patients is referred by general practitioners (42.2%), followed by family medicine physicians (37.5%) and eventually other specialists in primary health care (20, 3%). There was no statistically significant difference in the number of requirements by physicians at the outpatient clinic from family practice clinics of general prac-

tioners and family medicine.

3.2. Laboratory tests in diagnosis required within PHCC

The prevalence and types of tests in laboratory diagnostic requirements in the PHCC Gracanica is shown in Table 2. In 1000 requests for laboratory tests there was a total of 5333 represented a variety of laboratory tests: urine, ESR, CBC, glucose, total cholesterol, HDL cholesterol, triglycerides, total bilirubin in the blood, aminotransferase (ALT, AST), alkaline phosphatase (AF), urea, creatinine, Acidum uricum (Urica), fibrinogen, CRP, serum calcium, phosphorus in serum GGT and CK.

Test	No.of tests	%
SE	551	10.3
WBC	747	14.0
GLUCOSE	748	14.0
CHOL	451	8.5
HDL CHOL	35	0.7
TGL	448	8.4
UREA	258	4.8
CREAT	357	6.7
URICA	30	0.5
TBIL	47	0.9
ALT	358	6.7
AST	358	6.7
AF	44	0.8
FIBRINOGEN	49	0.9
CRP	44	0.8
Ca	31	0.6
P	29	0.5
GGT	4	0
CK	1	0
Urine	743	13.9

TABLE 2. Representation of the number and types of tests in the requirements

Table 2 presents the required individual tests, the total number in 1000 requires the percentage representation of individual tests in the total number of required tests in 1000 requires for the laboratory diagnosis. In the requirements is represented a total of 5333 laboratory tests. Percentage of required laboratory tests in individual requirements of all the teams of doctors involved in the health care system was in this order: glucose (14%), WBC (14%), urine (13.9%), SE (10.3%), total cholesterol (8.5%), triglycerides (8.4%), aminotransferase (ALT, AST 6.7%), creati-

Tests	
Total	5333
General practice	2348(44%)
Family medicine	2167(40.7%)
Specialists	818(15.3%)

TABLE 3. Representation of tests by type of physician

nine (6.7%), urea (4.8%), Tbil. (0.9%), fibrinogen (0.9%), CRP (0.8%), AF (0.8%), HDL cholesterol (0.7%), serum calcium (0.6%), phosphorus in serum (0.5%), Acidum uricum (0.5%).

Mostly were required the following laboratory tests in the requests of doctors from PHCC: glucose, WBC, urine, SE, lipids, transaminases, creatinine and urea in the 94% required.

Figure 1 is the view that the highest percentage of representation of individual laboratory tests in the requirements of physicians in the outpatient clinic of a total of 5333 search is in this order: glucose (14%), WBC (14%), urine (13.9%), SE (10.3%), lipids (8.5%), transaminases, creatinine (6.7%).

3.3. Representation of the test requirements of doctors in the PHCC

Requirements for the laboratory diagnosis by physicians vary in the number of tests. For 1000 patients was required a total of 5333 laboratory tests. The overall prevalence of tests by doctors is shown in Table 3.

Since 5333 is the total number of tests 2348 tests or 44% was required by general practitioners. Family Medicine doctors requested 2167 tests or 40.7%, and other specialists have demanded 818 tests, or 15.3%.

3.4. Representation of the number and type of laboratory tests by doctors in the PHCC

In 1000 requests for laboratory tests from a doctor of family medicine, general practitioners and specialists: pediatricians, gynecologists and specialists in occupational medicine are required various laboratory tests. The requests by the doctors are different in number and % distribution of laboratory tests.

In Table 4 is shows a representation of laboratory tests in the requirements, from general practitioners, doctors of family medicine and other specialists in PHCC Gracanica.

The requests of family practice doctors in the % is nearly equal represen-

tation of most requested search: NE, WBC, urine and glucose.

When we look at the distribution of the required search for doctors, it can be concluded that the requirements vary. Thus, the requirements for the SE and HP at the same level

of representation at general practitioners and family medicine physicians. In doing so, the requirements related to HP and urine findings significantly higher in specialists compared with other groups of doctors. It is interesting to note that the lipid profile in patients rarely require much by FM doctors in relation to general practitioners. Specific laboratory tests such as CRP and fibrinogen are present in the double greater extent in family medicine doctor.

3.5. Representation of the most common tests in the requests of doctors in the PHCC

The highest incidence of tests which are usually required: glucose, WBC,

urine, SE, lipids, creatinine, ALT, AST and is shown in Table 5.

Percentage of most commonly requested search was extensive, and % is almost identical to the requirements in the order: glucose, WBC, urine, SE,

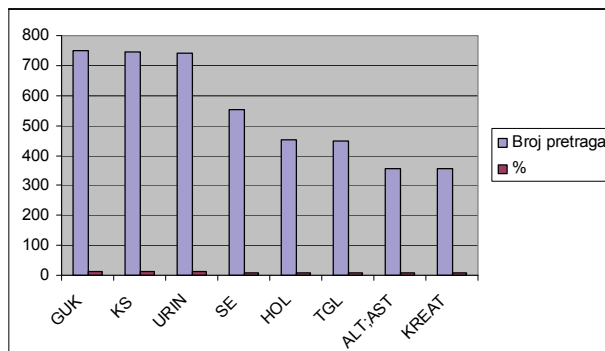


FIGURE 1. Representation of the number and types of tests in the requirements within PHCC

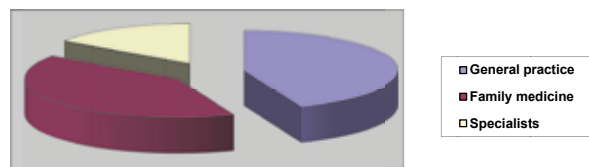


FIGURE 2. Representation of tests by type of physician 1000 requires laboratory diagnosis had 5333 tests.

lipids, creatinine, ALT, AST of all doctors in the outpatient clinic, which was one of the expected results. Represent-

Test	General practice		FM		Specialist	
	No.of tests	%	No.of tests	%	No.of tests	%
SE	231	9.8	225	10.4	95	11.6
WBC	305	13	276	12.7	166	20.3
Glucose	341	14.5	292	13.5	115	14
CHOL	226	9.6	189	8.7	36	4.4
HDL CHOL	27	1.1	5	0.2	3	0.4
TGL	227	9.6	187	8.7	34	4.2
UREA	117	5	115	5.3	26	3.2
CREAT	165	7	130	6	62	7.6
URIC	7	0.3	20	0.9	3	0.4
TBIL	13	0.5	29	1.3	5	0.6
ALT	152	6.8	161	7.4	45	5.5
AST	152	6.8	160	7.4	46	5.5
AF	19	0.8	17	0.8	8	1
FIBRINOGEN	11	0.5	36	1.6	2	0.3
CRP	13	0.5	22	1	9	1.1
Ca	14	0.5	14	0.6	3	0.4
P	12	0.5	13	0.6	4	0.5
GGT	1	0	3	0.1	0	0
CK	0	0	0	0	1	0.1
Urine	315	13.4	273	12.6	155	18.9
Total	2348	44.1	2167	40.6	818	15.3

TABLE 4. Representation of the number and % of laboratory tests by doctors

Test	General practice	FM	Specialist			
	No.of tests		%	No.of tests	%	No.of tests
GLUCOSE	341	14,5	292	13,5	115	14
Urine	315	13,4	273	12,6	155	18,9
WBC	305	13	276	12,7	166	20,3
SE	231	9,8	225	10,4	95	11,6
CHOL	227	9,7	189	8,7	36	4,4
CREAT	165	7	130	6	62	7,6
ALT;AST	152	6,5	161	7,4	45	5,5

TABLE 5. The prevalence and types of the most requested search of doctors in the PHCC

Test	Glucose	Urine	WBC	SE	Chol; tgl.	ALT; AST
Total	341	315	305	231	226	152
%	80	75	72	55	54	36

TABLE 6. Representation of the most common tests in the requirements of general practitioners

Test	Glucose	Urine	WBC	SE	Chol; tgl.	ALT; AST
Total	292	276	273	225	189	161
%	78	74	73	60	50	43

TABLE 7. Representation of the most common tests in the requests of family medicine doctors

Test	WBC	Urine	Glucose	SE	ALT; AST	Chol; tgl.
Total	166	155	115	95	46	36
%	81	76	57	47	18	22,3

TABLE 8. Representation of the most common tests in the requirements of other specialty physicians

tation of the most common tests in the requirements of general practitioners

General practitioners after examination of patients in family medicine clinics required 2348 laboratory tests and to the representation of the order the following tests: glucose, urine, WBC, SE, TGL, Chol, ALT, AST, etc.

From general practitioners in 422 requires for a laboratory diagnosis was required the most common test in percentage: 80% glucose, urine 75%, HP 72%, 55%, lipids 54% and 36% of transaminases. SE, WBC, glucose, lipid profile and urine were the most frequently found in the requirements of general practitioners in 54-80% required.

Representation of the most common tests in the requests of family medicine doctors Family medicine doctors after examination of patients in family medicine required 2167 tests and to order the following tests: glucose, WBC; urine; SE, Chol, TGL, ALT, AST, etc.

In the 375 requires a laboratory diagnosis from a doctor of family medicine required the following tests, in percentages: 78% glucose, urine 73%, HP 74%, 60%, lipids 50% and 43% of transaminases. SE, WBC, glucose, lipid profile and urine tests in the presence of requests of family medicine doctors in

50-78% required. From the laboratory diagnosis requires is not noticed a significant difference in the requests by family medicine physicians and general practitioners in the requirements for the search: SE, glucose, WBC, urine, serum lipid, ALT and AST. Representation of the most common tests in the requirements of other specialty physicians in the outpatient clinic. The doctors of other specialties are required 818 tests and to order the following tests: WBC; urine glucose, SE, creatinine, ALT, AST, Chol; TGL etc. In the 203 requires for a laboratory diagnosis is required percentage of 57% glucose, urine - 76%, WBC - 81%, SE - 47%, ALT/AST (transaminase) - 18%, lipids - 22,3%. WBC, blood glucose and urine tests in the presence of other requirements of physicians in specialty outpatient clinic in 57-81% required. The doctors of other specialties except family medicine specialist at the outpatient clinic have a different order and representation of tests by specialty which can be seen from the requirements of laboratory diagnosis.

4. DISCUSSION

Laboratory diagnosis is important and common diagnosis which shows the representation of requires the num-

ber, types of laboratory tests. In requirements of PHC units in PHCC laboratory tests are required at all levels of service: urine, WBC, SE, glucose, bilirubin, ALT, AST, AF, CK, cholesterol, HDLchol., triglycerides, creatinine, urea, uric acid, CRP, fibrinogen, calcium and phosphorus. The following requirements are the most common laboratory tests at the primary levels: urine, WBC, glucose, cholesterol, urea, and found the secondary level of triglycerides, aminotransferase, creatinine that is not an adequate distribution of the index levels and did not clear the number of searches required by the standards and norms of PHC. The requirements of GPs are 44, 1%; FM requests doctors make up 40% and the requirements of other specialists (pediatricians, gynecologists and specialists in occupational medicine) are 15, 3%. A similar percentage share index in family practice: general practitioners and family medicine physicians.

Representation of the most common tests by doctors demonstrates the need for request, and the frequency of use of MBL. The doctors in family practice, requested in this order: glucose, urine, WBC, SE, TGL, Chol, ALT, AST, creatinine and urea 94% required. General practitioners are demanding more cholesterol and triglycerides, a family medicine doctors are demanding lower cholesterol and triglycerides and higher CRP, fibrinogen, total bilirubin, ALT, AST. Other specialists are the most demanded and urine WBC. General practitioners are the views of patients in family medicine most demanded in a row the following tests: glucose, urine, WBC, SE, TGL, Chol, ALT, AST% proportion of 36-80%.

Doctors in family medicine (FM) after examination of the patient in family medicine the most demanding order the following tests: glucose, WBC; urine, SE, Chol, TGL, ALT, AST, with the proportion of 43-78%. Other specialty doctors in primary health care are the most demanded in a row the following tests: WBC; urine; the proportion of 76-81%.

Laboratory diagnosis of PHC in the PHCC because it is a comprehensive diagnosis of a multidisciplinary nature, without any special preparation,

ordering and the result is obtained immediately. It is a great representation of laboratory tests, but the number and type of laboratory tests done in the biochemical-hematological laboratory of the PHCC Gracanica. In our study, a total of 1000 requests for an analytical laboratory diagnosis found 5553 tests.

But the fact is that the requirements for the laboratory diagnosis are continuously increasing. Due to the increased volume of work needs to establish criteria of feasibility and the effect of tests. Each diagnostic test should be analyzed from the aspect of effectiveness, or to determine its efficacy and safety as stated in the accreditation standards for PHCC. Family medicine doctors often require extensive medical services of the biochemical laboratory (MBL), although teams of family medicine clinics in FM with the existing equipment can do certain tests. In all types of doctors in family practice can be concluded that all patients in the study population is large requiring laboratory tests it is necessary to apply the analysis: effectiveness and cost of gain and efficiency, and minimization. Demand for laboratory diagnosis and often contains over 10 tests. The user often has repeated a request is identical to previous findings did not take. But it is efficient to do the analysis now required when search results have utility in the state of health and healing.

Using self-control, self-discipline or self-criticism both of the patient and doctor laboratory diagnosis can and must be in the future developed and applied. Because development of the laboratory with plenty of activities offered laboratory tests, but also a good selection and interpretation of results, with a series of still other factors can be continuously used in the prevention, diagnosis and therapy. In studies of this type of account can be taken and the concept of contingent evaluation (CV) as a measure of willingness by individuals or groups: labor organizations for systematic, periodic preventive examinations in pilot projects. Analyses of this kind and such determination HgA1C; markers of hepatitis B, C can be difficult to determine the profits: from improving health to prevent epidemics of infectious and noninfectious diseases today

such as metabolic syndrome, a profit is often the quality of life or QALY (Quality adjusted life years). This analysis applies, for example the value of prevention, systematic review of laboratory in improving the quality and survival of patients diagnosed. Usability (utility) is the basis for evaluating the application of results of laboratory diagnostics in preventive examinations. When utility analysis results can be expressed in obtaining a healthy health care users. "Better safe than sorry." But using the test protocol can be obtained faster and more cost-effective result. For reasons of transparency and harmonization of economic analysis and the term should be adopted guidelines for the implementation of some analysis, especially for cost-effectiveness analysis, as the most complete.

The analysis of the indicators that have been unduly almost routinely require e.g. urine, blood glucose, WBC, SE, cholesterol, triglycerides, creatinine, urea, AST, ALT, Ca. Here it is necessary to establish criteria for requesting supplemental index with clear guidelines for laboratory team with the irrationality of suffering and great valued and depreciated and effort and risk. One can question the need or require unnecessary to request certain laboratory tests.

5. CONCLUSION

Extensive request for laboratory diagnosis becomes an obstacle for small laboratories as well as those provided for in family medicine. Worldwide, there have been changes in the organization of laboratories to convert these units into the family medicine centers for the samples that are to be processed at larger laboratories. Family medicine and laboratory professionals need to be connected and work together. With this concept, laboratory professionals will be able to participate and realize their role in the care of patients. The role is that it so good with the cooperation of the patient, doctor of family medicine and health management is a high-quality health care.

In today's system of organization of health in the Federation B&H, much is told but there are few studies that take into account the need for reform of

MBL as an important segment of health care, and that there have not compromised the health care system and the implementation of the quality of health care. In creating the model of health care, i.e. treatment, diagnosis, where among other things, emphasizes the effect today, must be involved people from the profession that carry teams of biochemistry laboratory activities.

We should strive for efficiency in use of laboratory tests in family medicine, in the health care with the new organization:

- Availability of laboratory services closer to users,
- Utilization of sophisticated technology and knowledge,
- To define standards and guidelines based on evidence.

All this requires an organized communication where the patient is the focus of a unit: FM, MBL and management of health that are bound into a unified information system of health care, including, also, System of biomedical scientific information (10).

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ORIGINAL PAPER

The Impact of Acute Myocardial Infarction on Left Ventricular Systolic Function

Dardan Koçinaj¹, Aurora Bakalli¹, Masar Gashi¹, Luljeta Begolli¹, Merita Berisha², Allma Koçinaj¹, Blerim Berisha¹, Xhevdet Krasniqi¹.
University Clinical Centre of Kosovo, Prishtina, Republic of Kosovo¹
National Institute of Public Health of Kosovo, Prishtina, Republic of Kosovo²

Background. During acute myocardial infarction left ventricular systolic function is an important prognostic factor whose worsening is still frequent despite the therapeutic approach. We aimed to estimate the incidence of left ventricular systolic dysfunction among patients experiencing acute myocardial infarction. **Methods.** The study involved 154 consecutive patients admitted at Coronary Care Unit. The study design was based upon the collection of patient histories, clinical examination and other complementary tests. **Results.** In overall study population, predominantly with male gender, the incidence of left ventricle systolic dysfunction was 42.3%, which correlated with myocardial damage, electrocardiography changes, myocardial enzymes, and myocardial wall motion. **Conclusions.** Transthoracic Echocardiography represents a valuable tool and left ventricular ejection fraction should be evaluated in all patients experiencing acute myocardial infarction since the incidence of left ventricular dysfunction in patients with Acute Myocardial Infarction remains relatively high. **KEY WORDS:** ACUTE MYOCARDIAL INFARCTION, LEFT VENTRICLE FUNCTION, ECHOCARDIOGRAPHY.

Corresponding author: Koçinaj Dardan, MD. University Clinical Centre of Kosovo Rrethi i Spitalit p.n. 10000 Prishtina, Republic of Kosovo. Tel. +37744312144. Fax. +38138556562. e-mail: dall_k@yahoo.com

1. INTRODUCTION

The assessment of left ventricular function following acute myocardial infarction (AMI) has been shown in many studies to give important prognostic information as well as helping to guide therapeutic intervention. Although Wall Motion Score Index (WMSI) assessed by echocardiography is a relatively easily obtained marker of global left ventricular (LV) dysfunction, a greater degree of wall motion abnormality must take place before a lower ejection fraction (EF) occurs. Several studies have shown that WMSI correlates well with LV EF and some have directly compared it in the assessment of prognosis after myocardial infarction (1).

Patients with AMI who have diabe-

tes have an increased risk of death. It has also been shown that undiagnosed glycemic abnormalities are common in patients with an acute myocardial infarction, which are detectable early in the post infarction period. These disorders in the early phase of an acute myocardial infarction could be used as early markers of high-risk patients (2). Nevertheless, the issue of whether glucose concentrations below the diabetic threshold may be predictive of increased cardiovascular risk has not yet been fully elucidated. Some findings suggest the increased mortality rate among nondiabetic coronary patients with impaired fasting glucose (3) known as a direct and independent risk factor. The mechanisms are attrib-

uted in the production of free radicals, which favours the development of an endothelial dysfunction (4, 5). Also, on the other hand, the risk of acute coronary events is significantly increased and is similar to that of patients without diabetes who have already had a myocardial infarction. Nowadays diabetics are accounting for a greater proportion of the global population, increasing the number of hospital admissions, being at heightened risk of heart failure, cardiogenic shock and death (6).

On the other hand, among other laboratory parameters, although there is an evidence of increase in the number of white blood cells, still few data exist about the relationship of circulating granulocyte-macrophage colony stimulating factor and some soluble adhesion molecules to the severity of AMI and the pathophysiological events of post-infarction LV dysfunction (7).

Some other techniques, as quantitative analysis of color kinesis images, provide easy information of endocardial excursion, enabling fast, objective and more accurate evaluation of LV regional wall motion (8). The main aim of our study was to estimate the incidence of LV systolic dysfunction among patients experiencing acute myocardial infarction. We also had a purpose to determine the most exposed gender, age, previous related diseases, and early in-hospital mortality. Finally we aimed to evaluate the relationship between extension of myocardial damage at ECG, myocardial enzymes, WBC and myocardial regional contractility involvement.

2. MATERIALS AND METHODS

2.1. Population

This cross sectional prospective study involved 154 consecutive patients aged <75 years admitted at Coronary Care Unit of our Institution for Acute Coronary Syndromes and treated by noninvasive management protocol.

2.2. Study design

The study design was based upon the collection of patient histories, clinical examination and laboratory data, the ECG, and the transthoracic echocardiography.

2.3. Diagnostic criteria

Acute myocardial infarction (AMI) was defined by elevated cardiac markers associated with more than one of the following characteristics: symptoms of myocardial ischaemia, development of ST-T abnormalities considered of ischaemic origin, and/or development of new Q waves. Hypertension and/or Diabetes mellitus were reported either if a patient had a history of the disease or documented an ongoing treatment. Previous Myocardial Infarction was encountered by previous history, documentation or present ECG.

2.4. Transthoracic echocardiography

All patients underwent conventional transthoracic echocardiography using commercially available equipment (Phillips iE 33). Transthoracic echocardiographic (TTE) examinations and measurements were performed with the subject in the left lateral decubitus position, according to the recommendations of the American Society of Echocardiography (9). Left ventricular end-diastolic/end-systolic diameters, wall (septal and posterior) thickness have been measured from parasternal M-mode recordings according to standard criteria.

Left ventricular ejection fraction (EF%) was determined from apical views with a modified Simpson’s rule. Left ventricle systolic function was considered impaired if ejection fraction <45 %. Assessment of wall motion abnormalities (WMA) was made according to the recommendation of AHA Writing Group on Myocardial Segmentation and Registration for Cardiac Imaging (2002). WMSI was derived by grading the wall motion of individual myocardial segments (motion and systolic

Modalities	N	%
M	99	64.3
Average age±SD	61.4 ±11.8	
Hypertension	48	31.2
Diabetes mellitus	31	20.1
Previous MI	14	9.1
AMI non anterior	67	43.5
Early In-Hospital Mortality	9	5.8

TABLE 1. Basic Characteristics of the Study Population

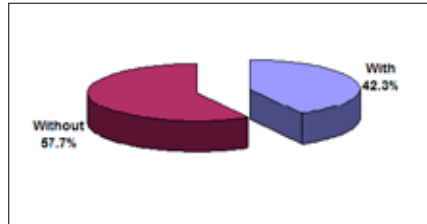


FIGURE 1. Left ventricular systolic dysfunction among the analyzed patients

thickening) and dividing the total score by the number of analyzable 17-segments (9, 10). The function of each segment was confirmed in multiple views. Segment scores were as follows: normal or hyperkinesis =1, hypokinesis = 2, akinesis (negligible thickening) = 3, dyskinesis (paradoxical systolic motion) = 4 and aneurysmal (diastolic deformation) = 5.

2.5. Statistical analyzes

Collected data were analyzed, presented by tables and figures, statistical parameters (mean, SD, etc.) were calculated and tested. These data are discussed with relevant data from the references. Correlation between variables was calculated using Person correlation test. P value < 0.05 was considered of statistical significance.

3. RESULTS

3.1. Basic demographic data of the study population

Total number of the examined population was 154 with a mean age 61.4 (±11.8) years. Male gender was predominant in our overall study population, accounting 64.3%. All the patients were diagnosed as acute myocardial infarction. Around one third of them (31,2%) had arterial hyperten-

sion, 31 (20.1%) had diabetes mellitus and 9.1% had previously suffered a myocardial infarction.

Based on electrocardiography, the acute episode of myocardial infarction appeared to happen mostly in the anterior left myocardial wall, while the non anterior AMI was found on 43.5% of this population. The early In-hospital mortality occurred on 9 (5.8%) out of the patients included in the study, (Table 1) two of them where diabetics with LV systolic dysfunction.

3.2. Impaired left ventricle systolic function

In overall study population, predominantly with male gender, the incidence of left ventricle systolic dysfunction was 42.3%. (Figure 1).

The average value of ejection fraction of all analyzed patients was 49.4±9.5%. In patients with low ejection fraction, nine of them were diabetics, whereas three of them have ended up fatally.

3.3. Correlation of several parameters of our study population

There was a significant high correlation $r=0.87$, $p<0.001$ between left ventricle ejection fraction and WMSI, and a negative medium correlation $r=-0.4$, $p<0.001$ between left ventricle ejection

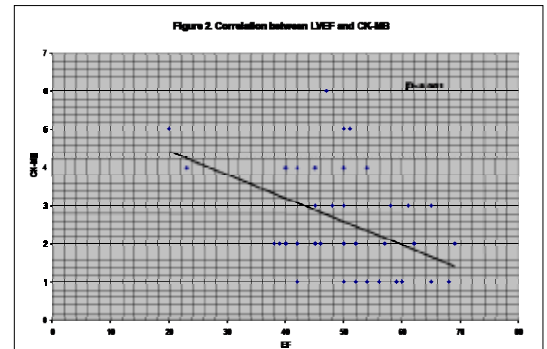


FIGURE 2. Correlation between LYEF and CK-MB

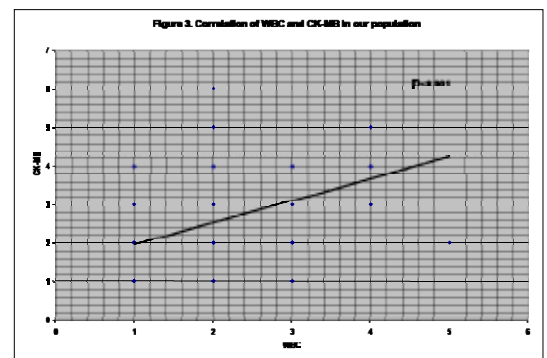


FIGURE 3. Correlation between WBC and CK-MB in our population

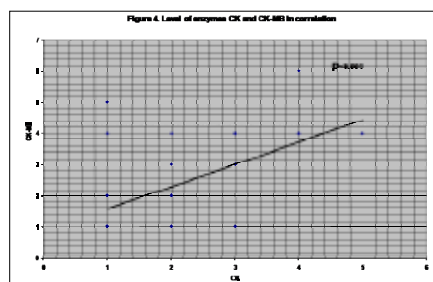


FIGURE 4. Levels of enzymes CK and CK-MB in correlation

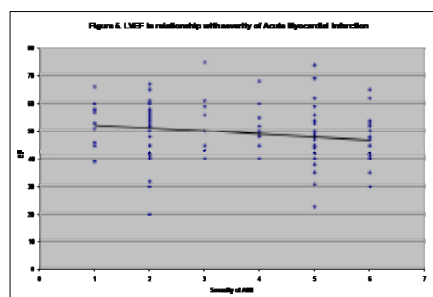


FIGURE 5. LVEF in relationship with severity of Acute Myocardial infarction

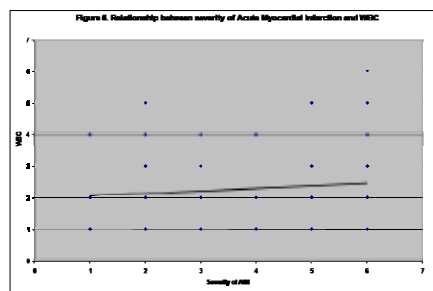


FIGURE 6. Infarction and WBC Figure 6. Relationship between severity of Acute Myocardial and WBC

fraction and CK-MB. (Figure 2). Opposite same correlation $r=0.4$, $p<0.001$ has been found between WBC and CK-MB (Figure 3), while a significant correlation, $r=0.7$, $p<0.001$ of CK and its isoenzyme CK-MB. (Figure 4). A negative low correlation was found between LVEF and severity of AMI. The latter had also low correlation with WBC. (Figure 5 and 6).

4. DISCUSSION

The risk of heart failure is particularly high in diabetic patients with MI and was the most common cause of death, also reported in the DIGAMI (Diabetes mellitus Insulin-Glucose infusion in Acute Myocardial Infarction) study (11, 12). One fifth of our population had diabetes but there was no difference in term of impaired left ventricular function related to the rest of study group, but still there is evidence of relatively aged population even with

history of previous MI which also increases the risk of post AMI complications comparable to diabetes. On the other side, Parissis et al. reported a significant elevation, with the highest values, of plasma GM-CSF and soluble adhesion molecules, in patients with AMI complicated by heart failure manifestations. Though, they may contribute to the pathophysiology of the disease and post-infarction cardiac dysfunction (7). Our data relied on a single value of WBC, which in general showed a low correlation with severity of AMI based on ECG changes, but still a good correlation to CK-MB isoenzyme. WMSI as an easily measurable marker of LV function closely correlates with EF post AMI. A closer correlation is reported for anterior infarctions before discharge. WMSI of 0.6, 0.8, and 1.1 correspond best to EF 45%, 40%, and 35%, respectively based on RNV (radio-nuclide ventriculography) (1). Our data suggest a significant high correlation of those two parameters.

5. CONCLUSIONS

The incidence of left ventricle dysfunction in patients with Acute Myocardial Infarction remains relatively high. Heart failure commonly complicates acute myocardial infarction in patients with diabetes. The level of myocardial injury correlates with development of left ventricular failure and regional contractility involvement. Trans-thoracic Echocardiography represents a valuable tool and left ventricular ejection fraction should be carefully evaluated in all patients experiencing acute myocardial infarction. At present prevention of myocardial infarction remains the main management goal for protecting people with diabetes from the risk of heart failure.

STUDY LIMITATION

Limitation of the present study is the relatively small study group and no repetition of Echocardiography study. ABBREVIATIONS: AMI- Acute Myocardial Infarction, WMSI- Wall Motion Score Index, LV- Left Ventricle, EF- Ejection Fraction, CCU- Coronary Care Unit, ECG- Electrocardiography, WBC- White Blood Cells, TTE- Trans-thoracic Echocardiography, WMA- Wall Motion Abnormalities, CK-MB- Creatine Kinase- MB isoenzyme, CK- Creatine Kinase, DIGAMI- Diabetes mellitus Insulin-Glucose infusion in Acute Myocardial Infarction, GM-CSF- Granulocyte-Macrophage Colony Stimulating Factor, RNV- Radionuclide Ventriculography

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ORIGINAL PAPER

Influence of Clonidine on the Chemodynamic Stability and Stress Response in the Course of Surgery on General Anesthesia

Merlina Kalajdzija¹, Ibrahim Cero², Besim Prnjavorac³, Senad Ljuca²,

Department of Anesthesiology, Intensive care and Treatment of Pain, Cantonal Hospital Zenica, Bosnia and Herzegovina¹

Department of Surgery, Cantonal Hospital Zenica, Bosnia and Herzegovina²

Department of Internal Medicine, General Hospital Tesanj, Bosnia and Herzegovina³

This work provides results of therapeutic efficacy testing and clonidine toleration in moderating of perioperative tachycardia and hypertension, as well as reducing the needs for anaesthetic drugs, thus providing better patients' cardiovascular stability. **Material and methods:** The study involved 60 patients, that were subdued to elective non-cardiosurgical operations in general anaesthesia. One half of the patients was administered the Clonidine, 0,2µg/kg/min in solution, while the other half served as a control group. **Results:** of the study it was evident that the Clonidine group had considerably less stress response, which was shown through variation of cortisol levels during operation, glycemyl levels and vital parameters. There was a statistically significant difference ($p < 0,001$) in cortisol serum levels and glycemyl between these two groups. Complications during anaesthesia were fewer in the Clonidine group, and the consumption of anesthetic drugs was also lower. **Conclusion:** Clonidine effects were favourable during anaesthesia. **KEY WORDS:** α_2 -AGONISTS, CLONIDINE, ANESTHESIA, FENTANYL, BLOOD PRESSURE, HEART RATE, HYPERTENSION, TACHICARDIA.

Corresponding author: prof Besim Prnjavorac, MD, PhD., General Hospital Tešanj, ul. Brace Pobic 17, 74260 Tešanj, Bosnia and Herzegovina. E-mail pbsim@bih.net.ba. Tel: 0038732656300, Mobil 0038762166850

1. INTRODUCTION

Of all the relevant components constituting a neuroendocrine response to the pre-operative trauma, the most important one is catecholamine, or sympathoadrenaline response to the surgical stimulation (1). Measuring the concentration of the catecholamine during an anaesthesia and surgery showed that the cardiovascular responses to stress (hypertension and tachycardia) are primarily caused by the increased levels of adrenaline in the plasma and the locally increased levels of noradrenaline in synapses (2).

By following of the concentration of the stress hormones during the administration of various anaesthetic agents it

has been established that the inhaled anaesthetics lower the base secretion of catecholamine, but not the sympathoadrenal response to the surgical stimuli and the opiates given before the commencement of the surgery, and partially lower the secretion of the catecholamine, but not if administered later.

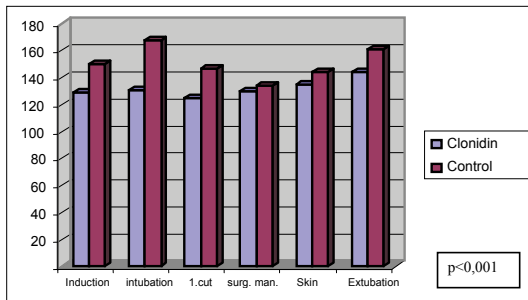
Clonidine is a prototype of α_2 agonist medicines, where its basic effect is sympatholytic and it is therefore traditionally administered as an antihypertensive agent. The most recent scientific studies discovered its sedative, anxiolytic and analgetic effects also, which lower the level of the necessary anaes-

thetic agents, which makes the interest for clonidine, as a potential agent in clinical anaesthesia, justified. The same studies also showed that Clonidine lowers the stress response before and after the surgery and it causes lesser oxygen consumption, which is indicative of the sympathetic activation, and at the same time it lowers the risk of myocardial ischaemia. However, the administration of clonidine, as an anaesthetic adjuvant remains the subject of additional research.⁶

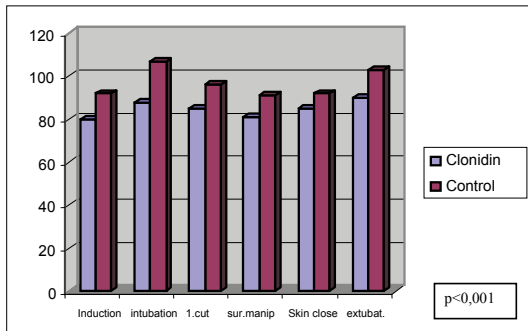
2. PATIENTS AND METHODS

This prospective study and research covered sixty (60) patients ASA I and II (American Society of Anaesthesiology), ages ranging between 30 and 60, of both sexes. Patients were prepared for the elective general surgery, gynaecology and orthopaedics.

Patients were, arbitrarily, divided into two groups; group A – Clonidine and group B – control group. One half of the patients, 30 of them, received Clonidine and the remaining half or 30 patients in the control group received physiological solution. Both groups were comparable based on sex, average age and body mass. The study did not include patients with complicated organ ailments, which could in any way compromise their cardiovascular function. Thirty minutes prior to anaesthesia Clonidine was administered to the assigned group with the speed of 0,02 ml/kg/min. This speed does not change ba-



GRAPH 1. Changes in systolic pressure during the course of the surgery (mmHg)



GRAPH 2. Changes in diastolic pressure during the course of the surgery (mmHg)

sic cardiovascular parameters for more than 10%. At the same time the control group received an infusion of the physiologic solution with the same speed. To all patients the same anaesthetic procedure was used, in accordance with the standard protocol. In case of increased heart frequency, systolic or diastolic blood pressure for more than 20% in relation to the pre-induction values an i.v. bolus of Fentanyl 2 µg/kg was administered. In case of decreased heart rate for more than 20 % in relation to the pre-induction values, during the surgery, an i.v. dose of Atropine 0,5 mg was administered. The assessment of the therapeutic efficacy of Clonidine was done by constant observation of the basic cardiovascular parameters: systolic and diastolic blood pressure and frequency of the heart rate. Their values were registered in those phases of anaesthesia and surgery where, based on experience, they are expected to have significant changes in cardiovascular parameters such as: induction of anaesthesia, endo-tracheal intubations, first cut, surgical manipulation with organs, sewing of the surgical incision and extubation and later compared with the values of cardiovascular parameters taken a day before the planned surgery.

The level of the cardiovascular control achieved with the Clonidine was

correlated with the lowering of the total consumption of Fentanyl and inhalatory anaesthetic. The assessment of the speed of recovery from anaesthesia was done by measuring the time that elapsed from the moment of stopping with the administration of the inhalatory anaesthetic until the moment when the patient can follow simple commands (open eyes on command), or until the patient spontaneously opens the eyes and becomes fully conscious. The consumption of Atropine was used as an indicator of the level of negative chronotropic activity of the drugs used. As a parameter of the strength of the stress reactions, the increase in plasma cortisol and the increase in the glucose values, measured during the surgery were used and compared to the base pre-operative values.

3. RESULTS

We emphasize that the Clonidine and the control group were comparable based on age, weight and sex and that there were no statistically significant differences between the patients of both groups. Below are shown intra-operational results of the measured parameters of both groups.

It is noticeable that the patients of the Clonidine group have significantly less variation in the systolic pressure in all critical phases.

It is noticeable that the patients of the Clonidine group have significantly

less variation in the diastolic pressure especially during the phases of intubation, surgical manipulation and extubation.

There is a significantly lower variability in the heart frequency in the Clonidine group during the anaesthesia phases that were observed.

In the Clonidine group during the surgery Clonidine increased for, approximately 1,5 times in relation to the pre-surgery base values. In the control group, during the surgery we noted a significantly higher increase of cortisol ($p < 0.001$), approximately 3 times in comparison to the base pre-surgery values.

In the Clonidine group the levels of glycemia did not cross over the reference values (6.5mmol/l), while in the control group the glycemia level was significantly higher ($p < 0,001$) (8.3mmol/l), in comparison to the patients in the Clonidine group.

In the Clonidine group there was a significantly lower consumption of: Droperidole, Pavulone and Sevorane, while the administration of Fentanyl and Atropine did not statistically differ in the Clonidine and controlled groups.

In the Table 2 there are expressed parameters which define the speed and the quality of overcoming (waking up) from general anaesthesia. In the Clonidine group the patients were waking up faster and the time necessary for eye opening and consciousness was much shorter.

4. DISCUSSION

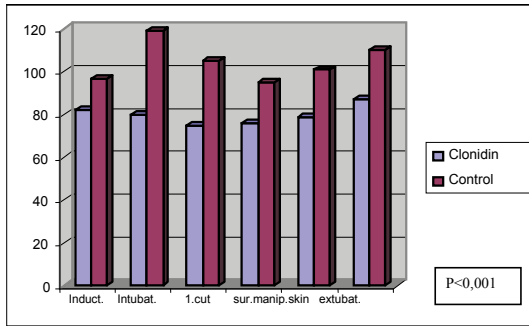
Selective agonists of α_2 adrenoreceptors have an important role in anaesthe-

Medicine (dose)	Clonidine	Control	Statistic significance
Fentanyl mg	0,30 +/- 0,04	0,34 +/- 0,05	n.s.
Droperidol mg	2,91 +/- 0,94	4,75 +/- 1,00	$p < 0,001$
Atropin mg	1,00 +/- 0,00	1,00 +/- 0,00	n.s.
Pavulon mg	4,70 +/- 0,79	6,66 +/- 0,84	$p < 0,001$
Sevorane administered in % cases	9/30 30%	28/30 93,3%	$p < 0,001$

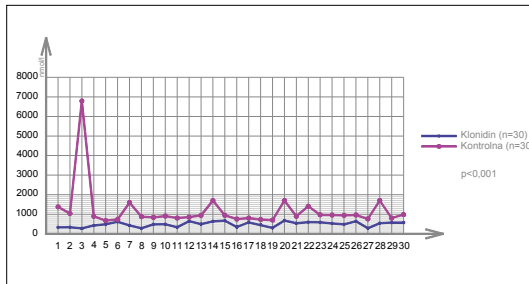
TABLE 1. Group expression of the medicines used during general anaesthesia

Parameter (size)	Clonidine	Control	Statistic significance
Anaesthesia duration (min)	93,46 +/- 19,51	96,20 +/- 9,41	n.s.
Eye opening upon call (min)	4,56 +/- 1,86	7,90 +/- 2,66	$p < 0,001$
Spontaneous eye opening (min)	7,23 +/- 2,16	10,10 +/- 3,13	$p < 0,001$
Complete consciousness (min)	10,76 +/- 2,43	13,93 +/- 2,93	$p < 0,001$
Extubation possible in (% cases)	30/30 100%	28/30 93,3%	n.s.

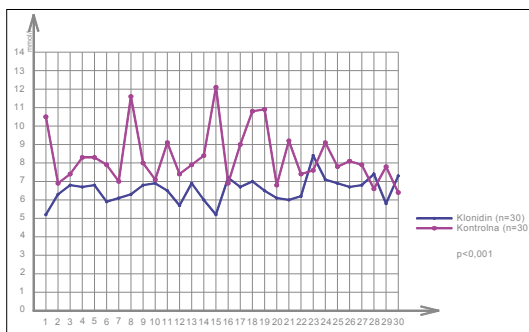
TABLE 2. Group expression of the speed and quality of recovery following general anaesthesia



GRAPH 3. Changes in the heart frequency during the surgery (FS/min)



GRAPH 4. Values of cortisol in the blood during the surgery. Clonidine group represented in blue and the control group in purple



GRAPH 5. Blood sugar values during the surgery

sia and pre-surgery support of the circulation because of their sympatholytic attributes in the vascular and central nervous systems. *Inkeringil and associates* have reported a satisfactory hemodynamic stability and good sedation when Clonidine is used in infusions at doses of 0,2-0,4µg/kgTT (8).

There are also several experimental studies (*Inkeringil and associates, Ebert and associates, Wijesundera and associates*) confirming that Clonidine leads to the neuro-protective effects through the activation of α_2 adrenoreceptors, probably through inhibition of the production and release of glutamates and

its affect on pain through the α_2 adrenoreceptors. This effect of the agonist α_2 adrenoreceptor, exhibited through the central and spinal receptors is sympatholytic and leads to moderate lowering of the blood pressure and heart frequency, as well as the wide spectre of other occurrences, including analgesic, anaesthesia and sedation, as well as lower consumption of oxygen, energy and production of CO₂. The differences in pharmacological and clinical reactions can be explained by the differences in selection (9).

The key factor of this phenomenon is the size of the initial dose. With the proscribed clinical doses of the medicine in the plasma from 0.7-1.5 nanog/ml there is a slight lowering of the systemic blood pressure and of the frequency. This same efficacy has been confirmed in our study. Clonidine, administered in the course of pre-medication in the dose of 0.2 µg/kg/min, has successfully suppressed the hypertensive-tachicardic response during the intubation of the trachea and surgical manipulation (as evident in Table 5). It is evident that Clonidine is especially successful in repressing the post-intubation tachycardia and the tachycardia caused by

the surgical manipulation, which is especially important for the patients suffering from the coronary disease and compromised cardiac output, where a tachycardia significantly lowers the amount of blood that during the diastole enters the left chamber.

In the tracheal extubation phase there are also pain impulses which increase the blood pressure and cause the increased heart rate. The mechanism of this phenomenon is also sympathoadrenal. Clonidine has successfully suppressed the hypertensive-tachicardic response, which corresponds to the data available in literature.

5. CONCLUSION

Complications during anesthesia were fewer in the clonidine group, and the consumption of anesthetic drugs was also lower. So, clonidine effects were favourable during anaesthesia in any phase of performed surgery.

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ORIGINAL PAPER

Urinary Tract Infections in Polycystic Kidney Disease

Alma Idrizi¹, Myftar Barbullushi¹, Alketa Koroshi¹, Marinela Dibra², Eriola Bolleku¹, Valbona Bajrami¹, Xhoana Xhaferri¹, Nestor Thereska¹
 Laboratory of Bacteriology, University Hospital Center "Mother Teresa", Tirana, Albania¹
 Service of Nephrology, University Hospital Center "Mother Teresa", Tirana, Albania²

Aim. The aim of this study was to evaluate the bacteriological findings and the frequency of urinary tract infections in autosomal dominant polycystic kidney disease and their impact on renal function. **Methods.** One hundred eighty patients with autosomal dominant polycystic kidney disease were studied from 2003 to 2008. Subjects were considered as having urinary tract infections if they had had one or more episodes of urinary infection. The antibiotic therapy for the treatment has been adapted according to the bacteriological findings. **Results.** Urinary tract infections were observed in 60% of our patients (108 patients), and were more frequent in women than in men. The infections were typically caused by gram negative enteric organisms. Blood culture was positive in 10%, while urine culture was negative in 40%. The episodes of isolated cyst infections (negative urine culture and absence of white blood cell casts in urinary sediment) were more frequent than those of acute or chronic pyelonephritis (urinary sediment was positive for white blood cell casts). **Conclusion.** We conclude that urinary tract infections are frequent in our patients with autosomal dominant polycystic kidney disease. Distinguishing between cyst infection and acute or chronic pyelonephritis is often a challenge, and the diagnosis relies mainly on clinical and bacteriological findings. **KEYWORDS:** AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE, BACTERIOLOGICAL FINDINGS, CYST INFECTION, RADIOLOGICAL FINDINGS, URINARY TRACT INFECTIONS.

Corresponding author: Alma Idrizi, MD. Service of Nephrology, UHC Mother Teresa, Dibra Street, No. 372, Tirana, Albania. Postal code: 1000, Tel: +355684063625/Fax: +35542363644. E-mail: alma_idrizi@yahoo.com

1. INTRODUCTION

Urinary tract infections are common in patients with autosomal dominant polycystic kidney disease (ADPKD), influencing on renal dysfunction (1, 2, 3). The exact prevalence of upper urinary tract infection has not been well evaluated. Causal organisms generally reach the kidneys by the ascending route. Patients may present infections of the bladder, perinephric tissue, cysts and renal interstitium (1). Upper urinary tract infections are mostly caused by the organisms (enterobacteriaceae) commonly responsible for lower urinary tract infection. Occasionally, in-

fection is caused by gram-positive and anaerobic bacteria. Renal infection is potentially severe since it may be complicated by septic shock or perirenal abscess. There are also doubts about the adverse effects of urinary tract infection on the progression to renal failure in ADPKD (4, 5). The aim of this study was to evaluate the frequency of urinary tract infections in ADPKD, bacteriological findings and their impact on renal function.

2. SUBJECTS AND METHODS

One hundred eighty patients with ADPKD were studied from 2003 to

2008. The diagnosis for ADPKD is done based on criteria established by Ravine et al. in 1994 (6) modified then by Pei et al. (7): the presence of polycystic kidney and a typical familial history or, in the absence of familial history, the presence of three or more (unilateral or bilateral) renal cysts for individuals aged between 15 to 39 years, two or more cysts in each kidney for individuals aged 40 to 59 years, and four or more cysts in each kidney for individuals aged >60 years. Subjects were considered as having urinary tract infections if they had had one or more episodes of urinary tract infections. The diagnosis of cyst infections and radiological evaluation were based on the following criteria:

Cyst infection was considered as likely in the presence of all of the following features: Fever (temperature >38.5°C for >3 d), abdominal pain (particularly a palpable area of renal or liver tenderness), increased C-reactive protein (CRP >50 mg/L), and the absence of any significant recent intracystic bleeding (based on the results of an abdominal computed tomography [CT] scan) or other causes of fever.

Kidney and liver ultrasound data were considered positive when debris with a thick wall and/or a distal acoustic enhancement was detected in at least one cyst.

Kidney and liver CT scan and magnetic resonance imaging (MRI) data were considered positive when enhanced wall thickening and/or perilesional inflammation was detected in at least one cyst.

Efficacy of antibiotic treatment and infection eradication were defined by the disappearance of fever, normaliza-

	Patients with UTI (108 patients)	Patients without UTI (72 patients)	P value
Age	45.4±6.2 years	47.2±7.6 years	NS
Sex			
Females/Males	60/48	32/40	NS
Renal function			
GFR>60 ml/min/GFR<60 ml/min	67/41	42/30	<0.05
BMI (kg/m ²)	28.2±4.5	21.0±3.9	<0.05
Gross hematuria	65 (56%)	36 (43%)	NS
Mean age	41.4±4.5 years	42.7±3.6 years	
Kidney stones	70 (64%)	46 (63%)	NS

GFR- glomerular filtration rate, BMI- body mass index, UTI- urinary tract infections, NS- not significant.

TABLE 1. Demographic data of patients

tion of CRP levels, and at least two negative blood and/or urine cultures (8).

The antibiotic therapy for the treatment has been adapted according to the bacteriological findings, and oral administration of antibiotics with good intracyst penetration such as trimethoprim (Baktrim) or preferably a fluoroquinolone such as ciprofloxacin, have been for long term treatment in patients with more than three episodes of urinary tract infections in last six months. Treated patients were compared with patients without urinary tract infections (untreated patients). We used trimethoprim 480 mg 1 cpr/die alternate weeks for three months, discontinued for three months, again alternate weeks for three months and so on. Results are reported as mean±SD. P values ≤ 0.05 were considered statistically significant.

3. RESULTS

Urinary tract infections were observed in 60% of our ADPKD patients (108 patients) (mean age 45.4±6.2 years, range 18-65 years), and were more frequent in women than in men (Table 1). 47 patients have cyst infections, 41 patients have acute pyelonephritis and 20 patients have bladder infection. Microbiological data were available for 75% of patients with episodes of urinary tract infections. The infections were typically caused by gram negative enteric organisms (Figure 1). The blood culture was positive in 10% of patients, while urine culture was negative in 40%. The episodes of isolated cyst infections (negative urine culture and absence of white blood cell casts in urinary sediment) were more frequent than those of acute or chronic pyelonephritis (urinary sediment was

positive for white blood cell casts). For all patients the ultrasonography examination was performed. In 18 patients the CT scan revealed the heterogeneous contents and irregularly thickened walls of infected cysts. MRI was determinant for cyst infection in other 5 cases undetermined by CT scan. C reactive protein was performed in almost of patients and resulted very high in 50 % of patients with cyst infections and in all of them with parenchymal infection.

The response to antibiotics has not been uniform. In some patients, the infection was rapidly controlled, while in 35% of patients fever was still present after a 5-day treatment. Those with cyst infections were treated with antibiotics with good intracystic penetration, like fluorquinolones, while those with acute pyelonephritis were treated with antibiotics with good parenchymal concentration like cephalosporines of second or third generation. Those with episodes of cyst infections were treated with trimethoprim for three to six months to prevent the recurrence of cyst infections.

In patients with a severe renal infection, associated with septicemia parenteral administration of a fluoroquinolone or a third-generation cephalosporin was used as initial therapy.

Treated patients with urinary disinfectants had a significantly lower frequency of urinary infection (p<0.001) and hematuria (p<0.001) after one year of treatment than untreated patients. Moreover, treated patients demonstrated a slope of serum creatinine of 0.0007 vs. 0.0148 of untreated patients (p<0.001) (Figure 2).

4. DISCUSSION

Approximately 30 to 50 percent of patients with autosomal dominant polycystic kidney disease (ADPKD) will have a urinary tract infection during their lifetime (2, 9). Cyst infections responsible for hospitalization occur much less frequently, approximately 9 percent (8). Patients may experience symptoms from cyst infections, cyst hemorrhage, or pain from ruptured or expanding cysts. Urinary tract infections are frequent in our ADPKD patients being more frequent in women than in men (female to male ratio 2.1/1.5) as reported in literature (8). The finding of E. coli on more than 60% of our cases suggests an ascending mechanism for cyst infection, at least in the case of positive urine culture. The differentiation between parenchymal and

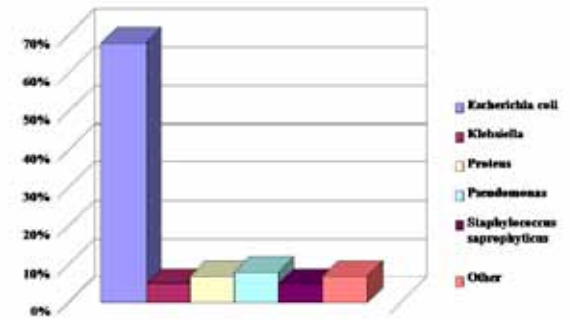


FIGURE 1. The frequency of microbial agents for urinary infections

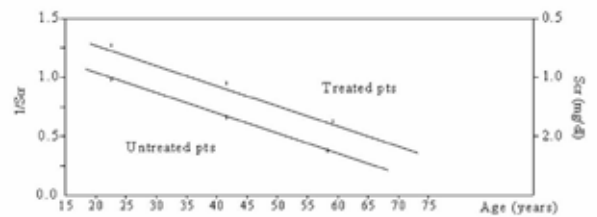


FIGURE 2. Slope of the reciprocal of serum creatinine of treated and untreated patients

cyst infection is not always easy (10). The former is evidenced by a positive urine culture and prompt response to antibiotic therapy. The latter is characterized by the development of discrete, new palpable area(s) of renal tenderness, a quite often negative urine culture (as infected cysts may not communicate with the pelvis), a very high proportion

of positive blood cultures, and apparent refractoriness to antibiotic therapy. In difficult cases, imaging techniques such as ultrasonography or, more often, CT scan may provide valuable information (10). We used CT scan and MRI as diagnostic tools in some difficult cases and the results were very helpful for diagnosing infected cysts. While Rule et al. (11) reported that history of urinary tract infections was identified as a prognostic factor for a decline in measured glomerular filtration ratio, our study showed that the correct treatment of urinary tract infections decreased their frequency and has beneficial role in the rate of progression to renal failure. The refractory nature of cyst infection has been shown to be largely due to poor penetration of commonly used antibiotics into cyst fluid (12). A major route for antibiotic penetration into the cyst is indeed diffusion across the cyst wall, a property dependent on lipid solubility. Lipophilic antibiotics (such as trimethoprim, fluoroquinolones, chloramphenicol, and metronidazole) rapidly achieve high intracystic concentrations. Fluoroquinolones and third-generation cephalosporins remain the standard treatment for cyst infections in patients with ADPKD and we used them in 35% of the patients with urinary tract infections included in this study. The optimal duration of antibiotic administration is unclear. There is no evidence that giving antibiotics for more than 3 weeks has significant

advantage in common cases of parenchyma infection (12). Based in our experience, we recommend a 12-week (three months) course in proven or suspected cyst infection. If the infection recurs after withdrawal of antibiotics, treatment should be reinstated and continued for other 12 weeks.

5. CONCLUSION

We conclude that urinary tract infections are frequent in our ADPKD patients. The infections were typically caused by gram-negative enteric organisms. Distinguishing between cyst infection and acute or chronic pyelonephritis is often a challenge, and the diagnosis relies mainly on clinical and bacteriological findings. The long course treatment with antibiotics is associated with a better renal function.

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ORIGINAL PAPER

Assessment of Depth of Anesthesia: PRST Score Versus Bispectral Index

Jasmina Smajic¹, Mirsada Praso¹, Mirsad Hodzic², Samir Hodzic¹, Amna Srabovic-Okanovic⁴, Nedim Smajic², Zinka Djonlagic⁴
University Clinical Centre, Anesthesiology and Reanimatology Clinic, Tuzla, Bosnia and Herzegovina¹
University Clinical Centre, Neurosurgery Clinic, Tuzla, Bosnia and Herzegovina²
University Clinical Centre, Orthopaedic and Traumatology Clinic, Tuzla, Bosnia and Herzegovina³
Health Centre, Emergency Medicine Department, Tuzla, Bosnia and Herzegovina⁴

Assessment of depth of anesthesia is the basis in anesthesiologist's work because the occurrence of awareness during general anesthesia is important due to stress, which is caused in the patient at that moment, and due to complications that may arise later. There are subjective and objective methods used to estimate the depth of anesthesia. **The aim** of this study was to assess the depth of anesthesia based on clinical parameters and on the basis bispectral index, and determine the part of bispectral monitoring in support to clinical assessment. **Material and methods:** Sixty patients divided into two groups were analyzed in a prospective study. In first group (group 1), the depth of anesthesia was assessed by PRST score, and in the second group (group 2) was assessed by bispectral monitoring with determination PRST score concurrently. In both groups PRST score was assessed in four periods, while bispectral monitoring is used continuously. For analysis were used the BIS index values from the equivalent periods as PRST scores. PRST score value 0-3, and BIS index 40-60 were considered as adequate depth of anesthesia. **The results** showed that in our study were not waking patients during the surgery. In the group where the depth of anesthesia assessed clinically, we had a few of respondents (13%) for whom at some point were present indicators of light anesthesia. Postoperative interview excluded the possibility of intraoperative awareness. In the second group of patients and objective and clinical assessment indicated at all times to adequate depth of anesthesia. **Conclusion:** The use of BIS monitoring with clinical assessment allows anesthesiologists precise decision-making in balancing and dosage of anesthetics and other drugs, as well as treatment in certain situations. **KEY WORDS:** DEPTH OF ANESTHESIA, PRST SCORE, BISPECTRAL INDEX

Correspondent author Mr. sci. Jasmina Smajic, MD. E-mail jasnasmajic@gmail.com; tel. 00 387 61 721 353

1. INTRODUCTION

Surgical anesthesia should be harmless and reversible state of insensibility of the patient, whose characteristics are sleep, analgesia, muscle relaxation and loss of reflexes. One of the achievements of modern anesthesia is the possibility of monitoring the depth of anesthesia. Adequate depth of anesthe-

sia is present when the concentrations of drugs are sufficient to provide comfort to patients and perform surgery (1, 2). Clinical signs of "shallow" anesthesia (increases in blood pressure, heart rate, sweating and tearing) in conjunction with surgical stimulation were used and are still used to titrate anesthetic to the patient's needs. PRST score (pres-

sure, rate, sweating, tears) was proposed for the detection of inadequate depth of anesthesia. The control parameter value is the value that was before the induction. Adding up the points of all four parameters determine the total amount which can range from 0 to 8. There is inadequate depth of anesthesia if score is more than three (3).

To estimate the depth of anesthesia can be used objective methods that are based on recording and analysis of brain electrical activity. This electrical activity has a significant direct physiological correlation with the depth of anesthesia. Anesthetics act on brain physiology and lead to changes in cortical neural activity, resulting in changes in electrical brain activity with a reflection on the electroencephalogram (EEG). EEG is a noninvasive indicator of brain function when the patient is unconscious and without sensitivity (4, 5).

Bispectral index (BIS index) is a numerical processed, clinically confirmed EEG parameter obtained by combining more advanced EEG techniques such as bispectral analysis, a powerful spectral analysis and time analysis. These components are combined to optimize the correlation between EEG and clinical effects of anesthesia. BIS index is a number between 0 and 100 arranged to correlate with clinical status during the application of anesthetics. BIS value near 100 is a clinical state of alert, while 0 means the greatest possible effect on the EEG (isoelectric EEG). Administration of hypnotics leads to the

fall of the BIS index value of 100 in the waking state. Loss of consciousness occurs at BIS values between 70 and 80. BIS index of 40-60 indicates adequate hypnotic effect of general anesthesia with postoperative rapid return of consciousness. BIS value below 40 indicates a deep hypnotic state. BIS values decline below 70, the possibility of explicit survival is less. With the BIS index values of less than 60 is very small chance of awareness (6, 7).

2. AIM

The aim of this study was to evaluate the depth of anesthesia based on clinical parameters and bispectral monitoring, and to determine the value of bispectral monitoring in support to clinical assessment of depth of anesthesia.

3. SUBJECTS AND METHODS

The study was prospective and 30 patients who underwent inguinal hernia surgery at the Department of Surgery, University Clinical Centre Tuzla were analyzed. Subjects were of both sexes, aged 20-70 years, according to the classification of the American Society of Anesthesiologists (ASA) I and II operational risk. Two groups of 30 subjects have been selected consecutively. All patients preoperatively signed the consent to be included in the study. In the first group (group 1) depth of anesthesia was assessed by PRST score, and in the second group (group 2) by BIS index. Before induction, all patients were premedicated using midazolam (0.05 mg / kg). For introduction to anesthesia was used propofol (1.5 to 2.5 mg/kg), for muscle relaxation atracurim (0.6 mg/kg), while the anesthesia was maintained with O_2 , N_2O and sevoflurane, and analgesia with fentanyl (0, 15 to 0.25 mg). Depth of anesthesia was assessed at the moment of intubation (t_1), at first skin incision (t_2), twenty minutes after the first incision (t_3), and immediately after placing the last suture in the skin (t_4). In the first group of respondents, before the introduction of anesthesia blood pressure and heart rate values were noted (t_0). At the time of intubation (t_1), the first skin incision (t_2), 20 min after the first incision (t_3), and immediately after placing the last suture

	Group	N	Mean	Standard deviation
PRST score t_1	1	30	1.5667	1.2229
PRST score t_2	1	30	0.8333	1.0532
PRST score t_3	1	30	0.5333	0.9732
PRST score t_4	1	30	0.9333	1.3374

TABLE 1. PRST score mean values in the first group of respondents

	Group	N	Mean	Standard deviation
PRST t_1	2	30	1.0333	0.9643
PRST t_2	2	30	0.2000	0.4068
PRST t_3	2	30	0.0667	0.2537
PRST t_4	2	30	0.1000	0.3051

TABLE 2. The mean of PRST score in second group of respondents

in the skin (t_4) values of blood pressure and heart rate were again recorded, also the occurrence of tears in the closed eye or while opening the eye, and as well as the degree of skin moisture. Each parameter was scored from 0 to 2 and by summing up all the points obtained by the PRST score, depth of anesthesia was estimated. Values greater than three were considered as inadequate depth of anesthesia. In the second group of subjects to estimate the depth of anesthesia was used by appliance of BIS XP, Aspect Medical System. Before the introduction of anesthesia unilateral BIS sensor, that record the EEG waves, was mounted on cleaned and dried forehead. BIS sensor is with the appropriate cable connected with the BIS monitor that displays the EEG waves and BIS index value. Using a sensor that is placed on the patient's forehead BIS monitoring translates information from the electroencephalogram into a simple number that is read on a monitor and represents a patient's state of mind. BIS index was monitored continuously, and we recorded the value at the time of intubation (t_1), the first skin incision (t_2),

20 min after the first incision (t_3), and immediately after placing the last suture in the skin (t_4). During anesthesia, the BIS index values were maintained in the range 40-60, which is considered adequate depth. By noting BIS index quotation, the PRST score was determined and noted, too. With both groups of respondents completed the interview 24 h after surgery, in order to obtain information about whether is something heard, seen or felt during the general anesthesia.

Statistical analysis was performed by descriptive statistics to calculate the mean and standard deviation, and t-test, χ^2 test for calculating the materiality established the results. Statistical analysis was performed with a confidence interval of 95%, a value of $p < 0.05$ was considered significant.

4. RESULTS

The study included two groups of 30 respondents, aged 20-70 years. In group 1 mean age was 52, 86 ± 16.00 , while the second group, 51.43 ± 13.77 ($p=0.35$). In both groups most patients were in the age 51-65 years. Out of 60 analyzed, 54

	Group	N	Mean	Standard deviation	Mean standard error
BIS t_1	1	0	.	.	.
	2	30	38.9333	13.8039	2.5202
BIS t_2	1	0	.	.	.
	2	30	46.5667	6.8767	1.2555
BIS t_3	1	0	.	.	.
	2	30	49.6667	5.6589	1.0332
BIS t_4	1	0	.	.	.
	2	30	60.4333	6.7552	1.2333

TABLE 3. The mean value of BIS index in group 2

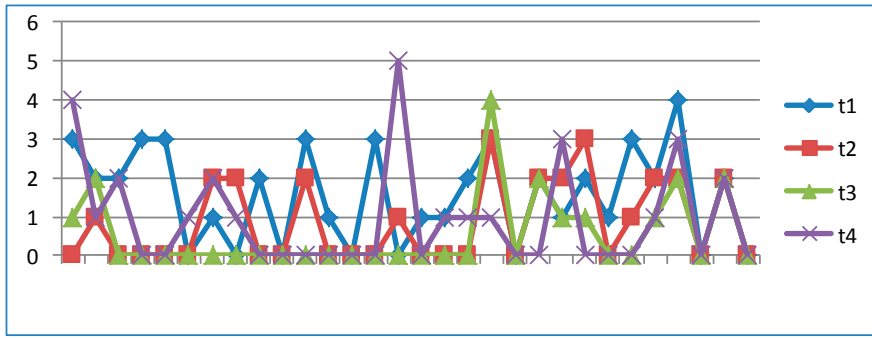


FIGURE 1. PRST scores of the first group of respondents

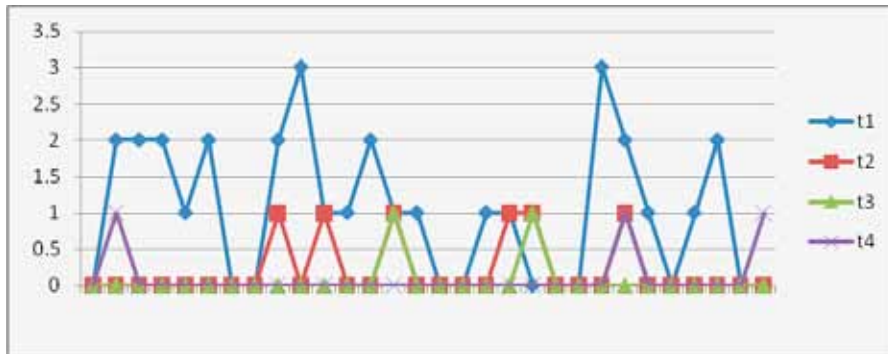


FIGURE 2. PRST scores in second group of respondents

patients were male (90%) and 6 females (10%). In both groups, a larger number of subjects were those who underwent surgery of left inguinal hernia and had the first surgery. The average duration of surgery in the first group was 60.5 ± 5.46 min, while in the second group, 54.93 ± 2.14 min ($p < 0.0001$).

The results of the PRST score in the first group showed that ten patients had a value of almost 3, three patients had the value of almost 4, and one respondent had a value of PRST score 5. In other subjects PRST scores were lower than 3 (Figure 1).

The highest mean of PRST score was in t_1 and its values in other periods were lower (Table 1). There is a statistically significant difference in the PRST score value at t_1 and t_2 , t_1 and t_3 in the first group ($p < 0,05$). PRST score values of other combinations within this group are not significantly different.

Results of the PRST score in the second group showed that two patients in this study group had PRST score 3, while in others the score value was less than 3 (Figure 2). In the second group, just like in the first group, the PRST score value at t_1 was higher than in other periods, but lower compared to the value of the PRST score of the first

group in the equivalent period (Table 2). There is a statistically significant difference between the PRST score value at t_1 and t_2 , t_1 and t_3 , t_1 and t_4 , t_2 and t_3 ($p < 0, 05$). The other combinations of PRST

score within this group do not have statistically significant difference. In all periods of measurement the subjects of the first group had a higher mean value PRST score, compared to the second group. There is a statistically significant difference in PRST scores in equivalent periods between the two studied groups (Figure 3).

Monitoring bispectral index in the second group got the lowest values in t_1 and the highest in t_4 (Figure 4). There is a statistically significant difference in BIS index values in all periods of measurement, and it is the most intensive between t_1 and t_4 , t_2 and t_4 , t_3 and t_4 ($p < 0, 05$) (Table 3).

All respondents were interviewed 24 hours after surgery. According to a prepared questionnaire we asked questions about the immediate preoperative, intraoperative and postoperative memory. There was no significant difference in that what is the last what they remember before surgery, $p = 0.1724$. A significant difference exists in that what is the first thing to remember after the surgery. Greater number of respondents in the first group recalled sick-room, while the majority of the second group recalled the operating room, $p =$

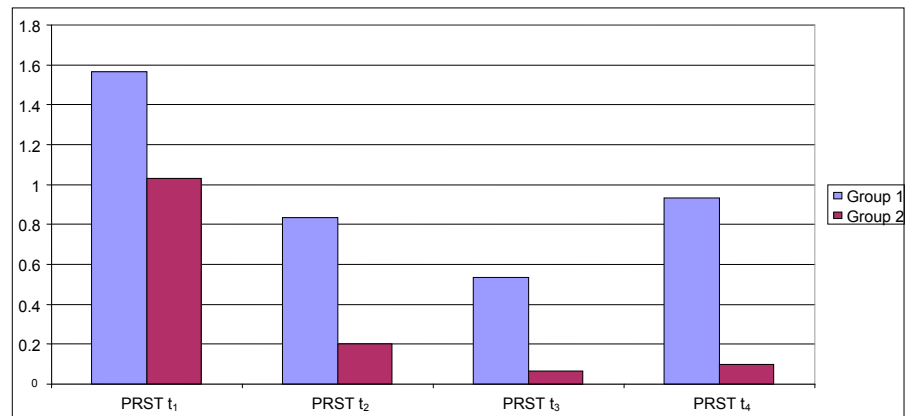


FIGURE 3. Mean PRST scores in both groups of respondents

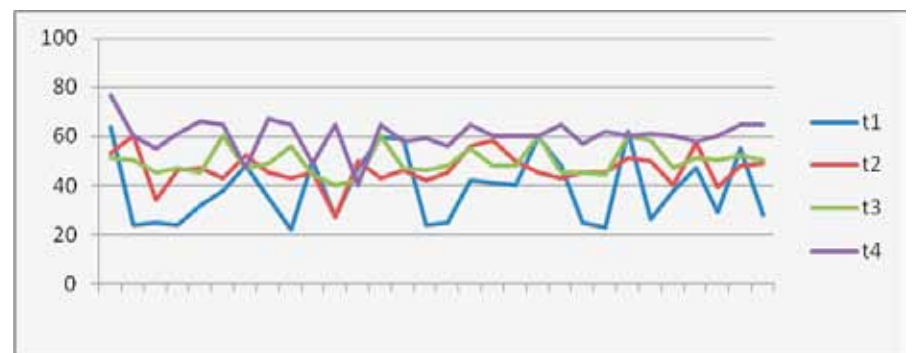


FIGURE 4. BIS index in group 2 during general anesthesia

0.0217. In both groups, all respondents gave a negative answer to the question of whether they remember something from a period of induction in anesthesia until the waking period.

5. DISCUSSION

In their daily work anesthesiologists assess the depth of anesthesia based on clinical signs, which represent a response of the autonomic nervous system of the organism to shallow anesthesia—tachycardia, hypertension, sweating, tearing, and dilation of the pupil. Evans and Davies in 1984 introduced a scoring system for clinical assessment of depth of anesthesia (PRST score). In the clinical practice, for assessing depth of anesthesia hemodynamic response to laryngoscope, intubation and skin incision is used. The signs of increased autonomic activity may be absent when there are opioids, cholinergic, beta blockers, vasodilators and antihypertensive drugs used. Increasing the parameter values of PRST score can cause hypovolemia, inadequate analgesia, hypoxia or hypercapnia. Signs of a shallow anesthesia often occur, but the correlation with awakens is low. In our study, depth of anesthesia in the first group of subjects was assessed only on the basis PRST score. The highest mean of PRST score we had in t_1 (1.56). According to the mean value at this time we had an adequate depth of anesthesia, but by analyzing the individual values in one patient score was 4, which indicated a shallower anesthesia. During surgery, the t_2 PRST score values were below 3, and in t_3 in one patient score was the four. After placing the last suture (t_4) in two subjects score was above the three. So, in three periods of assessment of depth of anesthesia by PRST score, we could conclude that in some respondents was not achieved an adequate depth of anesthesia. When we performed the postoperative interview after 24 h with the subjects, all of them gave a negative answer to questions about whether something is heard, seen or felt during the general anesthesia. In the second group of our patients anesthetic titration and assessment depth of anesthesia was done on the basis of bispectral index. Before giving mid-

azolam to subjects BIS index value was between 97 and 100, after giving midazolam and fentanyl, it was over 80, and after injection of the intravenous anesthetics value was below the 60. Parallel to continuous monitoring of the BIS index, we assessed PRST score in the equivalent time as in the first group of subjects. The lowest mean of BIS index, we had in t_1 , and the highest in t_4 , which was expected because for induction to anesthesia we titrated an intravenous anesthetic to BIS index values below 40, and at the end of surgery reduced the concentrations of volatile anesthetic accompanying EEG and BIS. Monitoring PRST score parameters in the second group got the values that were significantly lower and different from values in the first group at the equivalent times. In the second group, in any period of analysis we had no PRST score higher than three. In this group of subjects we titrated the anesthetic by the BIS index values, keeping it in the range 40-60, which according to an activity level of the central nervous system is required for general anesthesia. In addition to this objective method, neither did the clinical assessment of depth of anesthesia by PRST score in this group of respondents indicate the being of “shallow” anesthesia and intraoperative awareness. And the second group of respondents in the postoperative interview after 24 hours gave a negative statement about being something heard, seen or felt during the surgery.

Myles and colleagues conducted a study which examined the two groups. In one group of subjects (N=1225) the depth of anesthesia was assessed by bispectral index, and in second group (N=1238) by clinical parameters. Two patients from the BIS group postoperatively declared that at one moment during surgery they were awake, and from the group that has been clinically evaluated for intraoperative wakefulness declared eleven patients ($p=0.022$). The results showed that the use of bispectral index in assessing depth of anesthesia reduces the risk of intraoperative awareness by 82% (8). In our study, the average duration of general anesthesia in the first group of subjects was 60.5 ± 5.46 min, while in the second group it was 54.93 ± 2.14 min

($p < 0.0001$). Considering the shorter duration of general anesthesia in the second group, we can conclude that our respondents in the BIS group had a faster recovery than those whose depth of anesthesia was assessed by clinical parameters. Use of BIS monitoring during surgical procedures, aside from preventing the occurrence of intraoperative awareness, it allows more precise dosing of anesthetics, shorter staying in the recovery room and reduces the incidence of postoperative nausea and vomiting. In a study conducted by Gan and colleagues, it was analyzed the rate of recovery from general anesthesia in two groups. In one group depth of anesthesia was assessed by clinical parameters, and in second group on the basis of the clinical parameters and bispectral index. The results showed that the respondents in the BIS group before opened their eyes, carried out the orders and before were extubated after surgery (9).

Bispectral index allows to anesthesiologists directly and accurately monitoring the central nervous system during the application of anesthetics or sedatives, and assessment of the hypnotic effect of anesthesia (10, 11). Bispectral index monitoring assesses the depth of anesthesia and facilitates titration of anesthetics. In the operating room changes in blood pressure and heart rate are not uncommon, and the task of anesthesiologists in these situations is to make a prompt diagnostic evaluation and timely intervention to eliminate the cause of these changes. BIS monitoring provides new information that can facilitate the anesthesiologist in making decisions and treatment of many of these situations (12, 13).

6. CONCLUSION

Evaluation of intraoperative depth of anesthesia is one of the main tasks of anesthesiologists. In their daily work anesthesiologists assess depth of anesthesia by clinical parameters. The use of bispectral monitoring facilitates anesthesiologist assessment the depth of anesthesia. Assessing the depth of anesthesia using BIS monitoring is a non-invasive method. BIS monitoring is not a substitute for clinical assessment

of depth of anesthesia. With bispectral monitoring it is necessary to observe clinical parameters, and the ultimate decision about the measures, which should be taken, make on the basis of bispectral index and clinical parameters in the equivalent time. The use of BIS monitoring with clinical assessment allows anesthesiologists precise decision-making and balancing a dosage of anesthetics and other medicines such as analgesics and cardio active agents, especially in patients with higher operative risk

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work institution, and all essential facts of the work, -introduction, formulation of problems, purpose of work, used methods, (with specific data, if possible) and basic facts. Summaries must have review of underlined data, ideas and conclusions from text. Summary has no quoted references. Four key words, at the most, need to be placed below the text.

Central part of the article. Authentic papers contain these parts: introduction, goal, methods, results, discussion and conclusion. Introduction is brief and clear review of the problem. Methods are shown, so that interested reader is able to repeat described research. Known methods don't need to be identified, they are cited (referenced). If drugs are listed, their generic name is used, (brand name can be written in brackets). Results need to be shown clearly and logically, and their significance must be proven by statistical analysis. In discussion, results are interpreted and compared to the existing and previously published findings in the same field. Conclusions have to give an answer to author's goals.

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Use of abbreviations. Use of abbreviations has to be reduced to a minimum. Conventional units can be used without their definitions.

Supplement. If paper contains original contribution to a statistical method or author believes, without quoting original computer program, that paper's value will be reduced. Editorial staff will consider possibility of publishing mathematic/statistic analysis in-extension. Papers with the following failures will not be accepted for publishing: grammatically or technically incorrect, materials do not represent original work by author and author(s) have to sign statement that the submitted paper has neither been published, nor is it currently under consideration.

ORIGINAL PAPER

Stress at Work and Burnout Syndrome in Hospital Doctors

Senada Selmanovic¹, Enisa Ramic¹, Nurka Pranjic², Sanja Brekalo-Lazarevic², Zejneba Pasic³, Alma Alic⁴
 Cathedra for Family medicine, Faculty of medicine, University of Tuzla, Bosnia and Herzegovina¹
 Cathedra for environmental health, Faculty of medicine, University of Tuzla, Bosnia and Herzegovina²
 Clinic for neurology, University clinical center Tuzla, Bosnia and Herzegovina³
 Family educational center, JZU DZ Zenica, Bosnia and Herzegovina⁴

Introduction. Reforming the health care system in Bosnia and Herzegovina began in 1998 through various forms of amendments to existing health plans and programs. There has been the introduction of new technologies, flow of new information from the profession, excessive demands on employers, financial constraints, etc. The hospital doctors in the workplace suffer from too many stressors. Burnout syndrome at work is a form of chronic stress reactions to stressors, and develops as a result of inefficient coping with and solving every day, demanding stressful situations related to professional duties. **Goal.** The goals of this study were: to identify the specific stressors of high intensity in the hospital physicians work environment, to discover whether and how certain stressors can affect the appearance of burnout syndrome at work in a hospital physician, to determine whether certain individual factors influence the occurrence of burnout syndrome at work. **Methods and subjects.** We made the intersection study involving the use of questionnaires, in order to assess the stressors and burnout syndrome in hospital among doctors of the University Clinical Center in Tuzla. **Results.** The study comprised 34.7% hospital doctors (specialists and doctors on specialization) of a total 423 employees in various departments of the University Hospital Clinical Center in Tuzla. High level of emotional exhaustion was recorded in 37.4%, a high level of depersonalization in 45.6%, and a low level in perceptions of personal accomplishments in 50.3% of respondents. **Conclusions.** Continuous exposure to stressors at the workplace, such as work at shifts, excessive workload, poor communication with superiors, and lack of continuous education of hospital physicians can lead to mental and physical exhaustion, professional burnout. Management of the University Clinical Center Tuzla should in the future address the structural reorganization of workplaces, as well as ongoing prevention interventions in other domains of risk factors or stressors, that this study identified. **KEYWORDS:** HOSPITAL DOCTORS, STRESS, STRESS AT WORK, BURNOUT SYNDROME AT WORK

Corresponding author: Senada Selmanovic, MD. Medical faculty of University of Tuzla. Univerzitetska 1, 75 000 Tuzla, BiH. Telefon: 00387 35 251 486; GSM: 00387 61 739 990. E-mail: senada_selmanovic@yahoo.com

1. INTRODUCTION

Reform of the health care system in Bosnia and Herzegovina began in 1998 through various forms of amendments to existing health plans and programs. There has been the introduction of new technologies, new flow of infor-

mation about the profession, excessive demands on employers, financial constraints, inadequate work space and equipment, inadequate number of staff and insufficient skilled personnel, and an increasing number of patients with an increasing number of requests. Work

assignments are often very difficult to fulfill (1, 2).

Stress and the type of stress in doctors working in hospitals and outside hospitals, were studied in the medical institutions of different countries. Jobs that are associated with stress the most are intensive care unit, oncology, emergency services and operating rooms. The health sector is increasingly talking about the burnout syndrome (3, 4, 5). In relation to emotional exhaustion work is perceived as discomfort, with perceived deterioration and emptiness with the loss of motivation. Knowledge and skills remain intact, but reduces the will and the spirit with which they are engaged. In this process, the motivation becomes impaired, in the most severe cases, completely destroyed (1, 6, 7). Stress at work is not necessarily a negative phenomenon in terms of disturbances in concentration and other pathological effects. However, if stress is intense, continuous or continually repeated, the person is unable to cope with it. In the context of the working environment, stress is often the result of inadequate adaptation to the situation and work colleagues or clients, with a decline in work ability below the optimum level (8, 9, 10).

Burnout syndrome at work is a form of chronic stress reactions, and develops as a result of inefficient coping and solving of everyday, demanding stressful situations related to professional duties. Intensive job stressors lead employees in a professional burnout syndrome, because they are not able to efficiently respond to the tasks. The outcomes of burnout syndrome in the workplace

are generally associated with a decline in the effectiveness of work, sick leave and reduced productivity of individuals and organizations (3, 11, 14). If the institution does not examine the conditions in the workplace, satisfaction of their employees and not taking adequate preventive programs, chances are that the employees because of continuing exposure to stress in the workplace, over a longer period of time, suffer the consequences on physical and mental health (3, 15, 16).

2. GOALS

The goals of this study were: to identify the specific stressors of high intensity in the hospital physicians work environment, to discover whether and how certain stressors can affect the appearance of burnout syndrome at work in a hospital physicians, to determine whether certain individual factors influence the occurrence of burnout syndrome.

3. METHODS AND RESPONDENTS

During 2007 was made a cross-sectional study, which involved the use of questionnaires, in order to assess the stressors and burnout syndrome in medical staff in the University Clinical Centre (UCC) Tuzla. Prior inclusion into the study, subjects were provided with the appropriate information, which clarify the purposes and objectives of this research, and voluntary participation.

3.1. Questionnaires

Questionnaire on stress in the workplace of hospital medical staff

In the study we use the "Questionnaire on work-related stress of hospital medical staff," which was created at the School of Public Health "Andrija Štampar" in Zagreb (17). The introductory section includes questions on individual factors and demographic data: age, gender, job, marital status and number of children, professional and scientific level, position, total years of service, hours, and the question about working in a team or independent work. The questionnaire includes assessing stressors at workplace of health workers: strength of impact factors of work organization, social relations, work demands, work distribution, the dynamics

of performing their tasks, the adequacy of working space, equipment, work, responsibility, coping with incurable patients, fear of risk from hazardous work (ionizing radiation, inhalation of anesthetics, cytostatics, infectious agents, work injury with a sharp object) and the lack of appropriate continuous education. The assumption is that some factor causes the most stress that the respondent experienced in their working environment, has a value of 5, a factor that causes no stress at all is worth 1 point. Answers which are 1 and 2 points represent a factor that does not cause stress, as opposed to responses that are 4 or 5 points that represent the factors that cause stress or stressors.

Questionnaire designed to evaluate burnout syndrome at work

To estimate the burnout syndrome "Maslach Burnout Inventory"—MBI questionnaire was used translated into our language (14). The questionnaire was used in the assessment of three specific dimensions of the burnout syndrome at work: the decline of personal accomplishment—PA by 8 claims, emotional exhaustion—EE by 9 claims and depersonalization—DP by 5 claims. Evaluation of responses was provided by a Likert-type scale from 0 (never) to 6 (every day). Burnout syndrome at work is contained in the answers "often" and "every day". The high level of personal accomplishment (PA) was estimated on the basis of score $PA < 30$; moderate PA on the basis of score 30–36, a low level for $PA \geq 37$. Exposure to emotional exhaustion (EE) of the respondents was estimated on the basis of EE score, so the score for the high level is $EE > 14$, moderate level for score 9–13, a low level for score $EE < 8$. Assessment of levels of depersonalization (DP) of the respondents was made on the basis of DP score. The high level is score $DP > 9$, a moderate level score 3–8, and a low level for score $DP < 2$.

3.2. Subjects

Respondents were doctors employed in the University Clinical Centre (UCC) Tuzla. In 2006 in the University Clinical Center in Tuzla, there were 423 doctors employed (18). The survey covered a representative sample of 147 (34.7%) hospital doctors (97 specialist doctors and 50 doctors on specialization), em-

ployed in various hospital departments that have voluntarily agreed to the interview.

3.3. Statistical analysis

To analyze the results was used standard SPSS version 10.0, as well as standard methods of descriptive statistics. To test the statistical significance of differences of selected variables was used nonparametric χ^2 -test. Basic sociodemographic data were presented descriptively, and stress was ranked according to the prevalence of intensity of stress experienced at high intensity. After that was formed three regression models in which variables are related to the experience of stress and defined as predictors, while individual components of the burnout syndrome as a dependent variable. Workplace stressors that are statistically significantly correlated with certain components of burnout syndrome were separated (model 1) and individual factors (model 2). Statistical hypotheses were tested at the level of statistical significance for $p < 0.05$.

4. RESULTS

During 2006 in the University Clinical Center in Tuzla, were employed 423 specialists in various medical specialties, and physicians specializing in various clinical disciplines. A cross-sectional study was conducted during 2007 which included a representative sample of 147 hospital doctors. Among the respondents there were 66% medical specialists and 34% of doctors specializing in various clinical disciplines (Figure 1).

The study showed a high degree of stress at work. The most common stressors in the group "Labor organization" were 24-hour duty, overloaded with work and night work. The highest prevalence among stressors domain "Lack of continuous education and inadequate funds for the work" are inadequate income, financial constraints to work and inadequate working space. Stressors that were present in the domain of "Support and interpersonal relationships" are the administrative jobs, 24-hour duty and the everyday unforeseen situations. Stress from the domain of "professional risk" was afraid because of possible infection from the diseased and fear about the possibility of injury by sharp objects.

PERSONALITY DIMENSIONS MBI	N (%)	Mean \pm SD*
Personal Accomplishment (PA)		38.11 \pm 11.39
High level	26 (17.7)	
Moderate level	47 (32.0)	
Low level	74 (50.3)	
Emotional Exhaustion (EE)		10.15 \pm 9.14
High level	55 (37.4)	
Moderate level	37 (25.2)	
Low level	55 (37.4)	
Depersonalization (DP)		5.12 \pm 4.81
High level	67 (45.6)	
Moderate level	55 (37.4)	
Low level	25 (17.0)	

TABLE 1. Estimate by the frequency of the three dimensions of professional burnout and intensity and mean values in subjects (n=147). *SD- standard deviation

Analysis of present and identified workplace stressors in hospital medical staff in the University Clinical Center in Tuzla has shown that the presence of these phenomena can lead to burnout syndrome at work. This study (Table 1) clearly showed presence of burnout syndrome at work in three dimensions of personality: the level of emotional exhaustion (37.4%), high level of depersonalization (45.6%) and low perception of personal accomplishment (50.3%).

Regression analysis showed that the decline in perceptions of personal achievements significantly affected by shift work and the pressure of time deadlines for completion of tasks, all of the domains of work organization. Significant predictor of decreased personal achievements and overtime. Individual factors (as confirmed in a second step regression analysis) have no influence in the development of the PA decrease.

As predictors of emotional exhaustion in hospital physicians, recognized as inadequate by the expectations of patients and their families, overloaded with work, and lack of continuous education. Little opportunity for promotion and administrative activities can adversely affect the appearance of burnout syndrome. Age may have significant impact on the perception of emotional exhaustion.

The main predictor of stress at the workplace that affects the occurrence of depersonalization in the group of

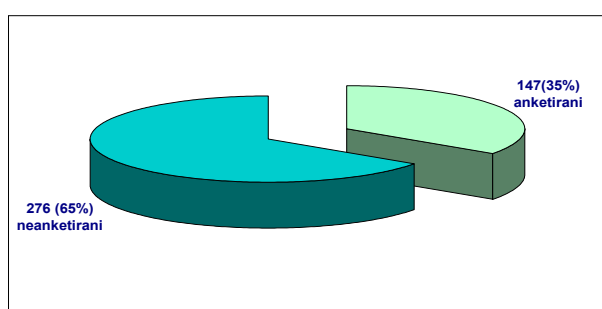


FIGURE 1. Number of physicians surveyed (n=147) employees of the University Clinical Center in 2006

hospital doctors is poor communication with superiors. The introduction of new technologies, poor communication with colleagues and the unavailability of the necessary literature, can also lead to depersonalization worsening. On the occurrence of depersonalization do not affect individual factors.

5. DISCUSSION

Burnout syndrome at work is similar to chronic fatigue syndrome, and can often remain unrecognized as a problem. With a sense of fatigue, in burnout syndrome, a person changes their attitude toward work as for the chronic fatigue it is not a characteristic (19). Burnout syndrome at work is a kind of trap. Because this process exhausts the person to a degree when work becomes too painful and when it is necessary to take certain steps in order to break the circle of emotional exhaustion (1).

We compared the exposure to stressors of high intensity exposure in a hospital environment of our respondents in relation to the results of Knezevic et al. (5). Dominated are the stressors out of the domain organization of business and finance, which is

a general regional problem, when it comes to the medical profession. Varying is the proportion of stressors in communication and professional risk factors. In our subjects more prominent stressor is administration in relation to the research by physicians in Croatia (5), the result is still conducted under the reform processes in health care in Tuzla Canton. Results from Melbourne, Australia (20) showed that the leading, among other stressors, was the time limit for the examination of the patient. In our research, this stressor is associated with the perception of decline of personal accomplishment.

The results of earlier burnout syndrome studies in 511 cases of Bosnian physicians showed that 27% have high levels of emotional exhaustion, 22% have high levels of depersonalization, and 29% of doctors have a low level of personal accomplishment perception (1). Comparison of these parameters with results of other authors of different countries (U.S. and some European Union countries), showed that physicians in Bosnia and Herzegovina suffered a lower degree of emotional exhaustion and depersonalization, and have higher personal accomplishment scores (8, 16, 19, 21, 22, 23). Our research has shown that high levels of emotional exhaustion had (37%), which is closest to the prevalence of 33% in physician-radiologists in the UK (8). The high level of depersonalization (46%) found in our population is similar to the prevalence in the general practice residents in the United States (21). The low level of personal accomplishment (50%) in our hospital physicians is almost identical to the prevalence of British radiologists (49%) (8).

Overloaded with work in our research is the dominant predictor of emotional exhaustion in the burnout syndrome, as in Bergman's and co-workers study (24), conducted in Toronto, Canada. For depersonalization, poor communication to the superiors is the key. Predictor overloaded with work, too, proved to be very important, leading doctors in the burnout syndrome at work (15), a lack of education has a lasting impact on the occurrence of the syndrome of professional burnout among specialist doctors. Age

has a statistically significant influence in the perception of emotional exhaustion. Other individual factors have a significant impact on the development of burnout syndrome. Gill-Monte (16) points out that specialist status affects the increase in emotional exhaustion, and age can influence on increasing levels of depersonalization.

6. CONCLUSIONS

The study identified specific risk factors for physician in UCC Tuzla. The presence of inappropriate expectations by patients and their families, work overload, poor communication with supervisors, work in shifts, inadequate or lack of continuous education, hospital physicians exposed to continuous stress. Everyday stress can lead to mental, psychological and physical exhaustion, and professional burnout. They are often added to the enumerated other factors, such as lack of support from colleagues, the introduction of new technology, little opportunity for promotion, administrative work and time pressure for completion of tasks.

Management of UCC Tuzla should in future address the structural reorganization of workplaces, as well as the continuous preventive interventions in the domains of risk factors or stressors, that this study identified. Structural and organizational changes and preventive interventions could positively influence the suppression, not only of professional burnout syndrome, but also to protect the health of hospital doctors in general.

This study is accompanied by certain difficulties and limitations. The key limitation is the relatively small num-

ber of subjects, as well as local character (doctors employed in the University Clinical Center in Tuzla).

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ORIGINAL PAPER

Incidence and Types of Sleep Disorders in Patients with Stroke

Zejneba Pasic¹, Dzevdet Smajlovic¹, Zikrija Dostovic¹, Biljana Kojic¹, Senada Selmanovic²

Neurology Clinic, University Clinical Centre Tuzla, Faculty of Medicine, University in Tuzla, Tuzla, Bosnia and Herzegovina¹

Department of family medicine, Faculty of Medicine, University of Tuzla, Tuzla, Bosnia and Herzegovina²

Introduction. Sleep disorders (SD) after stroke (stroke) are common occurrences, and most often in sleep apnea, insomnia and daytime sleepiness. **Goals.** Research goals were to determine the types of SD and their frequency in patients with stroke in relation to the type of stroke and side of lesion. **Materials and methods.** The study analyzed 200 patients with acute stroke hospitalized in the Clinic of Neurology, University Clinical Centre Tuzla in the period from 1st August 2007 to 1st June 2008. All patients have confirmed the existence of stroke by computerized tomography. SD was verified according to the General Curriculum of sleep, the Berlin questionnaire and Epworth scale. Stroke, by type, were divided into hemorrhagic and ischemic, and the localization of the stroke to right and left cerebral hemispheres. **Results.** Of the total number of respondents, 78% had SD. Very serious level of SD had 42% of respondents, 20% moderate, and 16% of medium-severe degree. There was no statistically significant differences in the frequency of SD among patients with ischemic and hemorrhagic stroke (76.8%: 82.5%, $p=0.58$). In relation to the side of lesion there was more patient with SD and stroke in the right cerebral hemisphere, but there were no statistically significant differences (39.5%: 33%, $p=0.1$). According Epworth scale sleep apnea and snoring was present in 86%, daytime sleepiness in 49.5% and narcolepsy 0.5%. **Conclusions.** Sleep disturbance as a neuropsychological disorder has a significant incidence in the acute phase of stroke. SD is slightly more common in hemorrhagic stroke and stroke in the right hemisphere. Sleep Apnea and snoring are the most common types of SD in patients with stroke. **KEY WORDS:** SLEEP DISORDER, STROKE

occurs in 70-85% of cases, and develops due to the inability of supply to brain tissue oxygen and glucose due to the blockage of vessel. If there is hemorrhage within the brain mass, there is intracerebral hemorrhage, which accounts for 15-20% of stroke cases (3).

SD is frequent companion of stroke, both ischemic and hemorrhagic ones. In patients with stroke the most common SD are sleep apnea, insomnia and daytime sleepiness and can be easily identified. SD is often undervalued situation and unjustifiably ignored in the diagnosis and treatment (4). These disorders, when they occur, further reducing the functionality and significantly affect the reduction in quality of life for these patients. It was reported that people who snore loudly have 67% higher risk for stroke and 34% risk for heart disease compared to people who do not snore. The presence of quiet snoring does not pose a high risk for heart disease and stroke (5). Retrospective studies suggest that disturbed sleep and sleep apnea is associated with increased prevalence of stroke (6). Obstructive apnea is very common condition in patients with stroke and found in more than half of patients with stroke (7). Link between obstructive apnea and stroke is complex and there are more common risk factors. There are numerous mechanisms by which the state of obstructive apnea contributes to increased risk of stroke. Obstructive apnea is a risk factor for hypertension, atrial fibrillation and diabetes, which in turn are risk factors for stroke (8).

Corresponding author: Zejneba Pasic, MD. Medical Faculty University of Tuzla, Univerzitetska 1, 75 000 Tuzla, B&H, Phone: 00387 70 214 064; mobile: 00387 62 333 144, e-mail: nuraga.p@bih.net.ba

1. INTRODUCTION

Sleep is defined as a periodic and temporary interruption of alertness in which the motor inactivation is almost complete, an awareness of the surrounding is maximally reduced, and increased is reactivity and reflex irritability threshold (1). Sleep Disorders (SD) occurs in all age groups and significantly affect the quality of life of people. The most common SD is insomnia, and

it is considered that 30% of the population suffers from insomnia. Also, it is considered that there is high prevalence of SD, but also, it is rarely diagnosed (2).

Stroke is defined as a state of acute disorder of cerebral circulation with transient or permanent brain dysfunction. The basic division of stroke is according to the type of pathological process, whereby we differ hemorrhagic and ischemic stroke. Ischemic stroke

2. GOALS

Research goals were to determine the types of SD and their frequency in patients with stroke in relation to the type of stroke and side of lesion.

3. MATERIAL AND METHODS

The study analyzed 200 patients with acute stroke hospitalized in the Clinic of Neurology, University Clinical Centre Tuzla in the period from 1st August 2007 to 1st June 2008. All patients have confirmed the existence of stroke by computerized tomography. SD was verified by the General Curriculum of sleep (9), the Berlin Questionnaire (10) and Epvort scale (11). Stroke by type was divided into hemorrhagic and ischemic, and the localization on his right and left cerebral hemispheres.

3.1. Questionnaires

A general questionnaire about sleep

A general questionnaire on sleep was adapted from the general questionnaire on sleep and wakefulness with the assessment Stanford University, which is used in sleep-disorders center, New Jersey, United States. This questionnaire evaluated the following data: sociodemographic (name, age, sex, and occupation), data on sleep patterns, social habits before going to sleep, daytime sleepiness, social history, chronic somatic diseases and medical information (9). The questionnaire has a total of 46 questions. The scale is completed by the examiner by marking offered answers to questions with “yes” or “no.”

The Berlin questionnaire

The Berlin questionnaire includes 10 questions about the risk factors for apnea in sleep, including snoring, waking drowsiness or fatigue, obesity and hypertension (10). The scale was completed by the examiner by the circled answers.

Epvort scale

Epvort scale is designed to identify problems of drowsiness and sleep. It consists of 4 parts, which are analyzed: drowsiness during daily activities, sleep apnea/snoring, narcolepsy and other sleep behaviors (twitches and tingling of limbs during sleep, teeth grinding, walking and talking in his sleep). Scoring and analysis was carried out according to the enclosed key. Ranking of an-

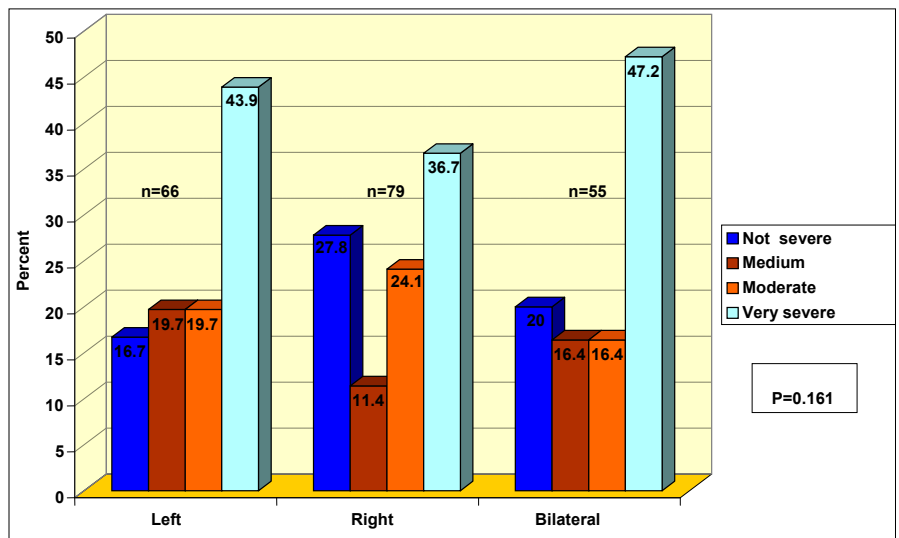


FIGURE 1. Distribution of patients according to their degree of sleep problems and side of lesion

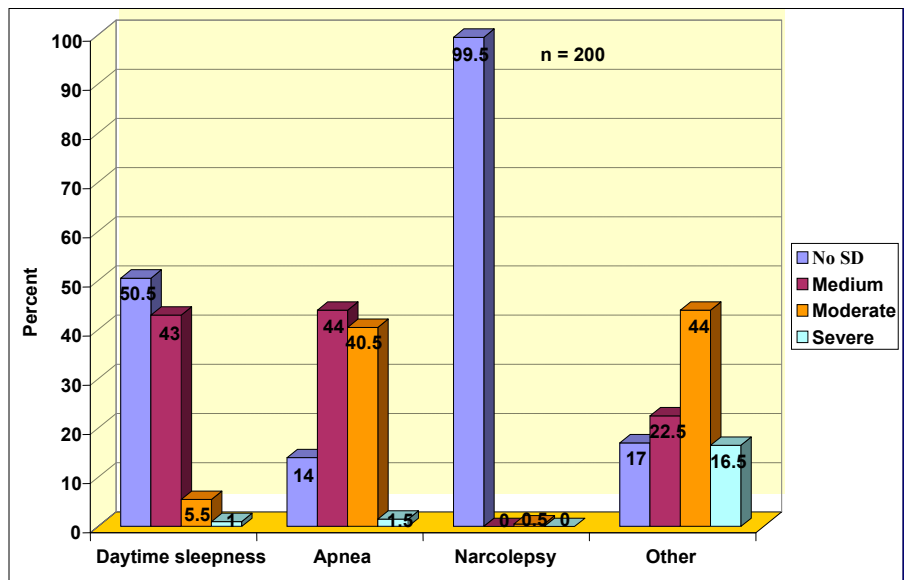


FIGURE 2. Distribution of patients according to types of sleep disorders by Epvort scale

swers is done as follows: 0 = never, 1 = rarely 2 = sometimes 3 = often 4 = usually (11). The scale is completed by the examiner.

3.2. Statistical analysis

Descriptive data were statistically analyzed using the χ^2 test (chi-square test) and test of proportions. When testing statistical hypotheses as significant was considered the level of $p < 0.05$. All calculations were conducted using the program for statistical data processing Arcus Quickstat Biomedical. The study was approved by the Ethics Committee of the University Clinical Centre Tuzla.

4. RESULTS

This prospective study found that 78% of patients had SD. Very serious level of SD had 42% of respondents, 20%

moderately severe and 16% of medium-severe degree. In 22% of respondents there were no symptoms of SD.

In patients with ischemic stroke 76.8% of patients had SD, and 82.5% of patients with hemorrhagic stroke. There was no statistically significant differences in the frequency of SD between patients with ischemic and hemorrhagic stroke (76.8%: 82.5%, $p = 0.58$).

In relation to the side of lesion 33% of patients had a stroke in the left hemisphere, and in the right 39.5%, in both hemispheres stroke had 27% of patients. It has been statistically determined that the frequency of SD in patients with stroke does not depend on the lesion side ($\chi^2 = 1.98$, $P = 0.161$) (Figure 1).

Analyzing the SD by Epvort scale the results showed that daytime sleep-

iness was present in 49.5% of respondents. Test of proportions found that the proportion of patients who have daytime sleepiness are not significantly different from the proportions of patients who have this problem ($p=0.833$). Sleep apnea and snoring was present in 86% of patients. Test of proportions was found that the proportion of patients who have sleep apnea and snoring was significantly higher than the proportion of patients who do not have apnea ($p<0.0001$). Of the total number of analyzed patients narcolepsy was present in 0.5% of respondents. Other SD, which included periodic limb movements, restless leg syndrome, teeth grinding, walk or talk during sleep had 82.5% of respondents (Figure 2).

5. DISCUSSION

Structural lesions in the brain, such as stroke, trauma and other can result in refractory SD (12). Patients with stroke, primarily ischemic, can suffer from several types of SD and its manifestations may depend on the specific neurological deficits (13). SD is present in 30% of the general population. Despite the high prevalence SD is considered to be rarely diagnosed (2).

In the study, Wierzbicki et al. analyzed 43 patients with stroke. SD in the above study has been reported in 35 patients. In left hemisphere lesions had 19 patients, 16 in right, while other patients had lesions in both hemispheres. The results of this study are similar to ours and show that side of lesion has no association with SD (14).

In the study of Elwood et al. tested were 1986 subjects, and was shown that it is 50% higher risk of stroke in patients in whom there was a form of SD (11). According to a prospective study of 152 patients with acute ischemic stroke, by Bassetti et al. confirmed that patients with acute ischemic stroke have high frequency of sleep disorders (72%), and in many cases sleep disorders preceding stroke and transient ischemic attack (6).

The research results by Bilwise et al. showed significant frequency of daytime sleepiness in patients with stroke (15). In the study by Cassels was also followed the presence of daytime sleepiness as an independent risk factor for stroke. Epworth scale was used for day-

time sleepiness, which confirmed the presence of this problem in more lenient level of 47% of patients, while in 9% of patients reported heavier degree of daytime sleepiness (16). This study indicates, together with other studies, that there is 4.5 times higher risk of stroke in those individuals who have a more severe level of daytime sleepiness, whereas the risk decreased significantly, to 2.6 times, with people who have mild forms of a given problem.

The narcolepsy affects about 1:2000 of the population in the USA, and in Japan 1:600. Patients with less severe forms of the disease, often remain undiagnosed (17). Scammell et al. presented the case of a young man who had a secondary narcolepsy after an extensive stroke in the hypothalamus (18).

Elwood et al. in their research analyzed the SD after stroke, following the presence of periodic limb movements in sleep, the presence of restless legs syndrome, burksism, and snoring. The study was conducted over ten years in 107 patients with stroke, aged 55-69 years. The study used the questionnaire on sleep patterns, and who meet the partners of the respondents. More than a third of respondents reported at least one symptom of SD (15).

According to the present results SD have a high incidence in patients with stroke and thorough assessment of health status of patients with stroke involves an analysis of SD. The contribution of our study is that the SD are partially confirmed the results of previous research and we are at the forefront of exploring the region pointed to the importance of SD as neurologic disorders in patients with stroke.

The main shortcomings of our study were: 1) data on the sleep of subjects before the occurrence of stroke have taken a history from the subjects or their families, rather than specific tests for SD, 2) control test by computerized tomography of the brain is not made to all respondents.

6. CONCLUSION

Sleep disorder (SD) as a neuropsychological disorder has a significant incidence in the acute phase of stroke. SD is more common in hemorrhagic stroke and stroke in the right hemi-

sphere. Sleep Apnea and snoring are the most common types of SD in patients with stroke.

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ORIGINAL PAPER

Role of Renal Anemia in the Functional, Morphological and Autoimmune Thyroid Disorders in Patients on Chronic Hemodialysis

Selma Jusufovic¹, Emir Hodzic², Alma Halilcevic¹

Department of Endocrinology, Clinic for Internal Diseases, University Clinical Centre Tuzla, Bosnia and Herzegovina¹

Department of Nephrology and Dialysis, Clinic for Internal Diseases, University Clinical Centre Tuzla, Bosnia and Herzegovina²

Thyroid disorders are common in chronic kidney disease. The aim of this study was to examine the role of renal anemia on thyroid function, morphology and autoimmunity in clinically euthyroid patients on chronic hemodialysis (HD). Prospective study during 12 months period included 40 stable patients on chronic HD treatment. Patients were divided into two groups according to the serum hemoglobin level (group A Hgb > 125 g / L and group B Hgb <125 g / L). Blood samples were taken for determination total and free thyroid hormones, thyroid antibodies and standard biochemical tests. Thyroid ultrasonography was performed with a 7.5 MHz transducer, 50 mm linear transducer. Thyroid volume was calculated, echostructure assessed and presence of nodular changes. In group A, was found significantly lower levels of total T3 (1.29 ± 0.0469 vs. 1.55 ± 0.0352 , $p < 0.1$); higher prevalence of low T3 syndrome (17.24% (n = 5) vs. 0.00% (n = 0), $p < 0.05$); ultrasound findings suggestive for Hashimoto thyroiditis (13.79% (n = 4) vs. 0.00% (n = 0), $p < 0.05$) and multinodular goiter (13.79% (n = 4) vs. 0.00% (n = 0), $p < 0.05$). We found no statistically significant difference in the mean values of thyroid antibodies levels, as well as in their percentage representation among groups. Morphological, functional and autoimmune disorders of thyroid gland are more common in patients on HD with Hgb level <125 g / L. These findings suggest a role of renal anemia in the pathogenesis of these, and need for periodical screening of thyroid function, morphology, and titer of thyroid antibodies in patients HD, as well as more effective diagnosis and more aggressive treatment of renal anemia. **KEY WORDS:** THYROID FUNCTION, MORPHOLOGY, HEMODIALYSIS, TSH, AUTOIMMUNITY, HGB, RENAL ANEMIA.

Corresponding author: Selma Jusufovic, MD. Department of Endocrinology, Clinic for Internal Diseases, University Clinical Centre Tuzla, Trnovac bb, 75 000 Tuzla, Bosnia and Herzegovina

1. INTRODUCTION

Chronic kidney disease (CKD) and hemodialysis (HD) are accompanied by numerous metabolic and hormonal disorders which include thyroid function, morphology and autoimmunity disorders (1). CKD affects both the hypothalamus-pituitary-thyroid axis and

peripheral metabolism of thyroid hormones (2, 3, 4). Level of serum thyroid stimulating hormone (TSH) is usually normal or elevated in CKD, but has reduced response to its releasing hormone (TRH) (3, 4, 5). In CKD are also disturbed circadian rhythm of TSH and TSH glycosylation (6).

According to previous researches, the most common thyroid imbalance on chronic HD is a low T3 syndrome with FT3 levels generally within the normal limits (7). This reduction is associated with reduced peripheral conversion of T4 to T3, systemic acidosis, the length of dialysis and markers of endothelial dysfunction and inflammation (8, 9, 10). The reduction of total serum T3, but not FT3 is associated with increased cardiovascular mortality in euthyroid patients with CKD. Total and free T3 are acting as markers of survival in patients on HD (11). And finally there are reports to conclude that low serum T3 levels before kidney transplantation are associated with decreased graft survival (12). Although free and total T4 can be normal or slightly reduced, it can sometimes be increased due to the effect of heparin used in anticoagulant therapy during HD. Lipolytic activity of heparin leads to lipolysis of triglycerides in non-esterified free fatty acids which in high concentrations compete with T4 for proteins carriers (13). TSH levels according to several study results in patients with CKD are not uniform. In some studies was not found significant differences in mean TSH level in HD patients and healthy subjects (14, 15). In study Conchol et al. (16) there was examined 3089 adult patients with CKD who require dialysis treatment. It was concluded that subclinical primary hypothyroidism is relatively common in these patients (18%) and was correlated with decline in GFR.

Increased volume of the thyroid gland was found in about 50% of patients with CKD without clinically manifested goiter (14). Potential pathogenic factors are "capture" of iodine in the thyroid gland and possible accumulation of unidentified substances goitrogens in uremic plasma (10). Thyroid nodules and thyroid cancer are more common in patients with CKD and HD compared to general population. Patients on HD have a higher risk of oncogenesis, probably due to the impaired cellular immunity. Patients after kidney transplantation are under more risk of oncogenesis due to immunosuppressive therapy (17).

Renal anemia in recent studies is cited as a possible cause of thyroid dysfunction (18). Chronic kidney disease leads to renal anemia, primarily by reducing the production of erythropoietin, which leads to extremely low concentrations of hemoglobin (19). Other mechanisms with which CKD can lead to anemia include blood loss during dialysis; shortened lifespan of red blood cells; inefficient transport iron; vitamin B12 deficiency and folate; inflammation. In early stage disease, renal anemia occurs in about 25% of patients with CKD, and increases up to 75-95% in HD patients in late stage disease (20, 21). It seems that for the initial steps in the synthesis of thyroid hormones is necessary incorporation of iodine into tyrosine residues of thyroglobulin and that the covalent bonds between these residues are catalyzed with iron containing thyroperoxydase. Other hem-containing enzymes such as cytochrome C and myeloperoxidase and succinate dehydrogenase were also highly sensitive to iron depletion. Severe iron deficiency may therefore interfere with thyroid hormone synthesis and reduce thyroperoxydase activity (22). Tomoda et al. (23) showed that the introduction of recombinant human erythropoietin (Rh EPO) in treatment of anemia in HD patients leads to improving function of hypothalamo-pituitary-thyroid axis and levels of thyroid hormones in the periphery.

The aim of this study was to investigate the role of renal anemia on the function, morphology and autoimmune thyroid disorders in clinically euthyroid

patients on chronic hemodialysis.

2. MATERIALS AND METHODS

A prospective single center study in 12 months period included 40 stable patients who were on HD treatment longer than three months. All patients are on treatment with Rh EPO. Patients are divided in two groups according to serum Hgb level (group A Hgb > 125 g/L and group B Hgb < 125 g/L). Exclusion criteria were previous thyroid disorders, systemic illnesses, critically ill patients, acute inflammatory diseases, and previous known other etiology anemia. The control group included 40 healthy participants.

Blood samples were taken fasting and before dialysis treatment and heparin administration. The following parameters were assessed: total protein, albumin, creatinine, urea, cholesterol, triglycerides, urea using Architect c 8000 Abbott. Hemoglobin, red blood cell count was assessed by standard laboratory measurements using SISEMEX. T3, T4, and TSH were assessed using Architect i2000 Abbott TSH (IRMA) by means of standard laboratory methods. Free T4, free T3 and thyroid antibodies (TgAb, TPOAb) were assayed by RIA using commercially available kits.

The ultrasonographic examination of thyroid gland was performed with 7.5MHz probe, 50 mm linear transducer. Three consecutive measurements were taken for each thyroid lobe, than the thyroid volume each lobe was calculated with formula $V = a \times b \times c \times n/6$, n/6 is correction factor 0.479 (24). A total thyroid volume was calculated as a sum of lobe volumes. After the thyroid volume measurement the thyroid echostructure was estimated. The thyroid gland was especially examined in respect of nodules presence.

We defined clinical features as:

Body mass index (BMI) was calculated according to the universal formula, as follows $BMI = (\text{weight in kilograms}) / (\text{height in meters}) \times (\text{height in meters})$. Anemia was defined according to guidelines NKF-K/DOQI (19): Adult men and postmenopausal women with CKD Hgb ≤ 12.5 g/dL (125 g/L) (Hct < 37%) of premenopausal women Hgb ≤ 11 g/dL (110g/L) (Hct < 33%).

Subclinical hypothyroidism is de-

defined as a mild elevation in (TSH) $TSH > 4,4$ mmol/L levels in patients with normal serum thyroxin level (25). Hypothyroidism is defined as elevation in $TSH > 10$ mmol/L and reduced T3 and T4 (26). Low T3 syndrome is defined with reduced $T3 < 0.89$ (27).

Simple goiter is defined with elevated thyroid volume > 20ml (28). Nodular goiter is defined with presence of one node in either of thyroid lobe, multinodular goiter is defined with two or more nodules in thyroid lobes (28). Autoimmune thyroid disease is defined with finding of elevated thyroid antibodies (TgAb, TPOAb) and irregular pathognomonic ultrasound echostructure (29).

Data are expressed as means \pm standard deviations. Statistical differences between arithmetic means of variables of each parameters were assessed using parametric and non parametric tests. To test hypotheses about the relationship of two variables correlation coefficients were calculate. Values less than 0.05 were taken as significant. Data processing software package was used SPSS for windows.

3. RESULTS

The study included 40 patients on HD. Figure 1 shows that the most common cause of CKD is undefined renal disease (47%), followed by chronic glomerulonephritis (25%). Patients were divided into two groups according to serum hemoglobin level: group A (Hgb < 125 g/L) and group B (Hgb > 125 g / L). Table 1 shows that there is no statistically significant difference in the average values of age, gender participation, BMI and GFR between the groups. There is a significantly lower time of dialysis treatment in the group A.

Table 2 shows that there was no statistically significant differences in mean values between these groups in mean values of total and free thyroid hormones, $p > 0.05$. Testing with the significance level of 0.1 (10%) shows that in group A is statistically significant lower mean values of triiodothyronine (T3) level. Table 3 shows that in HD group is statistically significant more frequent low T3 syndrome and subclinical hypothyroidism ($p < 0.05$).

In Figure 2 is shown that there is

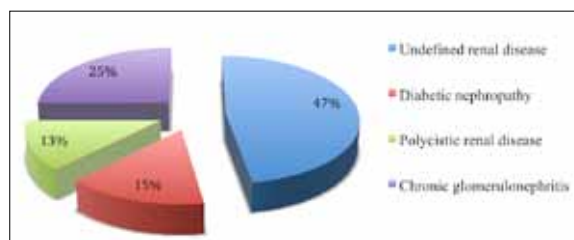


FIGURE 1. Percentage of underlying diseases in HD group

a significantly higher frequency of the ultrasound findings suggestive for the

available literature which investigates the role of anemia in pathogenesis of

of elevated levels of antibodies in the group A comparing to group B: TgAt (13.79% (n=4) vs. 18.18% (n=2), p>0, 05); TPOAt (24.13% (n=7) vs. 27.27% (n=3), p>0.05).

4. DISCUSSION

There are a limited number of studies in currently available literature which investigates the role of anemia in pathogenesis of

HD patients with a hematocrit level of 25%. Before rh EPO applications levels of thyroid hormones, particularly FT4 and FT3 were below the reference value, whereas after administration of rh EPO there was significant increase in the total and free hormones in a group of patients in which is caused an increase in hematocrit > 5%, while in the group of patients in which is caused an increase in hematocrit to <5% there was no significant increase in hormones levels. They found a significant correlation between hematocrit and fT3 in all subjects. According to a study Dabaganesha et al. (18) patients with iron deficiency in serum had significantly higher levels of TSH and lower FT4 levels compared with patients with normal serum ferritin level.

In our study, the group of patients with serum levels of hemoglobin under 125 g/L we found a statistically significant lower mean total T3 levels and consequently a significantly higher prevalence of low T3 syndrome in 17.24% (n=5). We found no statistically significant difference in mean total T4, FT4, FT3 nor in mean TSH levels between groups.

Dabbaghmanesh at al. (18) investigated the role of iron deficiency anemia nonrenal causes in diffuse goiter pathogenesis. In their results, the presence or absence of goiter had nothing to do with a deficit of iron in serum. Azizi et al. (30) found a significant association with iron deficiency prevalence and diffuse goiter.

In our study we have not found a statistically significant difference in mean values of thyroid volume between the two groups of patients. We found significantly more frequently multinodular goiter in patients with serum levels

Variables	Serum hemoglobin level			P
	Group A	Group B	Total	
	$\mu \pm \sigma$	$\mu \pm \sigma$	$\mu \pm \sigma$	
Average age (yr; mean \pm SD)	54,38 \pm 12,388	50,36 \pm 9,841	53,28 \pm 11,760	0,341
Male gender (n[%])	11 (37,93%)	7 (63,64%)	18 (45,00%)	0,132
Female gender (n[%])	18 (62,07%)	4 (36,36%)	22 (55,00 %)	0,132
BMI (kg/m2 mean \pm SD)	23,03 \pm 2,179	23,45 \pm 1,809	23,15 \pm 2,070	0,573
Time on dialysis (mo; mean \pm SD)	49,82 \pm 33,64	88,00 \pm 27,85	60,32 \pm 36,18	0,002
HGB (g/L; mean \pm SD)	95,10 \pm 14,94	133,24 \pm 9,74	105,60 \pm 21,96	< 0,001
GFR (mL/min/1.73m2)	12,31 \pm 2,05	12,45 \pm 1,86	12,35 \pm 1,98	0,840

TABLE 1. Selected characteristics of study patients

Variables	Serum hemoglobin level			P
	Group A	Group B	Total	
	$\mu \pm \sigma$	$\mu \pm \sigma$	$\mu \pm \sigma$	
Triiodothyronine (T3) nmol/L	1,29 \pm 0,469	1,55 \pm 0,352	1,36 \pm 0,451	0,1018
Thyroxine (T4) nmol/L	78,52 \pm 15,850	85,11 \pm 26,357	80,33 \pm 19,167	0,3381
Thyroid stimulating hormone (TSH) mIU/ml	3,42 \pm 3,538	2,47 \pm 1,834	3,16 \pm 3,168	0,4067
Free T3 (FT3) pmol/L	5,26 \pm 2,194	5,10 \pm 1,494	5,21 \pm 2,008	0,8283
Free T4 (FT4) pmol/L	13,97 \pm 3,244	14,78 \pm 4,130	14,19 \pm 3,473	0,5140

TABLE 2. Mean values and dispersion measures of total and free thyroid hormones and thyroid stimulating hormone

Hashimoto thyroiditis in group A comparing to group B (13.79% (n=4) vs. 0.00% (n= 0), p<0.05). There was no statistically significant difference between the two groups in the incidence of nodular goiter (24,13% (n=7) vs. 27.27% (n=3), p>0.05), nor in the incidence of diffuse goiter (27.59 % (n=8) vs. 54.55% (n=14), p>0.05). Table 4 shows that by differentiation nodular goiter to uninodular and multinodular we found statistically significant higher percentage of multinodular goiter in group A, p<0.05.

Table 5 shows that there is no statistically significant difference between mean values of thyroid antibodies (TgAt, TPOAT) between the two groups of patients, p> 0.05. In Figure 3 is shown that there is no statistically significant difference in the incidence

thyroid function and morphology disorders in patients with CKD and HD. Tomoda at al. (23) examined the role of anemia on thyroid function in patients on chronic HD. The authors evaluated thyroid function before and after six months of treatment with rh EPO in 22

Thyroid function disorder	Serum hemoglobin level						P
	Group A		Group B		Total		
	f	%	f	%	f	%	
Without disorder	14	48,28	8	72,73	22	55,00	0,134
Low T3 syndrome	5	17,24	0	0,00	5	12,50	0,014
High T4 syndrome	0	0,00	0	0,00	0	0,00	---
Low T4 syndrome	2	6,90	1	9,09	3	7,50	0,824
Subclinical hypothyroidism	5	17,24	2	18,18	7	17,50	0,945
Clinical hypothyroidism	2	6,90	0	0,00	2	5,00	0,143
Subclinical hyperthyroidism	1	3,45	0	0,00	1	2,50	0,309
	29	100,00	11	100	40	100	

TABLE 3. Frequency of thyroid functional disorders among the groups

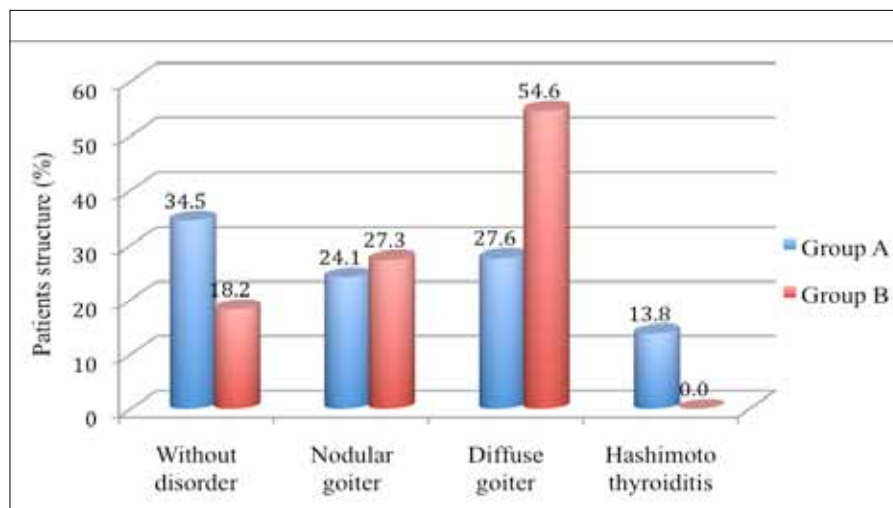


FIGURE 2. Thyroid morphology disorders among groups

of Hgb<125 g/L in 13.79% (n=4), p=0.03.

In further research of the literature we have not found studies that investigate the role of renal anemia on thyroid autoimmunity in patients on HD and CKD.

Sibbilla et al. (31) examined the relationship between chronic anemia defined as unexplained anemia that is not related to occult bleeding and/or hematological disorders in patients with au-

toimmune thyroid disease (ATD) and in patients with nonautoimmune thyroid disease (NAITD), but the prevalence of anemia was higher in hypothyroid patients with ATD and ATD patients who have associated autoimmune disorders.

In our results, we have not found a statistically significant difference between mean values of thyroid antibodies nor the frequency of elevated antibody titer between the two groups. Morphological changes suggestive for

Thyroid morphology disorder	Serum hemoglobine level						P
	Group A		Group B		Total		
	f	%	f	%	f	%	
Multinodular goiter	4	13,79	0	0,00	4	10,00	0,031
Nodular goiter	3	10,34	3	27,27	6	15,00	0,245

TABLE 4. Frequency of nodular and multinodular goiter among groups

Variables	Serum hemoglobin level			p
	Group A	Group B	Total	
	$\mu \pm \sigma$	$\mu \pm \sigma$	$\mu \pm \sigma$	
Thyroglobulin antibodies (TgAt) IU/ml	21,14 ± 33,560	15,64 ± 10,305	19,63 ± 29,018	0,5993
Thyroid peroxidase antibodies (TPOAt) IU/ml	18,60 ± 14,644	18,12 ± 12,769	18,47 ± 13,994	0,9249

TABLE 5. Mean values and dispersion measures for TgAt and TPOAt

toimmune thyroid disease (ATD) and in patients with nonautoimmune thyroid disease (NAITD). Of 1643 patients with thyroid disease, ATD was diagnosed in 652 patients (of whom 71 patients had Graves disease, and 581 had Hashimoto's thyroiditis). In 145 patients, ATD was associated with other autoimmune disorders. Chronic unexplained anemia was diagnosed in 123 (7-5%) cases, 49 had talasemic characteristics (2-9%). Prevalence of chronic anemia was not

autoimmune Hashimoto thyroiditis was significantly more frequently found in the group of patients with serum levels of Hgb <125 g/L in 13.79% (n=4) (p=0.031). Our results have a foothold in the research of Biondi et al. (32) according to whom irregular ultrasound echostructure may precede TPOAt positivity in autoimmune thyroid disease and TPOAt can be detected in only 20% of patients with ultrasound evidence of thyroid autoimmunity.

5. CONCLUSION

Considering that we are found in the HD patients a significant link of renal anemia with decreased level of T3 and higher incidence of low T3 syndrome, which are associated with increased cardiovascular mortality and morbidity, and acts as markers of survival in patients on HD, it is necessary to conduct a periodically measuring levels of T3 in these patients in order to assess the relationship between thyroid dysfunction and mortality risk in this population.

Also, our results relates renal anemia with greater frequency of multinodular goiter in these patients, who are already at greater risk of oncogenesis, so it is necessary to perform periodic ultrasound examinations of thyroid morphology. We are also found a significant link of renal anemia with morphological changes of the thyroid gland suggestive of Hashimoto thyroiditis. Considering that patients with this autoimmune thyroid disorder are at greater risk for subclinical and clinical hypothyroidism they requires periodic screening for thyroid antibodies and complete thyroid functional state assessment .

We found a significantly lower duration of dialysis treatment in patients with serum levels of hemoglobin <125 g/L, which may indicate the possibility that in patients who are shorter on HD anemia is not successfully corrected compared with patients with longer duration of HD.

The results of our study suggest that anemia contributes to the pathogenesis of thyroid function, morphology and autoimmunity disorders in patients on HD and recommend more effective diagnosis, aggressive treatment of anemia, and introduction of Rh Epo without delay.

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ORIGINAL PAPER

Evaluation of Standardized and Applied Variables in Predicting Treatment Outcomes of Polytrauma Patients

Goran Aksamija¹, Adi Mulabdic², Ismar Rasic¹, Samir Muhovic¹, Igor Gavric¹

Clinic for general and abdominal surgery. Clinical center University of Sarajevo, Sarajevo, Bosnia and Herzegovina¹

Clinic for emergency medicine. Clinical center University of Sarajevo, Sarajevo, Bosnia and Herzegovina²

Introduction. Polytrauma is defined as an injury where they are affected by at least two different organ systems or body, with at least one life-threatening injuries. Given the multilevel model care of polytrauma patients within KCUS are inevitable weaknesses in the management of this category of patients. **Objective.** To determine the dynamics of existing procedures in treatment of polytrauma patients on admission to KCUS, and based on statistical analysis of variables applied to determine and define the factors that influence the final outcome of treatment, and determine their mutual relationship, which may result in eliminating the flaws in the approach to the problem. **Material and methods.** The study was based on 263 polytrauma patients. Parametric and non-parametric statistical methods were used. Basic statistics were calculated, based on the calculated parameters for the final achievement of research objectives, multicoloration analysis, image analysis, discriminant analysis and multifactorial analysis were used. From the universe of variables for this study we selected sample of $n=25$ variables, of which the first two modular, others belong to the common measurement space ($n=23$) and in this paper defined as a system variable methods, procedures and assessments of polytrauma patients. **Results and discussion.** After the multicoloration analysis, since the image analysis gave a reliable measurement results, we started the analysis of eigenvalues, that is defining the factors upon which they obtain information about the system solve the problem of the existing model and its correlation with treatment outcome. **Conclusion.** The study singled out the essential factors that determine the current organizational model of care, which may affect the treatment and better outcome of polytrauma patients. This analysis has shown the maximum correlative relationships between these practices and contributed to development guidelines that are defined by isolated factors. **KEY WORDS:** POLYTRAUMA, THE VARIABLE FACTOR.

Corresponding author: Goran Akšamija, MD, PhD. Clinic for general and abdominal surgery. Clinical Center University of Sarajevo. Bolnicka 25, 71000 Sarajevo. Bosnia and Herzegovina. Email: g.aksamija@hotmail.com

1. INTRODUCTION

Polytrauma is defined as an injury where they are affected by at least two different organ systems of body, with at least one life-threatening injury (1, 2). In relation to its intensity is indicated by the score - Injury Severity Score -

ISS ≥ 16 (1, 3). Polytrauma in urgent service is the most difficult problem for the surgeon and the procedure that been used requires intensive care and organized involvement in optimal conditions at all levels of health care. Of all the injuries, polytrauma accounting

for 5-10%, with an extremely high rate of mortality and subsequent disability (4). In the mortality statistics injury is broken out in the third place, second to cardiovascular and malignant diseases, affecting most vital age group to 45 years, after which the statistics in the first place. Trauma surgeons, who organizes and begins treatment in hospital facilities, must consider and evaluate the entire therapeutic process and direct it to the care of polytrauma as a whole. It is necessary for this procedure is the existence of a unique algorithm that enables the organization of care for treatment and contact with other specialties in order of team-work to save lives of injured (5). Determination of specific tactics polytrauma care refers primarily to the doctrinal procedures at a critical stage, when life is threatened, followed by determining the sequence of other processes to the final outcome of treatment.

The organizational model of care on polytrauma patients at the Clinical Center University of Sarajevo (CCUS, KCUS) are done on the multi-level approach because of still undefined physical and personnel management of this institution in the approach to the problem. The line begins at the level of care in emergency medicine clinic and existing personnel within it, then use the organizational unit: Diagnostic disciplines, Clinic for Anesthesiology and Reanimation and other institutions within the subspecialist in KCUS (6).

Given the multi-level existing organizational model of care and trauma patients within KCUS, the lack of cen-

tralization of care through the widely known and accepted principles of trauma centers (all-in-one place), which is not identical to any one referral model, defects are inevitable in this category of patient care and significantly worse results of the final outcome of treatment in relation to European and U.S. standards. From the foregoing, there is a need to establish the best model of care of patients in this category compared to current conditions, which primarily depends on the capacity of the state and the health care system that is not currently able to fund and monitor the development of trauma systems to the construction of at least one referral by type of institution-level I trauma center.

2. AIM OF STUDY

The aim is to determine the dynamics of existing procedures in treatment of polytrauma patients on admission to KCUS, and based on statistical analysis of variables applied to determine and define the factors that influence the final outcome of treatment, and determine their mutual relationship to the current organizational model of care, which may result in removing flaws in the approach to the problem.

3. MATERIAL AND METHODS

The research was exploratory in nature which are used parametric and non-parametric statistical methods. To determine the basic statistical parameters, the descriptive analysis was used, where the calculated basic statistics (AS, SD, VAR), and based on the calculated parameters for the final achievement of research objectives multicolleration analysis, image analysis, discriminant analysis and multifactorial analysis were used.

The study involved 263 patients, both sexes, age groups above 15 years who as polytraumatized patients arrived at the service of Center for urgent medicine (CUM) for further treatment and final disposal. The selection was made using the method of maximizing the sample in the sample that entered each patient according to established criteria ($ISS \geq 16$), and represents population of polytrauma patients. The data source were protocols

of Clinic for Urgent medicine and the History of Disease of Clinic for Anesthesiology and Resuscitation. From the universe of variables for this study was selected sample of $n = 25$ variables, of which the first two modular: 1. *Year of admission*; and 2. *Sex*. Other area belong to a single measurement ($n = 23$) and in this paper are defined as system variables, methods, procedures and assessments of polytrauma patients, such as: 3. *Age*; 4. *The cause of injury*; 5. *Time in the CUM*; 6. *The urgency of surgery*, 7. *Diagnostic in CUM*; 8. *Trauma team KCUS-CUM*; 9. *Type of injury*; 10. *Trauma Score (TS)*; 11. *Expected survival rates TS (TS Ps)*; 12. *The Revised Trauma Score (RTS)*; 13. *Expected survival rates RTS (RTS Ps)*; 14. *Injury Severity Score (ISS)*; 15. *Expected survival rates TRISS (TRISS Ps)*; 16. *Expected survival rates ASCOT (ASCOT Ps)*; 17. *Earlier disease*; 18. *Trauma team KCUS-KAR*; 19. *KAR diagnostic tests*; 20. *Complications during treatment*; 21. *Number of patient days in KAR*; 22. *Phase surgery*; 23. *Fatal outcome in relation to the time interval A*; 24. *Fatal outcome in relation to the time interval B*, and 25. *The overall mortality* (7, 8, 9).

Statistical analysis and evaluation of results was performed using a computer statistical program SPSS Windows 12.

4. RESULTS

After descriptive analysis frequencies and percentages of system variables in measuring the applied area of access to a description of the basic statistical parameters of the applied variables on the applied sample. Applied on the system variables that accounted for a unique measuring space ($n = 23$), because the first two excluded as a modal, calculated as AS and SD in order to access the search and clustering of certain procedures in polytrauma patients, and any deviation from the AS to establish the variability of these procedures and found some legality variables in defining the interactive effects of subject variables in the measurement process. Multicolleration analysis calculated Pearson's correlation coefficients and found that:

The variable "gender" has no achieved significant correlation with any one variable.

The variable "age" has a negative correlation with the variable "type of injury" ($r = -0.16$), then the variable "Triss Ps" ($r = -0.26$), the variable "ASCOT" ($r = -0.18$), and variable "early diseases"; ($r = -0.47$); A positive correlation was achieved with the variable "fatal interval A" with the amount of correlation ($r = 0.17$); variable "fatal interval B" ($r = 0.18$) and the variable "total mortality" with a correlation coefficient $r = 0.19$.

The variable "cause of injury" has a negative correlation with the variable "the urgency of the surgery" ($r = -0.27$), then the variable "trauma team KCUS CUM" ($r = -0.17$). A very distinct positive correlation was achieved with the variable "type of injury" ($r = 0.54$).

The variable "time in the CUM" have a negative correlation with the variable "ISS" ($r = -0.24$) and the variable "total mortality" ($r = -0.19$). A positive correlation was achieved with the variables of the "urgency of surgery" ($r = 0.37$); variable "diagnostic CUM" ($r = 0.36$); variable "trauma team KCUS CUM" ($r = 0.23$), then the variable "TS" ($r = 0.24$) variable "TS Ps" ($r = 0.25$); variable "RTS" ($r = 0.21$); variable "RTS Ps" ($r = 0.22$); variable "TRISS Ps" ($r = 0, 22$) and the variable "ASCOT Ps" ($r = 0.19$).

The variable "urgent surgery" has a negative correlation with the variable "type of injury" ($r = -0.39$) and the variable "ISS" ($r = -0.19$); a positive correlation with the variable "diagnostic in CUM" ($r = 0.21$); variable "trauma team KCUS CUM" ($r = 0.19$); variable "TS" ($r = 0.19$) and the variable "diagnostic KAR" ($r = 0.17$).

The variable "diagnostic CUM" has no negative correlation, but a positive correlation was achieved with the variable "trauma team KCUS CUM" ($r = 0.40$), then the "trauma team KCUS KAR" ($r = 0.17$) and the variable "diagnostic KAR" ($r = 0.28$).

The variable "trauma team KCUS CUM" positively correlated only with the variable "trauma team KCUS KAR" ($r = 0.27$).

The variable "type of injury" has a negative correlation with the variables of the "fatal interval A" and "fatal interval B" at the level of statistical significance of $r = 0.05$.

The variable "TS" has a negative

correlation with the variable "ISS" (r = - 0.54), the variable "complications during treatment" (r = - 0.18), the variable "fatal interval A" (r = - 0, 33); variable "fatal interval B" (r = -0.34) and the variable "total mortality" (r = - 0.47), and has a positive correlation with the variable "TS Ps" (r = 0, 96), then the variable "RTS" (r = 0.93); variable "RTS Ps" (r = 0.87); variable "TRISS Ps" (r = 0.85); variable "ASCOT Ps" (r = 0.85) and the variable "diagnostic KAR" (r = 0.23).

The variable "TS Ps" has a high negative correlation with the variable "ISS" (r = - 0.52), the variable "complications during treatment" (r = - 0.18) and a relatively strong negative correlation with the variable "fatal interval A" (r = - 0.34), the variable "fatal interval B" (r = - 0.35) and the variable "total mortality" (r = - 0.48). A very high positive correlation, this variable has a variable "RTS" (r = 0.90); variable "RTS Ps" (r = 0.87); variable "Triss Ps" (r = 0.86) and the variable "ASCOT Ps" (r = 0.85), made a slight correlation with the variable "diagnostic KAR" the correlation of r = 0.21.

The variable "RTS" has a negative correlation with the variable "ISS" (r = - 0.52), the variable "fatal interval A" (r = - 0.33); "fatal interval B" (r = - 0, 33) and "total mortality" (r = - 0.45) and positively correlated with the variable "RTS Ps" (r = 0.94); variable "Triss Ps" (r = 0.87); variable "ASCOT Ps" (r = 0.89) and relatively mild correlation coefficient with the variable "diagnostic KAR" (r = 0.17).

The variable "RTS Ps" has a negative correlation with the variable "ISS" (r = - 0.51), the variable "fatal interval A" (r = - 0.31); "fatal interval B" (r = - 0.31) and "total fatal outcome" (r = - 0.45) and positively correlated with the variable "Triss Ps" (r = 0.85); variable "ASCOT Ps" (r = 0.89) and relatively mild correlation coefficient with variables "diagnostic KAR" (r = 0.27) and the variable "trauma team KCUS KAR" (r = 0.17).

The variable "ISS" has a high negative correlation with the variable "Triss Ps" (r = - 0.70), the variable "ASCOT Ps" (r = - 0.64), the variable "diagnostic KAR" (r = - 0.28), a positive correlation with the variable "fatal interval A" (r = 0.23); variable "fatal interval B" (r = 0.24) and the variable "total mortality" (r = 0.39).

The variable "TrissPs" has a negative correlation with the variable "fatal interval A" (r = - 0.41), the variable "fatal interval B" (r = - 0.42) and the variable "total mortality" (r = - 0.54), a positive correlation with the variable "ASCOT Ps" (r = 0.94) and the variable "diagnostic KAR" (r = 0.25).

The variable "ASCOT Ps" has a negative correlation with variable "fatal interval A" (r = - 0.34), the variable "fatal interval B" (r = -0.35) and the variable "total mortality" (r = -0.49), a positive correlation with the variable "diagnostic KAR" (r = 0.23).

The variable "early disease" no expressed correlation applied a set of variables.

The variable "trauma team KCUS KAR" has a negative correlation with the variable "total mortality" (r = - 0.17), a positive correlation with the variable "diagnostic KAR" (r = 0.36); variable "complications during treatment" (r = 0.23), the variable "number of hospital days KAR" (r = 0.26) and the variable "phase of surgery" (r = 0.20).

The variable "diagnostic KAR" has a negative correlation with the variable "total mortality" (r = - 0.25), a positive correlation with the variables of the "complications during treatment" (r = 0.24) and "number of hospital days KAR" (r = 0.27).

The variable "complications in the course of treatment" has a positive correlation with the variables "number of hospital days KAR" (r = 0.48); "stage of surgery"; (r = 0.21); "fatal interval A" (r = 0, 29); "fatal interval B" (r = 0.28) and the variable "total mortality" (r = 0.18).

The variable "number of hospital

days KAR" has a negative correlation with the variable "total mortality" (r = - 0.17) and positive correlation with the variable "stage of surgery" (r = 0.49). The variable "stage of surgery" has a negative correlation variable "fatal interval A" (r = - 0.17), the variable "fatal interval B" (r = - 0.17) and the variable "total mortality" (r = - 0.23).

The variable "fatal interval A" has a positive correlation with the variable "fatal interval B" (r = 0.98) and "total mortality" (r = 0.93). The variable "fatal interval B" has a positive correlation with the variable "total mortality" (r = 0.91).

Since this analysis established significant correlation of variables that have positive and negative correlations to determine the reason of this connection, access to the Image matrix and its antiimage as part multivariant analysis approach was made. After examining the matrix antiimage KMO (Kaiser-Mayer-Olkin) ratio was 0.78, and as such the Barlett test H², which is 5539.19, it was found that the matrix is fully suitable for further analysis.

In further analysis, based on a larger set of variables determined by the smaller set of basic variables or factors with the primary aim of analyzing the structure and classification of variables in order to obtain the hidden (latent) variables or factors that allow the separation of particles measuring instrument in the manifest variables. Calculating the determinant (D = 5.14) revealed that the matrix is fully suitable for scientific analysis. The method to extract the maximum correlation in this analysis was selected as the com-

Variable No	Variable	ORP	PAP
12	Revised Trauma Score (RTS)	0,95	0,97
16	Expected survival rates to ASCOT(ASCOT Ps)	0,95	0,94
15	Expected survival rates to TRISS (TRISS Ps)	0,95	0,91
10	Trauma Score (TS)	0,94	0,95
13	Expected survival rates to RTS (RTS Ps)	0,94	0,95
11	Expected survival rates to TS (TS Ps)	0,94	0,93

TABLE 1. Projections of variables on the first factor

Variable No	Variable	ORP	PAP
14	Injuri Severity Score (ISS)	-0,68	-0,64
9	Type of Injuri	-0,85	-0,86
4	Cause of Injury	-0,83	-0,87
6	Urgency of surgery	0,60	0,50

TABLE 2. Projections of variables on the second factor

Variable No	Variable	ORP	PAP
21	Number of patient days in KAR	0,81	0,83
20	Complications during treatment	0,67	0,69
22	Phase of surgery	0,63	0,63
18	Trauma team KCUS-KAR	0,58	0,56
19	Diagnostic tests KAR	0,54	0,51

TABLE 3. Projections of variables on the third factor

Variable No	Variable	ORP	PAP
24	Fatal outcome in relation to the interval B	0,98	0,96
23	Fatal outcome in relation to the interval A	0,98	0,96
25	Total mortality	0,92	0,85

TABLE 4. Projections of variables on the fourth factor

ponent model. Component model analyzes the total variance of variables with common variance-komunality (K) includes more specific variance and error variance. These two types of variance are called together unique variance or unicity (U).

Matrix was calculated from komunality and unicity which provides evidence of the entire system in variables applied in retrospective analysis of polytrauma approach. The total variance is standardized to 1, and is divided into two parts: one part that is unique to such variables as unicity, and common variance (the sum of multiple correlation- komunality) that each variable is given to all others, that reflects the subject of measurement. Analysis of unicity variables can be said that unicity variables are not homogeneous and that the majority of variables (n = 13) lower part of its variability is shared with other variables, and these unicity move continuously from 0.26 to 0.54. Other variables have very low unicity which gives us the information that much of the variability shared with all other variables, which is evident from the table. Further analysis can be concluded that the relatively high komunality variables that move in a continuum from 0.46 to 0.92. Most of komunality variables are related to applied and scoring systems and analysis of death outcome. The analysis of the results obtained in the direction of descriptive analysis we can conclude that these variables are aimed at assessing the final outcome of treatment of polytrauma patients.

To isolate the latent dimensions used in this study is a component model (method of principal components). This

method is obtained as the major components of what is the number of initial variables and principal components are calculated in succession. The first principal component is calculated on the full variance matrix of variables (R) and explains the greatest amount of variance of variables. Each variable is correlated with itself has a variance and it is the total proportion of variance of variables, and they counted the variable intercorrelations with other variables. In this model, the first is exhausted common variance of variables, and start spending the specific variance and error variance (U). The key components are selected by the Guttman-Kaiser criteria that was used in a way that they extract those components that have a variance ≥ 1 .

In this way shows the inherent value of its power to explain variability isolated six factors, as determined by the Guttman-Kaiser criteria. The first ei-

genvalue of 6.91 exhaust 31.40% of common variance of the overall system of applied variables. The following components, the mathematical logic of this method exhaust all the smaller percentage of common variance, so the last of the eigenvalues extracted from the 1.04 exhaust 4.74% common variance, and is the least significant eigenvalue. In one, isolated eigenvalues exhausting total of 73.07% common variability.

Significant main components have become the factors that caused by rotation in order that the final structure of each factor approach achieved the highest possible correlations in the analytical rotation. Were used and angle orthogonal rotation. The orthogonal rotations maintain the independence of the main components in angle rotations realized the odds of their connection. Orthogonal rotation produced projections that are reasonable and definitive, and the criteria for selection of orthogonal rotation which is taken in this study is the varimax criterion (Kaiser 1958.) and rounded criterion (Carrroll 1953.). On the basis of parallel and orthogonal coefficient projections made tentative interpretation of the factors, and defining their access through the following six tables:

In Table 7. coefficients of variance are shown in six isolated above factors.

5. DISCUSSION

Having examined it can be seen significant results in patients grouped

Variable No	Variable	ORP	PAP
7	Diagnostic tests CUM	0,81	0,84
5	Retention time in CUM	0,69	0,68
8	Trauma team KCUS-CUM	0,64	0,63

TABLE 5. Projections of variables on the fifth factor

Variable No	Variable	ORP	PAP
17	Earlier disease	0,85	0,86

TABLE 6. Projections of variables on the sixth factor

Factors	OBQ 1	OBQ 2	OBQ 3	OBQ 4	OBQ 5	OBQ 6
OBQ 1	1,00	0,06	0,05	-0,31	0,17	0,07
OBQ 2	0,06	1,00	-0,01	0,05	0,25	-0,06
OBQ 3	0,05	-0,01	1,00	-0,04	0,12	-0,03
OBQ 4	-0,31	0,05	-0,04	1,00	-0,01	0,00
OBQ 5	0,17	0,25	0,12	-0,01	1,00	-0,01
OBQ 6	0,07	-0,06	-0,03	0,00	-0,01	1,00

TABLE 7. Variance OBQ factors isolated

around their AS, and it can be stated that certain variables such as the urgency of surgery, type of injury, Triss Ps, ASCOT Ps and total mortality in their AS does not give significant differences, so that the SD group of variables is very low which indicates that measurements were performed on these variables in a way they tend to group around the AS. The second group of variables: time in the CUM, CUM diagnostic tests, diagnostic tests in KAR, complications during treatment and the number of patient days in the KAR, also tend to group around the AS, but the results of individual respondents expressed further from AS, which indicates that groups of variables: age, cause of injury, trauma team KCUS CUM, trauma team KCUS KAR, TS Ps, RTS Ps, ISS, earlier disease, phase of surgery, death outcome and the time interval A and interval B have values that oscillate around AS, whose deviations are greater than 1 SD, based on which it can be concluded that the system subject to considerable variations in measurements occurred in patients on which to determine that there are certain determinants which can be the basis for solving the given problem in research. Since this is exploratory research required a very complex statistical tests, which were used to search the resultant audit polytrauma patients, caused by different scoring system of individual particles in the applied system variables, which are oscillated different quantified values, it is applied multivariate statistical method of analysis that are applied in a hierarchical continuity of analysis of variance, discriminant analysis, multicolleration analysis, image analysis and analysis of the latent dimensions. Analysis of variance was applied to establish the result of variability in the examined sample, in order to gain insight into whether the variation is statistically significant, based on which to effect a scientific explanation and conclude on the basis of variability in the observed sample. Since it is established statistical significant variation, discriminant analysis was performed to confirm the possible distance to the subject and determine cause and effect relationships and the longitudinal distance in the interval of a predetermined period of time. Once we determined

this there was no statistically significant difference in the final outcome of treatment for a given period, they are now more complex multicolleration analysis, to assess the strength of association measuring segments and find justification for the use of more complex intercolleration odds, cause-effect relationships and, for information with help them to effect a scientific conclusion. For this analysis it was necessary to check the relevant characteristics of metric measurements, which served as a basis for image analysis that gave the odds of representation of each segment and the tests that are defined in the patients made up the original papers. Since the image analysis gave a reliable measurement results, we started the analysis of eigenvalues, that is defining the factors upon which they obtain information about the system solve the problem of the existing organizational model and its correlation with the final outcome of treatment of patients.

Table 1 coefficients are shown in parallel and orthogonal projection of variables on an isolated factor. Orthogonal and parallel projections, were obtained Ortoblique solution, which enabled the transformation of notional systems or major components, or intrinsic value. Orthogonal projections show the correlation of variables with an isolated factor, and parallel projections show a high saturation variables with isolated factor. After examining the ORP and PAP can be observed very high and the correlation and saturation, based on insight into the variables that represent patients scoring systems, we can conclude that the first principal component in polytrauma patients expressed in the form of an assessment of the patient, and this factor can call *the appropriate assessment factor*.

In Table 2. can be observed that the projections and the saturation on this factor carried out four variables, three of which have negative projections on this factor and one variable has a relatively high positive correlation in relation to this group of variables, and to the urgency of the surgery. ISS variable, negative projections shares its variation with the first and second factor, but there are more interpretable in the second implication of the factor where

it belongs. This saturation variables points to the fact that the type of injury, cause of injury and severity of injuries at the same time the most important determinant for urgent surgery, which indicates the fact that it requires quick reactions and good clinical practice in an experiential setting indications for emergency surgery. Compared to the values shown in the table, this factor can rightly be called an *adequate response factor*.

The third factor (Table 3) is determined by variables that have a positive correlation and saturation, and the highest correlation was achieved projection variable number of patient days in the KAR, complications during treatment, and the time when the number of surgical procedures (phase), which is all largely conditioned by a team approach and adequate diagnosis in KAR. In relation to this arrangement saturation variables, this factor can be called *post-polytrauma flow factor*.

After examining the orthogonal and parallel projections of variables on an isolated factor in Table 4. can be concluded that the correlations and projections so high that only may be a time of occurrence of death, and this factor can be rightly defined as the *final treatment outcome factor*.

In Table 5 projections of the largest correlations in the isolated factor reflecting variable diagnostic CUM. The influence of residence time in the CUM and team approach, the projection coefficients have a significant impact on diagnostic tests in cum, and this factor can call *emergency diagnostic factor treatment*.

The sixth factor is entered only one variable, as can be seen from Table 6. This variable refers to the presence of early disease in polytrauma patients. Although this variable in a separate methodological model put to the end of the primacy of the polytrauma processing, can be safely said that this factor is not as important in the overall approach to the patient. Most likely it is the shortcomings of the documentation is incomplete at the time there is no adequate research to a default protocol, but such an outcome could be attributed to some unknown factors which is why this study and future research

should be fenced off from the categorical conclusion. This factor can be called the *presence of previous disease factor*.

6. CONCLUSION

The results in Table 7 show variance ratios of isolated factors, and insight into this correlation can be observed that two isolated factors do not belong to a separate segment of the test area because they achieved a relatively good correlation relationships, namely a factor 1 and factor 4 with mutual negative correlation ($r = -0.31$) and factor 5 and factor 2, which have a positive correlation ($r = 0.25$). Other factors are very low, insignificant correlations, so that it can be concluded that they belong to separate polytrauma segments. Positive correlations were made: Factor of adequate emergency response and diagnostic treatment factor. This correlation is logical and is explained by the fact that immediate and correct treatment is set at the first diagnostic approach to polytrauma patients has direct implications for an adequate response. A negative correlation was achieved adequate

factor estimates by a factor of the final outcome of treatment ($r = -0.31$), which also has a logical connection, because the outcome of patient treatment directly depends on the degree of severity on admission. Inside KCUS there development guidelines that determine the correlative relationship of an organizational model of care with the cause-effect relationships of the final outcome of treatment. The study singled out the essential factors that determine the current organizational model of care and factors that may affect the better treatment outcome, but also define the existing conditions in KCUS for further development of this institution through the procedures of this category of patient care. This analysis has shown the maximum correlative relationships between these practices and contributed to development guidelines that are defined by isolated factors.

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ORIGINAL PAPER

The Hematoma Block an Effective Alternative for Fracture Reduction in Distal Radius Fractures

Neritan Myderrizi¹, Bilal Mema²

University Service of Surgery, Orthopedic Clinic, Regional Hospital Durres, Albania¹

Intensive Care Service, Regional Hospital Durres, Albania²

Background: An alternative to general anesthesia was tested against hematoma block by a double-blind, randomized clinical trial in reduction of Colles fracture. **Method:** 96 patients more than 18 years old with displaced fractures of distal radius were selected from 2007-2009 on the basis of: 1) informed consent; 2) no contraindication to any method of analgesia; 3) no associated injury. Patients were randomized into 2 equal groups. The A group received Propofol intravenously, whereas the B group received 10 ml of 2% Lidocaine Hydrochloride into the fracture hematoma. Fractures are reduced under acceptable criteria. Pain measured by Visual Analogue Scale (VAS) was recorded before, during, and after reduction. Time to Emergency department, to manipulation and to hospital discharge is measured. In radiographic before, after reduction and a week later the radial tilt, ulnar migration and dorsal tilt are measured. Loss of these parameters were study statistically data analysis by KW statistics. **Results:** 96 patients with displaced fractures of distal radius at mean age 54.3 (19-84) years old, M/F rate 37/59, left/right hand 37/58., from 2005-2008. VAS during reduction was 0 in group A and 0.97 ± 0.7 in group B and VAS after reduction was 2.72 ± 0.7 in group A and 2.25 ± 0.2 in group B. Time to reduction was 2.63 ± 0.96 hr in A and 0.90 ± 0.47 hr in B After a week, 21 fractures lose reduction in group A and 22 in group B. **Conclusion:** Hematoma block by local anesthetic is a safe and effective alternative to intravenous general anesthesia in reduction of Colles fracture. **KEY WORDS:** DISTAL RADIUS FRACTURES, HEMATOMA BLOCK, INTRAVENOUS GENERAL ANESTHESIA.

Corresponding author: Neritan Myderrizi, MD. University Service of Surgery, Orthopedic Clinic. Regional Hospital Durres, Albania.

1. INTRODUCTION

Fractures of distal radius are the most common fractures among patients treated at emergency rooms comprising more than 16% of all fractures (1, 2, 3, 4, 5).

They more commonly involve children and the elderly (5, 7, 8). These fractures more frequently affect women, increase in frequency with advancing age, and result from low energy falls more often than from high energy trauma (3, 9, 10).

Adult distal radius fractures requiring manipulation and reduction are commonly encountered in the Emergency Department. Various methods of analgesia are used to decrease the patient's pain during the procedure. These include intravenous regional anesthesia (IVRA), demand-valve nitrous oxide, haematoma block, intramuscular sedation, conscious sedation and general anesthesia (7).

Each of these methods has poten-

tial complications and may also result in inadequate anesthesia, analgesia and/or muscle relaxation, which could compromise the treatment process and results. Adverse drug reactions could also result from any of the agents used. Concerns over the toxicity of local anesthetics have been raised (14) and the serious dangers of leakage of anesthetic from a poorly contained Bier's block, perhaps resulting from an insufficient cuff, are well known (2, 12). The aim of our study is to find out the efficacy of the hematoma block versus intravenous general anesthesia for reduction of displaced distal radius fractures.

2. MATERIALS AND METHODS

From total number of 96 patients with displaced distal radius fractures need anesthesia to reduce the fractures. Patients were randomized into two groups namely group A receiving intravenous general anesthesia; and group B; receiving Hematoma Block for reducing distal forearm fracture. This was prospective randomized control trial comprising 48 patients in each group. The parameters/variables like :

- Level of pain before, during and after reducing the fractures by VAS;
- Anatomic parameters of reduction after manipulation and a week later through radiographs;
- The pain relief during reduction measured by Visual analogue scale;
- Quality of reduction and loss of reduction in unstable fractures. are topics of our study.

2.1. Statistical Analysis

Following statistically methods were employed:

- Measurement of magnitude of difference between values of outcomes in the two groups.
- Measurement of significance of difference through Kruskal-Wallis Test.

Pre-anesthetic evaluation was done in both the groups. In all patients intravenous access was opened by intravenous cannula and electronic monitor was connected to continuous record of pulse rate, respiratory rate, blood pressure and oxygen saturation by pulse oximeter. The group A received Propofol with induction 1-2.5 mg/kg and maintenance 50-200 mcg/kg/min intravenously on the unaffected wrist, the group B received 10 ml of 2% lidocaine hydrochloride into the fracture hematoma site from the dorsal aspect (6). Prior to injection of these drugs, the part was prepared with 7.5% povidone iodine. The calculated amount of Lidocaine was taken in 20 ml disposable syringe with 22^{1/2} gauge needle. The needle was placed at the fracture hematoma site. After ten to fifteen minutes the reduction and immobilization of the fracture was done (16).

VAS was recorded for evaluation of pain before, during, and after reduction Orthopedics on duty. Pulse rate, respiratory rate, blood pressure and oxygen saturation were recorded before, during and after manipulation.

Quality of reduction was assessed by X-ray immediately after reduction and a week later, measuring the angles like radial tilt, dorsal tilt and ulnar mi-

Final dorsal angle	Loss of radial length	Loss of radial tilt	score
Neutral	< 3	0-4	0
1-10	3-6	5-9	1
11-14	7-11	10-14	2
> 14	> 11	> 14	4

TABLE 1. Criteria of Radiological Assessment. Criteria for acceptable reduction based on Sarmiento et al.; 0 excellent, 1-3 good, 4-6 fair, 7-12 poor

	Group A	Group B	Total
Mean Age(yr)	50.02 (20-84)	56.88(19-82)	54.3(19-84)
Male/female	19/29	18/30	37/59
Left/right wrist	30/18	29/19	59/37
Dorsal/volar displacement	37/11	36/12	73/23

TABLE 2. Demographic Characteristics of the Study Population Group. A: intravenous general anesthesia group. Group B: hematoma block group. There are no significant differences between both groups.

gration. The radiological criteria were based on Modified Sarmiento Criteria for the post reduction acceptability varying from Perfect, Acceptable and Unacceptable. According to which Perfect reduction consists of Excellent and Good results, Acceptable reduction consists of Fair result; and Unacceptable consists of Poor results. Criteria of radiological assessment are shown Table 1.

3. RESULTS

All the patients in both groups have sustained fractures of distal radius from the same conditions. There is no difference in age between two groups. Dorsal displacement and the left hand is more frequent affected in both groups (Table 2).

The mean time to reduction is 2.63 ± 0.96 hr in the intravenous general anesthesia group and 0.90 ± 0.47 hr in the hematoma block group (Table 3). Most of the patients were not splinted or immobilized until arriving at hospital. The

mean time of presentation to the Emergency department and X ray department was similar to the both groups, but the time from X ray department to the reduction was different between both groups because the group of general anesthesia had to wait until they should be ready for the application of the general anesthesia (Table 3).

Mean time to discharge was 0.74 ± 0.2 hr for hematoma block and 1.17 ± 0.24 hr for intravenous general anesthesia. The group of hematoma block had no need to stay longer in hospital in comparison with the general anesthesia group, which should stay until full remission from anesthesia.

The Table 4 shows the VAS before the reduction of the fractures in both groups. It was 6.01 ± 1.40 and 5.95 ± 1.94 in the intravenous general anesthesia group and the hematoma block group respectively. None of the patients in this study received analgesics prior to reduction.

Table 4 also depicts the VAS recorded in various stages of procedure during the reduction and after reduction.

There is a minimal difference of VAS during manipulation (0 for Group A and 0.97 ± 0.7 for group B), two methods are effective in the reduction of pain.

Hematoma block group (2.25 ± 0.2) experienced less pain after reduction in comparison with general anesthesia group (2.72 ± 0.7) because the anesthetic effect of hematoma block last longer.

Through postero-anterior and lateral X-ray views taken after reduction and a week later,, we measured the loss

	Mean time to ED	Mean time to manipulation	Mean time to leave hospital	P value
Group A	2.75 ± 1.85	2.63±0.96	1.17 ± 0.24	< 0.005
Group B	3.31 ± 2.7435	0.90 ± 0.47	0.74 ± 0.20	< 0.0001
Total	3.30± 2.73	1.77 ± 1.15	0.94 ± 0.31	

TABLE 3. Mean Time to Charge to ED, Manipulation Time and Discharge from ED. Group A: intravenous general anesthesia group, Group B: hematoma block group, ED: emergency department. Data expressed mean ± standard deviation

	VAS before reduction	VAS during procedure	VAS after procedure	Kruskal-Wallis Test P value
Group A	6.01 ± 1.4	0	2.72 ± 0.7	< 0.0001
Group B	5.95 ± 1.94	0.97 ± 0.7	2.25 ± 0.2	< 0.0001

TABLE 4. Visual Analogue Scale before, during Manipulation and after Reduction Group A: intravenous general anesthesia group, Group B: hematoma block group VAS before, during manipulation and after reduction.

	Loss of reduction	Loss of radial tilt	Loss of dorsal tilt	Ulnar migration	Kruskal-Wallis Test P value
Group A	21	2.45 ± 1.66	2.68 ± 2.42	2.22 ± 1.90	0.1374
Group B	22	2.43 ± 1.68	2.74 ± 2.48	2.23 ± 1.91	0.8106

TABLE 5. Loss of Radial Tilt, Ulnar Migration, Dorsal Tilt. Group A: intravenous general anesthesia group, Group B: hematoma block group, Post reduction fracture configuration and non Significant P-value showing no difference in anatomic reduction of both groups.

of radial angle and ulnar migration.

Table 5 shows mean radial tilt, dorsal tilt and ulnar migration after reduction and a week later. The patients with undisplaced fractures were not included in this study. There was no statistically significant difference between both groups in the number of fractures which lose reduction after a week, 21 for group A and 22 for group B

4. DISCUSSION

Many authors has compared hematoma block with many type of anesthesia to relieve pain in the manipulation of fractures.

Funk (7) compared intravenous general anesthesia with haematoma block in 40 patients. He found that no patients receiving general anesthesia experienced pain during manipulation of their fractures, whereas patients in the haematoma block group experienced significant pain 0 versus 3.7 VAS.

In our study VAS scores were different between both groups because of the different waiting time before manipulation, 0 in group A vs 0.9 in group B. We recognized that waiting for about 10-15 minutes before manipulation give a pain free procedure.

There was nodifference between both groups in pain after manipulation in this study compared to Funk (7). In his study general anesthesia group experienced significantly greater pain compared to the haematoma block group (mean VAS scores: 5.8 versus 1.5 respectively, $p < 0.01$).

General anesthesia group waited for about two hours for manipulation compared to hematoma block group in our study ($p < 0.0001$). We found a significant difference between two groups in time to reduction. In intravenous general anesthesia was 2.63 ± 0.96 hr in comparison with the hematoma block group 0.90 ± 0.47 hr. We also found a significant difference in discharging

time from ED, which was 1.17 ± 0.24 hr in intravenous general anesthesia group in comparison with 0.74 ± 0.2 hr in hematoma block group.

Funk (7) compared among hematoma blocks alone, hematoma block with sedation and general anesthesia. He found that there was no statistically significant difference in the quality of reduction but a prolonged time to reduction in patients receiving intravenous general anesthesia..

Efficacy of hematoma block in reducing Colles' fracture was studied by Kendall et al. (5), in which an increasing awareness of cost and time within the National Health Service contributes to a marked change in the anesthetic management of Colles' fractures, and demonstrates the increasing popularity of the hematoma block compared with 5 years ago (7% in 1989 vs. 33% in 1994), at the expense of the general anesthetic (44% in 1989 vs. 24% in 1994). Handoll et al. (11) in 2002 reviewed in Cochrane Database of Systemic Reviews regarding anesthesia for treating distal radial fractures in adults. The 18 included studies involved at least 1200, mainly female and older, patients with fractures of the distal radius. All studies had serious methodological limitations, notably in the frequent failure to assess clinically important and longer term outcomes. Considering the risk of intravenous general anesthesia, hematoma block is much safer and can be done easily in emergency department.

General anesthesia gives better pain relief during manipulation but involves longer waits and takes longer, with higher procedural costs compared with haematoma block. There was some indication that there was more pain post manipulation after general anesthesia.

Singh et al. (4) studied about analgesia for reduction of Colles' fracture by double blind RCT between conventional sedation and hematoma Group.

Sixty six out of 80 consecutive cases with the fracture were studied. They concluded that pain scores during reduction in the Xylocaine group (i.e. Hematoma Group) were acceptably low, that is < 3 (median=1.8) as compared to the unacceptably high, that is > 3 pain scores in the conventionally practiced sedation group (median =8.7), at a very high level of clinical and statistical significance. Therefore they concluded that hematoma block by local anesthesia is a safe and effective alternative to sedation in reduction of Colles' fracture. This sole study favors the hematoma block for the reduction in distal radial fractures.

Bajracharya et al. (15) in his study found out the efficacy of hematoma block versus brachial plexus block.

Kendall et al. (9) included in his study 72 patients in Bier's block group and 70 patients in the hematoma block group. There was no difference in pain score on fracture manipulation as 1.5 in the Bier's block group and 2.8 in the hematoma group.

In our study, we did not found any statistically significant difference in reduction under hematoma block and general intravenous anesthesia. Other authors found different results comparing different anesthesia.

Kendall et al. (9) in 1997 found out that more manipulations were required in the hematoma block group (17/70 v 4/72; $P=0.003$). Therefore his study favors the Bier's block group for the perfect reduction than the hematoma block group. But his study may relate with the insufficiency of the hematoma block to manipulate pain free. Ogunlade et al. (13) showed, in his study in 35 patients, significant reduction of the pain following infiltration of 10ml of 2% Xylocaine at the fracture site and all the patients had satisfactory reduction of the fracture. This study also favors the present study.

We did not found out any significant difference in late collapse of distal radius fractures. Funk (7) also found no statistically significant differences in the numbers with radial shortening or with residual dorsal deformity. But in our study we analyzed late collapse of radius through measuring dorsal tilt, radial tilt and ulnar migration.

5. CONCLUSION

Considering the risk of intravenous general anesthesia, hematoma block by local anesthetic is a safe and effective alternative and can be done easily in emergency department compared to general intravenous anesthesia in reduction of distal radius fracture.

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ORIGINAL PAPER

Importance of the Cytoplasmic Super-oxide Dismutase in the Normal Tissue of the Endometrium and the Endometrium Carcinoma

Nenad Lucic, Zora Antonic, Vesna Ecim, Slobodan Grahovac, Rosanda Jeftovic, Dragica Draganovic, Branka Cancarevic- Djajic, Aleksandra Rodic

Department of Obstetrics and Gynaecology, Clinical Center of Banja Luka, Bosnia and Herzegovina

Objectives: The objective of the study is comparing pathohistological picture and test results of the activity of the enzymes of the anti-oxidative protection –cytoplasmic super-oxide dismutase (CuZnSOD) from the blood and endometrium in the promotion of the progression or regression of the hyperplasia and endometrium carcinoma.

Materials and Methods: The study has been carried out on 70 patients. We have analysed: The age patients, the supersonic test – transvaginal probe, pathohistological diagnosis (PHD) analysis of the curet of the patient – we have gathered the tissue of the normal and the pathologically changed endometrium from the exploratory curet, determining the CuZnSOD in the blood and in the tissue of the normal and pathological endometrium of the uterus. The Group A has been made out of 30 of them who did not have the irregular bleeding from the uterus, and 40 of them represented the Group B with the irregular bleeding, who also had PHD confirmed hyperplasia or malign changes of the endometrium. We have tested if there has been the pathological changes in the small pelvis (the ovary tumor, myoma etc.) in both groups. **Results:** Dominant age in the Group B is 41 – 50 (55%), in Group A, age difference is not that apparent ($p > 0.05$). The results of the arithmetic mean of the CuZnSOD in the blood (19.90%) and (29.05%) in the endometrium which is lower than the Group A (blood-29.95%, endometrium-32.56%). Lower values CuZnSOD in the blood (18,9%) and endometrium (30,09%) we have in the experimental group patients who have had bleeding as well as those beside bleeding had some other gynecological – pathological proces (myoma, cyst on the ovary etc.) **Conclusions:** According to the facts we can see the significance of the activity of the enzymes of the anti – oxidative system in the diagnostic of the hyperplasia and endometrium carcinoma as well as the possibility of their application in the clinical practice. **KEY WORDS:** CYTOPLASMIC, SUPER – OXIDE DESMUTASE, ENDOMETRIUM, CARCINOMA

Corresponding author: ass prof Nenad Lucic, MD, PhD. Clinic for Gynecology and obstetrics, Clinical center of University of Banja Luka, B&H. 12 beba Paprikovac Banja Luka Tel . : 0038765926923, E-mail : nenadi@blic.net

1. INTRODUCTION

In the last decade there has been series of interesting discoveries which are related to the free radicals and their effects in the biological system. It is es-

sential, for the physiology of the healthy organism to keep the dynamic balance between molecular oxygen in its free radicals. The anti – oxidative defence is usually based on the activities of the

enzymes marked as super-oxide dismutase (SOD), which are present in every organism, tissue and cell and they represent our genetic predisposition.

Mc Cord and Fridovich 1969. (1), indicate that SOD are metalloproteins with Cu, Zn, Mn or Fe in the active centre. In the cytosol of the eucaryotic cells CuZnSOD are present and they are characterized by evolutionary stability. In humans, the gene for CuZnSOD is situated on chromosome 21.

According to S. Pajovic (2), the results obtained from the clinical and biochemical studies indicate the presence of the certain correlation between the activity of the SOD and different pathological conditions (inflammatory, ulcerous, convulsive, diabetic and cancerous). In these cases much lower activity of the SOD is also noticeable which causes greater production of the super – oxide anion radicals. When the inefficient functioning of the anti – oxidative system in the protection from the free radicals appears, it will lead to the overcoming of the capacities of the anti – oxidants which will cause the condition known as the oxidative stress (3). Endometrium is a mucous membrane without the submucosa which reaches to the isthmus of the uterus where it is smooth, and to the cervical canal where it is wrinkled (4). There is a surface functional part and deep basis stratum on it. The process of the growth and the regression of the endometrium represents the answer to the cyclic changes during the menstruation, which is pre-

Age	Experimental group		Control group	
	Number	%	Number	%
Up to30	1	2.5	2	6.6
31 – 40	2	5.0	4	13.4
41 – 50	22	55.0	11	36.6
51 – 60	10	25.0	9	30.0
Over 60	5	12.5	4	13.4
Total	40	100.0	30	100.0

TABLE 1. Disposition of the patients according to their age

Control group in general		n	Ar. mean	Std. deviation	Std. error
A. O. Enzymes	CuZnSOD (k)	29	25.95	14.458	2.6848
	CuZnSOD (e)	29	32.56	13.806	2.5637
Experimental group in general		n	Ar. mean	Std. deviation	Std. error
A. O. Enzymes	CuZnSOD (k)	39	19.90	9.908	1.5866
	CuZnSOD (e)	39	29.05	18.850	3.0184

TABLE 2. General descriptive measures - the control and the experimental group: k - blood; e - endometrium

sented by the anatomic and functional changes in glands, vascular and stromal part of the endometrium.

The least controversial type of the hyperplasia of the endometrium is the cyst hyperplasia, while the adenoma is accepted as the precursor of the carcinoma endometrium. Atypical hyperplasia shows great affinity towards the progression in the adenocarcinoma. The more complex hyperplasia has greater chances for the emergence of the invasive carcinoma (5).

2. THE AIM OF WORK

The objective of the research is comparing the pathohistological picture with the tests of the activity of the enzymes of the anti – oxidative protection in the promotion of the progression or the regression of the malign changes of the endometrium.

3. METHODS AND MATERIAL

The material in this research was collected from the Department of the Obstetrics and Gynecology in Banja Luka. The study has been carried out on 70 patients. The control group has been made out of 30 of them who did not have the irregular bleeding from

Experimental group combined diagnoses		n	Ar. mean	Std. deviation	Std. error
A.O. Enzymes	CuZnSOD (k)	20	18.91	10.012	2.2398
	CuZnSOD (e)	20	30.09	19.258	4.3062
Experimental group bleeding		n	Ar. mean	Std. deviation	Std. error
A.O. Enzymes	CuZnSOD (k)	19	20.95	9.959	2.2847
	CuZnSOD (e)	19	27.96	18.873	4.3298

TABLE 3. Descriptive measures for the experimental group - combined diagnoses and bleeding

the uterus, and 40 of them represented the experimental group both the irregular bleeding, who also had pathohistological diagnosis (PHD) confirmed malign changes of the endometrium.

In the range of the study we have analysed:

- **The age** (patients were organised in five categories)
- **The supersonic test** – using the transvaginal probe, we have tested

if there has been the pathological changes in the small pelvis (the ovary tumour, myoma etc.) in both groups.

- **PHD analysis** - we have gathered the tissue of the normal and the pathologically changed endometrium from the exploratory curettage of the patients, and the results that we have got from the curettage were analysed with the optical microscopy – pathohistological diagnostic.
- **Determining the anti – oxidative enzyme** in the blood and endometrium has been carried out in The Institute For The Nuclear Science Vinca in Belgrade. In our research we have been stipulating the activities of the cytoplasmic SOD – CuZnSOD, which activity is present in the tissue of the

normal and pathological endometrium of the uterus. The testings were carried out using the methods given from Misra and Fridovich (6, 7). These methods are based on the capability of the SOD to inhibit the autooxidation of the adrenaline into the adrenochrome.

The results of the tests were presented as the specific enzyme activity (unit/mgprotein).

4. RESULTS AND DISCUSSION

According to their age, patients were organised into five categories. In the Table 1 has been presented that dominant age group was 41-50 years.

General note:

The extreme values (Outlier) have been excluded as well as those who can lead to the wrong conclusions. The criterion of the exclusion of the specific values of the testings was that those values were out of the interval (2SD) so they were left out from the sample.

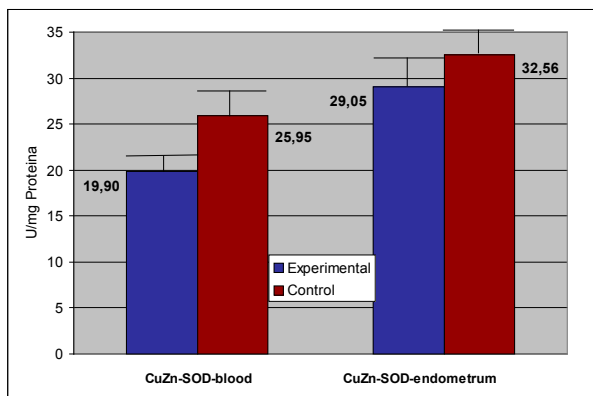


FIGURE 1. CuZn - SOD in the blood and endometrium - the experimental and the control group in general

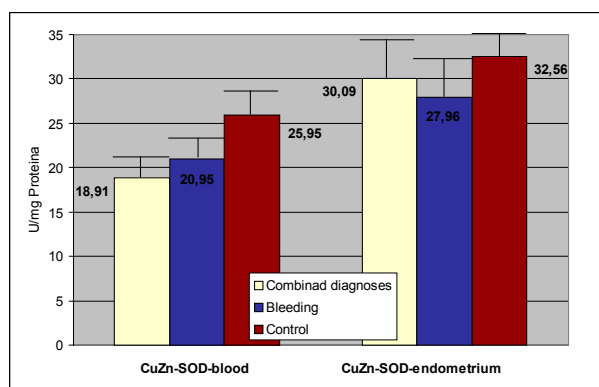


FIGURE 2. CuZnSOD in the blood and endometrium in cases of combined diagnoses and bleeding - the experimental and the control group

The results of the arithmetic mean of the CuZnSOD were 19,90% in blood and 29,05% in endometrium of the experimental group, while in the control group were 25,95% in blood and 32,56% in endometrium (Table 2, Figure 1).

The results of the arithmetic mean of the CuZnSOD in the blood and endometrium in the experimental group were lower comparing to the control group. This shows that there are changes in the activity of the dismutase, that can lead to the quantitatively and qualitatively changes of the enzymes created during the process of the hyperplasia, as well as, malign transformation of the endometrium. The results of Punnonena and Sar,1993. (8), show the lower values of the SOD in the carcinoma endometrium compared with the normal endometrium in the results of Finland's and Japan's women.

The changes in the anti-oxidative protective system were explained as changes combined with the changes of the biochemical paths. Dach and all 1983. (9), explain that the activity of the SOD in tumours as well as the older tissues is reduced compared with the normal tissues or the tissues of the younger organism. While the normal cells are capable to induce different forms of the anti-oxidative enzymes which can reduce relative radicals and prevent damages of the cell in the conditions of the oxygen stress, tumour cells mainly lose that capability and can not induce these enzymes so their concentration and activity are reduced (10).

In our research we have also exam-

ined patients in the experimental group who have had bleeding confirmed with pathohistological diagnosis of malign changes of the endometrium as well as those who beside that had some other gynecological - pathological process (myoma, cyst on the ovary etc.). We have noticed lower values CuZnSOD in the blood (18,91%) and endometrium (30,09%) in

experimental group patients who have had bleeding caused by malign changes of endometrium, as well as those bleeding had some more gynecological pathological process (myoma, cyst of the ovary et.) (Table 3, Figure 2). The presence of these pathological conditions is confirmed with the supersonic test. We have compared these results with the results of the control group in order to verify if some other gynecological - pathological condition can affect the values of the anti - oxidative enzymes in patients who have had irregular bleedings.

According to the results of the arithmetic means of the CuZnSOD in the blood and endometrium in both tested groups we can draw the conclusion that there are visible lower values of the enzymes in the blood and endometrium in the experimental group compared with the control group. Ishikawa and all indicate that anti - oxidative enzymes in the endometrosis as well as the adenomyosis are constantly higher during the menstruation (11). Testing the informational RNK in the peritoneal liquid of women, the mentioned authors have shown that the expression of the CuZnSOD is greater in the patients' suffering from the adenomyosis

5. CONCLUSION

In the diagnosis of the pathology of the endometrium of the uterus, besides the explorative curettage, the new screening methods can be considered.

The results that we have come up with in our research indicate the lower

activities of the SOD in the blood and endometrium of the patients who have the hyperplasia and endometrium carcinoma of the uterus.

We have also registered the lower activity of the SOD in the blood and endometrium with the patients who have some other processes as well (myoma, cyst on the ovary etc.). Based on the shown results we can see the significance of the detection and modulation of the activity of the enzymes of the anti - oxidative system in the diagnostic of the carcinoma endometrium, as well as the possibility of their application in clinical practice.

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PROFESSIONAL PAPER

The Experience with Anterior Minimally Invasive Hip Surgery

Mithat Asotic¹, Predrag Grubor², Sahib Muminagic³

Orthopedic and Traumatology department at General Hospital in Travnik, Bosnia and Herzegovina¹

Orthopedic and Traumatology clinic, Clinical center of University of Banja Luka, Bosnia and Herzegovina²

Surgery department, Cantonal hospital Zenica, Bosnia and Herzegovina³

Introduction. When total hip arthroplasty (THA) is performed, the surgeon has to make a decision about the correct approach. **Goals.** In this research we will show our first experience with the implantation of endoprosthesis for hip, using the method of anterior minimally invasive surgery. **Methods.** At the Traumatology clinic in Banja Luka, General hospital in Travnik, General hospital „Medicus“ in Jelaha during the period between March 30th 2005 and June 1st 2009 53 hip prosthesis were implanted using minimally invasive Hueter approach, with the average length of incision of 7.3 cm. Subjects were 28 females and 25 males, with an average age of 56.8 years old. The reason for the surgery was hip arthrosis III i IV degree with 48 patients, while two patients had displastic arthrosis. One patient had arthritic changes following non-dislocated fracture of the acetabulum. One patient had arthritic changes of the femur. We implanted 50 non-cemented prosthesis, and tri comined (hybrid) prosthesis. **Results.** The orthopedic surgery was done with the use of two assistants and operating nurse, within 68 minutes on average while using on average 436 mL of transfused blood. Movements in an upright position with full weight bearing was done on post operative day one with 50 patients. Acute rehabilitation lasted 8.9 days on average. Full recovery was at 50 days on average, with achieved full range of motion and no use of assistive devices. The average Harris Hip Score (HHS) preoperatively was 56, and three months postoperatively it was 93. Five patients had complications: two with anterior dislocation of the hip, one sealing of the shaft of the femur, and two infections; one superficial and the other deep. Superficial infection was treated with conservative therapy and the other patient had a removal of the prosthesis. **Conclusion.** Anterior minimally invasive surgery with THA is a method which gives a number of advantages for the patients, such as: lesser extent of operative trauma, shorter hospital stay, and quicker return to activities of daily living. **KEY WORDS:** ANTERIOR MINIMALLY INVASIVE SURGERY, ALOPLASTY OF THE HIP.

Corresponding author: Mithat Asotic, MD. Department of orthopedics. Cantonal hospital Travnik, Bosna i Hercegovina. Tel. + 387 30 515 770. E-mail: info@zft.ba.

1. INTRODUCTION

A classical approach to hip surgery in orthopedics is: medial (Ludolf), antero-medial or ilioingvinal (Langeu Beck), anterior direct approach (Murphy), anterior, iliofemoral (Hueter-Smith-Peterson), anterolateral (Watson-Jones-Harding), direct lateral,

transtrochanteric or transfemoral (Ollier-Mercat), and a posterior (Gibson, Moore). In order to perform the hip surgery, the knowledge of the mentioned approaches is necessary. The correct choice of the surgical approach allows for easier healing.

When total hip arthroplasty (THA)

is performed, the surgeon makes a decision about the appropriate approach. The approach depends on: the experience of the operating team, available instruments, the type of prosthesis available, if the hip joint is centralized, subluxed, luxed, etc.

The preferred choice over the last 10-20 years has been Watson-Jones and Moor approach, where the incision is approximately 15 cm long. The preference is minimizing of surgical trauma, which has been clinically evident in endoscopic surgery. The fast technological evolution and the introduction of highly sophisticated equipment in the operating room has allowed conditions for minimal surgical trauma, technically without mistakes.

What is anterior minimally invasive surgery when referring to total hip prosthesis? It refers to the THA done through an incision of 6 cm, instead of performing muscle tenotomy. Darzi states that the minimally invasive surgery represents „the most important resolution in surgical technology since the 1900's (1).

2. THE AIM

The aim for this research was to find the advantages and disadvantages for implantation of endoprosthesis of the hip, with the method of minimally invasive surgery using Hueter approach (2), versus classic Moor approach used by these practitioners for the last 15 years.

Assessment of treatment outcome is done by the same criteria for all patients.

The criteria consisted of: individual assessment of the patient and objective clinical testing while calculat-

ing for the Harris hip score (HHS) preoperatively and postoperatively, as well as the length of the surgery, time before upright activities and independent ambulation, length of stay in the hospital, the amount of transfused blood and blood derivatives, as well as complete rehabilitation.

Clinically assumed doubts for infection, luxation, were made objective with the use of laboratory and radiological findings.

3. THE METHODS

At the Traumatology clinic in Banja Luka, The Department of Orthopedics of the Cantonal hospital in Travnik, and General hospital in Jelah, between March 30th 2007 and June 30th 2009, 73 noncemented hip prosthesis were implanted, using Moor's posterior approach with the approximate length of the incision of 23 cm.

At the Traumatology clinic in Banja Luka, the Department of Orthopedics of the Cantonal hospital in Travnik, and General hospital "Medicus" from Jelah between March 30th, 2005 and June 1st, 2009 53 THA's, with anterior minimally invasive approach were completed using Hueter approach (Figure 1). An average incision size was 7.3 cm. Hueter approach is the most medial access to the hip joint (1). It was used in the first part of the 19th century by Hueter. The patient is positioned supine on the table without any additional support for the back or the legs. The surgical table needs to have an additional table, in order to assist during specific parts of the surgery in terms of a support for traction, external or internal rotation, or lowering or rising of the operated leg. If there is no adequate table, this can be done by an assistant, who can during the surgery, hold onto the leg and move it, as needed, into a desired position. Modified Muler table can be used as well.

An incision of 6-8cm is started at one finger lateral to anterior-superior iliac spine (ASIS) and it follows the line which connects ASIS and the head of caput fibulae. The simplest orientation is made by palpating the groove between tensor fascia lata and sartorius muscles. Upon incision through the skin and the next layer, a surgeon makes

a longitudinal incision through tensor fascia lata, which then needs to be separated from the muscle (3). In this way one can enter the space between the muscles tensor fascia lata and sartorius. Very carefully the surgeon longitudinally incises fascia from sartorius, so that there will be no damage to femoral cutaneous nerve, or his gluteal branch. Upon separation of these two muscles retractors are placed between the muscles and one comes to an exposed aponeurosis of rectus femoris. It is important to identify and ligate anterior circumflex artery, which sits on the muscle next to the distal femoral neck, usually in the fat layer. Upon ligation of the artery a longitudinal incision of fascia from rectus femoris is done. The last muscle before joint capsule is iliopsoas. With the use of Lambert iliopsoas is separated from the anterior joint capsule which is now completely visible. Ekarters are moved and one can see the entire capsule (3). The capsule is cut with the use of an electric knife in a V shape. One branch of the letter V is toward acetabulum, and the other is toward the vertex of the intratrochanteric line, and the lines are joined in the distal part of the neck of femur. This is where support stitch is made and the complete joint becomes visible (3).

Upon capsulectomy two Hofman hooks are placed between the neck and the capsule and osteotomy is performed at the cervicotrochanteric angle at the neck of the femur, with initial check that the patella is in neutral. Upon completed osteotomy, traction of the leg is done in order to allow for an easier approach with the corkscrew at the place of the osteotomy and the same one is removed. The surgical leg needs to be slightly rotated, and Hofman retractor placed at the distal part of anterior inferior iliac spine, which is when the complete joint surface of the acetabulum is exposed (4).

For the implantation of the prosthesis with this approach one must have adequate instruments. Modified handle for tilling of the acetabulum and handle for application of prosthesis modified to enable the preparation of the acetabulum and the placement of acetabular part of the prosthesis through this

approach to the hip. Instruments modified in this way allow setting of the acetabular component of the prosthesis without increased risk to the inclination or antversion, and without compromising the outcome of the arthroplasty (4).

Upon implantation of the acetabular component of the prosthesis, the leg traction is released and the same is placed in the external rotation to 90 degrees and the leg is lowered toward the floor so that the osteomized femoral neck "floats to the surface". Rasps made for this approach are used for preparation of the femoral prosthesis component and the same is inserted. Next, the repositioning is done, hemostasis control and assessment of the need for drainage. Supporting suture for the capsule is used for the reconstruction of the capsule, two to three sutures for the attachment of the fascia of tensor fascia lata and sartorius, subcutaneous sutures, and the skin sutures (5).

With this surgical approach the muscles are not tenomized nor detached and the gluteal musculature is out of surgical field. Only the capsulotomy is performed, which is at the end of the procedure sutured, which rules out the muscle insufficiency therefore allowing the stability for the prosthesis, as well as for fast recovery.

Preoperatively all patients received medicated thromboembolitic prophylactic treatment, and for mechanical prophylaxis we used elastic bandaging.

4. RESULTS

At the Traumatology clinic in Banja Luka, The Department of Orthopedics of the Cantonal hospital in Travnik, and General hospital in Jelah, between March 30th 2007 and June 30th 2009, 73 noncemented hip prosthesis were implanted, using Moor's posterior approach with the approximate length of the incision of 23 cm. Patients consisted of 45 females and 28 men, with the mean age of 54.2. The reason for total hip replacement in 43 patients was a hip arthrosis grade III and IV, while seven patients had dysplastic arthrosis. Three patients had arthritic nondislocated changes after acetabular fracture, and twenty patients had femoral neck fractures. We implanted 50 non-

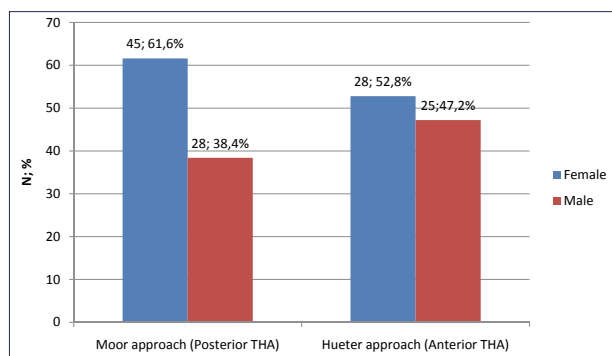


FIGURE 1. Gender comparison by method used

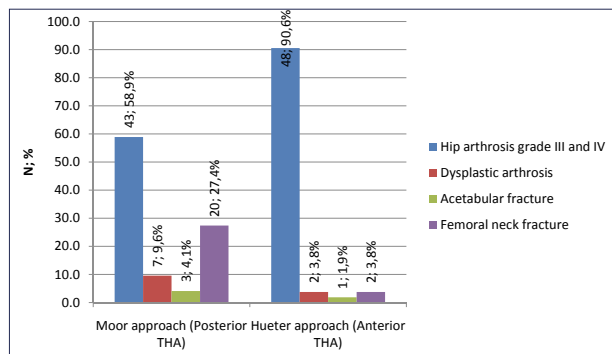


FIGURE 2. Indications for treatment

cemented and 23 cemented prosthesis.

The surgical procedures were performed with three assistants and a surgical nurse with an average of 97 minutes with the need for transfusion during surgery averaging at 744 ml. Out of bed activities with the movement in full weight bearing were performed on the third postoperative day in 50 patients and in 23 on the seventh postoperative day. The length of acute hospital stay was 16.8 days. The full recovery was at approximately 120 days with full range of motion and ambulation without assistive devices.

The average value of the Harris hip score was 50 preoperatively and 92 three months after. From the 73 surgical patients, three died first day postoperatively, two had postoperative fractures, three had dislocations that were immediately

reduced by repositioning and continued physical therapy, and 3 had infections. Two infections were repaired with surgical debridement, while one had removal of the prosthesis 5 months after surgery (Figure 2).

At the Traumatology clinic in Banja Luka, The Department of Orthopedics of the Cantonal hospital in Travnik, and General hospital in Jelah, between March 30th 2007 and June 30th 2009, 53 THA's were completed using Hueter approach (Figure 1), operating on 28 women and 25 men, with the mean age of 56.8, without statistically significant differences in gender ($\chi^2=0,651$; $p=0,4199$) and age ($t=0,257$; $p=0,842$).

The reason for THA's in 48 patients was a hip arthrosis grade III and IV, while two patients had dysplastic arthrosis. One patient had arthritic

changes after acetabular fracture, and two patients had femoral neck fractures with statistically significant difference compared to Moor's approach ($\chi^2=7,253$; $p=0,001$) (Figure 2). We implanted 50 cementless prostheses Medacta and three combined (hybrid) prosthesis.

The surgical procedure was performed by the orthopedic surgeon with one assistant and a surgical nurse, on average, for 68 minutes with the need for blood transfusion for surgery on average of 436 ml. Out of bed activities with full weight bearing were done on the first postoperative day with 50 patients. Length of acute hospital stay was 8.9 days. Complete recovery was after an average of 50 days with a full range of motion and movement without assistive devices (Figure 3). All parameters observed were statistically significantly lower in case of Hueter approach ($p<0,05$).

The average value of the Harris hip score (HHS) was 56 preoperatively and three months after surgery it was 93 (Figure 4) without significant difference between approaches ($p>0,05$).

X-ray position of the implants showed no difference compared to the last approach practiced in our institutions for the past 15 years.

Complications occurred in 5 patients: an anterior dislocation of the hip on the first postoperative day, which we solved by closed reduction and cast butterfly immobilization for 8 days, one anterior dislocation on the 17th postoperative day, which was repaired using reduction and the continuation of physical therapy, one fissure of the femur which was repaired without any treatment, and two infections. One infection was surgically repaired by debriding while in the other removal of the prosthesis was done 4 months after surgery which is significantly less than in case of Moor's approach ($\chi^2=8,523$; $p=0,004$).

5. DISCUSSION

There are only a few articles that discuss the comparison of the minimally invasive technique with conventional surgical technique. The reason for this may be this technique has been used the last 5-6 years (6).

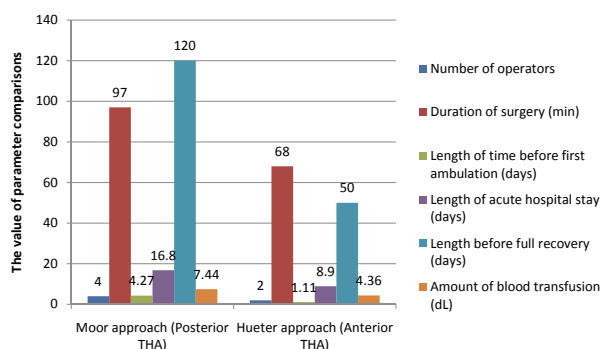


FIGURE 3. Average parameters during surgery and recovery

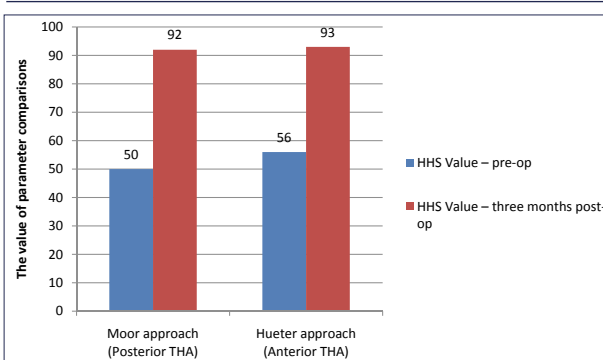


FIGURE 4. Average HSS value before and three months after the surgery

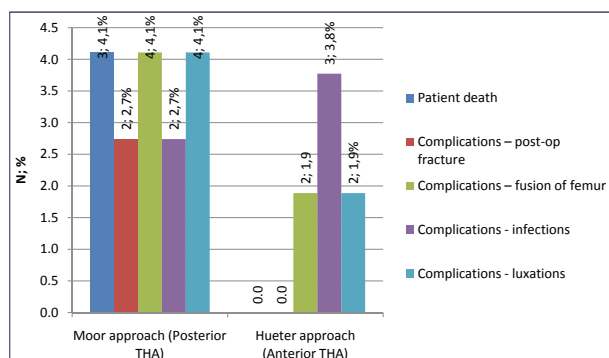


FIGURE 5. Lethal outcome and complications after the surgery

In recent years we have witnessed the development of new techniques in orthopedic surgery known as minimally invasive procedures (7). The advantage of this surgical technique is reflected in the reduction of operative treatment and work with one assistant, less blood loss, shortened hospital stay and quicker return to activities of daily living (8).

Conventionally used technique for hip arthroplasty, complications such as poor fixation, instability, dislocations, and infections are documented in the 18-20% of patients (6).

Wenz and colleagues have presented the comparative results on 111 patients treated using a minimally invasive technique and 62 patients operated by conventional methods. Comparing these two groups clearly demonstrated that the minimally invasive procedure significantly reduces operating time, reduced blood loss and need for transfusion of blood and its derivatives. 94% of patients had well-positioned implants, considering that the correct position of inclination of 33 degrees to 55 degrees was taken into account. Dorr in his study defined the optimal angle of inclination of 25 degrees to 45 degrees, and anteversion of 15 degrees to 30 degrees. The technique used an incision

length of 10 cm. In 19% of cases the expected position of the implant was not achieved (9, 10).

Mears and colleagues using different minimally invasive surgery with an incision of 5 cm showed 28% of complications in terms of fractures of the femur, which is almost three times more than stan-

dard approach. Berger and colleagues examined the results of 100 patients treated using a minimally invasive technique with 2 incisions and had 1% of femur fractures, but without dislocation, poor fixation, or dislocation (11).

Goldstein et al used comparative studies for 85 patients treated using a minimally invasive technique and 85 with standard procedures, showing an average value of the inclination of the acetabulum to be 47 degrees (11).

6. CONCLUSION

This surgical technique does not affect the blood flow, and rapid mobilization establishes a mechanical thromboembolic prophylaxis which significantly reduces the likelihood of thromboembolism. During the anterior minimally invasive surgery of the hip only one assistant is needed. This reduces the time duration of the surgical procedure and conditions to the decreased compensation with blood and blood products. Also, there is a reduction of surgical trauma and reduction of local complications.

THA with anterior minimally invasive surgery reduces the number of acute hospital days postoperatively, need for rehabilitation and the amount of time for the postoperative recovery.

This is also a less expensive option for those requiring THA.

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CASE REPORT

Management of Frontal Sinus Fracture: Obliteration Sinus with Cancellous Bone Graft

Sahib Muminagic¹, Tarik Masic², Emina Babajic¹, Mithat Asotic³
 Cantonal hospital Zenica, Bosnia and Herzegovina¹
 Clinical center of University of Sarajevo, Bosnia and Herzegovina²
 Cantonal hospital Travnik, Bosnia and Herzegovina³

Frontal sinus fractures make up about 2-15% of all facial fractures. This is relatively low frequency of occurrence, but it has a large potential of complication and may involve not only the frontal sinus but more importantly the brain and the eyes. The management depends of the complexity. If anterior wall is fractured with grossly involved nasofrontal duct (NFD) in the injury it is paramount to occlude NFD. Very often, sinus obliteration is done at the same time. In our experience autogenous cancellous bone graft is considered to be the best grafting material. It has the less short - or long-term complications and the donor site morbidity is insignificant. **KEY WORDS:** FRONTAL SINUS, FRACTURE, CANCELLOUS BONE GRAFT.

Corresponding author: ass prof Tarik Masic, MD, PhD. Clinic of Maxillofacial surgery, Clinical center of University of Sarajevo, Bosnia and Herzegovina

1. INTRODUCTION

Frontal sinus fractures make up about 2-15% of all facial fractures (1, 2, 3). This is relatively low frequency of occurrence, but it has a large potential of short - and long-term complication that may involve not only the frontal sinus but more importantly the brain and the eyes (4). It can affect anterior and/or posterior table with or without hitting the nasofrontal duct (NFD) (3). The management depends of the complexity (5, 6).

The surgical techniques used access to the fractures via coronal incision or through existing lacerations. Other incisions are not aesthetically pleasing (1, 3). Isolated anterior table fracture not displaced or minimally displaced do not require surgical repair. If the fracture is isolated to the anterior wall but displacement is greater than the width of this table, depressed segment is carefully reduced and the fracture is fixed with titanium miniplates. If ante-

rior wall is fractured with NFDs injury the decision about treatment depends of the condition of the NFD. When the NFD is grossly involved in the fracture, it is paramount to occlude the NFD and completely separate the nasal cavity from the sinus. For obliteration of NFD can be used fibrin sealants. Very often, sinus obliteration is done at the same time.

Common material for sinus obliteration are: autologous avascular grafts (abdominal fat, muscle, bone), vascular regional flaps (pedicled pericranial flap) or synthetic materials (hydroxyapatite cement). Management of the posterior wall fracture first has to determine does injury of the dura exist. To seal small fractures fibrin sealants are an excellent option (5, 7, 8). If there are displaced fragments of the posterior wall, they can cause dural tears and cerebrospinal liqor (CSF) leak. This condition usually requires a cranialization procedure (8).

2. CASE REPORT

A 27-th years old male was transferred from Department of emergency medicine to Maxillofacial department because of upper face trauma caused by traffic accident. There was no history of lost of consciousness, vomiting, or any other signs of intracranial injury. Examination in Department of emergency room was not revealed any other associated injuries. When the patient was admitted he has periorbital ecchymosis, forehead swelling (without any wound) and pain, with visible depression in region of frontal sinus.

Radiologic evaluation confirmed diagnosis of multifragmental fracture of anterior wall of frontal sinus with nasofrontal duct involvement. This was indication for surgical treatment. Approach to the fractures performed through coronal incision. The coronal flap is elevated in a subgaleal plane until 2 cm above frontal sinus, than commenced subperiosteal plane. Visualisation of the fractures was made (Figure 1).

Fractured anterior wall bone frag-



FIGURE 1. Visualisation of fractures


FIGURE 2. Frontal sinus antrum

ments were removed and saved (Figure 2). Than sinus and NFD were prepared for obliteration. The sinus mucosa was meticulous removed with sinus curettes. The material choosed for obliteration is free bone graft. Proximal tibial epiphysis is an excellent source of cancellous bone for grafting (Figure 3).

Technique was followed strict aseptic condition. After incision of the skin, subcutaneous and fascial layers, the periosteum is visualised. Opening through the cortical bone was made. The cancellous bone is harvested using orthopedic bone curettes. After hemostasis the wound is closed in layers. Open surgical drainage system was applied subcutaneously. NFD was obliterated with fibrospun (to prevent the reepithelization of the frontal sinus, isolating it from the nasal cavity) and


FIGURE 3. Tibial epiphysis

FIGURE 4. Obliterated frontal sinus

FIGURE 5. Overfilled frontal sinus.

FIGURE 6. Results after a few weeks.

frontal sinus antrum where carefully overfilled with cancellous bone graft, the saved fragments of anterior plate returned back (without osteosynthesis), and protected with periost and pericranium (Figure 4). The wound is closed with a single stitches (Figure 5).

A few weeks after surgery the result was aesthetically pleased (Figure 6).

3. DISCUSSION AND CONCLUSION

Many complications can follow frontal sinus fracture repair (9, 10, 11). Acute complications include wound infection associated with incision, infection associated with the sinus (osteomyelitis) or with its new contents (abdominal fat), complications associated with donor site (abdomen, bone), intracranial events (meningitis, brain absces), CSF leaks (15). Chronic complication include: mucocele or mucopyocele, cosmetic deformity, chronic headache, neurologic deficits (11). In some frontal sinus fracture cases, sinus obliteration

is necessary. It is difficult to find an adequate, safe, material for obliteration without long or short-term complications (12, 13). With synthetic hydroxyapatite should not to be obliterate the entire sinus because of high risk of infection resulting from lack of adequate vascularization. The most frequently used material, with the longest history of use is abdominal fat, but more than 60 % of the transferred fat may be re-sorbed with time (1, 2). Cancellous autograft has the disadvantage of poor structural support. The potential disadvantages of pericranial flap frontal sinus obliteration are the devascularization of the anterior table and the flap vascular compromise (14). In our experience autogenous cancellous bone graft is considered to be the best grafting material. It has the less short - or long-term complications and the donor site morbidity is insignificant.

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CASE REPORT

Spondylodiscitis due to *Sallmonela* in an Immunocompetent Patient

Klodiana Shkurti-Leka¹, Dhimiter Kraja¹, Nikollaq Leka², Gjergji Vreto², Kastriot Melyshi², Genti Kasmi³
 Department of Infectious Diseases University Hospital Center "Mother Teresa", Tirana, Albania¹
 Department of Diagnostic Imaging University Hospital Center "Mother Teresa", Tirana, Albania²
 Department of Microbiologic Laboratory University Hospital Center "Mother Teresa", Tirana, Albania³

Salmonella is a gram-negative bacillus that penetrates in human from contaminated food or water. *Sallmonela* spondylodiscitis is a rare condition occur secondary to hematogenous spread after bacteremia episode. We presented a successful treatment with Levofloxacin in a 26 years old immunocompetent male with a septic form of *sallmonelosis* complicated with lumbar spondylodiscitis without surgery. He was treated with intravenous Levofloxacin for three weeks and was discharged from the hospital with oral Levofloxacin for more than two months. Clinical and laboratory evaluation two months after oral treatment resulted normal. **KEY WORDS:** SALLMONELA, SPONDYLODISCITIS.

Corresponding author: Klodiana Shkurti-Leka, MD. Department of infectious diseases, University hospital center "Mother Theresa" Tirana, Albania.

1. INTRODUCTION

Salmonella is a non-spore-forming gram-negative bacillus of the family Enterobacteriaceae. In most cases humans ingest the organism from contaminated food or water and small bowel becomes its habitat. Salmonella can be either quiescent in an asymptomatic carrier state or manifest as gastroenteritis, typhoid fever, or bacteremia (1, 2). Typhoid fever is a systemic infectious disease caused by the dissemination of this organism arising from the gastrointestinal tract and is commonly characterized by fever and abdominal pain (3). Salmonella spondylodiscitis is a rare condition that is more prevalent in patients with sickle cell disease or immunosuppression; however, it can also be found in immunocompetent patients, too. Salmonella spondylodiscitis thought to occur secondary to hematogenous spread after an episode of bacteremia.

2. CASE REPORT

A 26 year old male was admitted in Service of Infectious Diseases with a diagnosis of febrile condition with lumbago and hepato-lienal syndrome. His complaints were: temperature 39-40 degrees continua, strong lumbar pain, unable to walk and move. Symptoms were start five days ago with fever, lumbago and some diarrhea episodes. He

was treated in a regional hospital for 3 days, but the situation wasn't improving. He worked as emigrant in Greece from arrived two weeks ago healthy.

Objective examination showed pale face, hepato-splenomegaly and unable to move feet and lumbar region because of terrible pain. A complete blood count revealed hemoglobin of 13g/dL, white blood cell count (WBC) of 13,600 cells/mm³ (60% neutrophils and 40% lymphocytes) and platelet count of 250,000 cells/mm³, Erythrocyte Sedimentation Rate (ERS) 45mm/h. C-Reactive Protein (CRP) was 12 mg/dL. Blood sugar and other blood chemistry tests were normal. Chest radiography was normal. Chest sonography examination were normal. In two cultures of blood were seen gram negative bacteria, *Sallmonella* Group B. Urine culture were negative. Results in first Widal test were: TO1:160, TH 1: 320. Other serological tests: Wright, Wail-Felix, HIV, ELISA Brucellosis IgM, IgG were negative. Gamma-interferon test and PPD

Year, country	Sex, age (years)	Underlying disease/ predisposing condition	Duration of illness	Infection site	Treatment		Outcome
					Medication	Surgery	
1962, Nigeria ⁽⁹⁾	M, 16	Sickle cell anemia	3 weeks	L4-5	Penicillin and streptomycin for 6 weeks	No	Survived without neurological sequelae
1963, England ⁽⁹⁾	F, 45	No, consumption of raw oysters	2 months	L1-2	Chloramphenicol for 2 months	Laminectomy	Survived without neurological sequelae
1981, England ⁽⁹⁾	F, 12	No	3 months	T11-12	Chloramphenicol and amoxicillin for 2 months	No	Survived without neurological sequelae
1999, South Africa ⁽⁹⁾	F, 12	No	2 days	L5-S1	Ampicillin for 6 months	No	Survived without neurological sequelae
1999, South Africa ⁽⁹⁾	M, 13	No	4 weeks	L4-5	Ampicillin for 4 weeks	No	Survived without neurological sequelae
2004, Mali ⁽¹¹⁾	M, 50	No	2 weeks	L2-3, psoas abscess	Ceftriaxone and ciprofloxacin for 16 weeks	No	Survived without neurological sequelae
2004, India ⁽¹³⁾	F, 38	No	3 months	L4-5	Ceftriaxone for 4 weeks	Laminectomy	Survived without neurological sequelae
2006, Hong Kong ⁽³⁾	F, 25	No	3 weeks	L4-5	Ampicillin for 6 weeks	No	Survived without neurological sequelae
2008, Jordan ⁽¹⁾	M, 56	Diabetes	3 months	T3-4, epidural abscess	Ceftriaxone for 6 weeks	Laminectomy and debridement	Survived with mild neurological sequelae
2008, Thailand [*]	M, 57	Diabetes, consumption of raw vegetables	1 month	T11-12, epidural abscess	Ciprofloxacin for 3 weeks, ciprofloxacin and cotrimoxazole for 6 months	Laminectomy, discectomy and debridement	Survived with mild neurological sequelae

TABLE 1. Results of searching of literature about Spondylodiscitis (diagnosis and treatments)

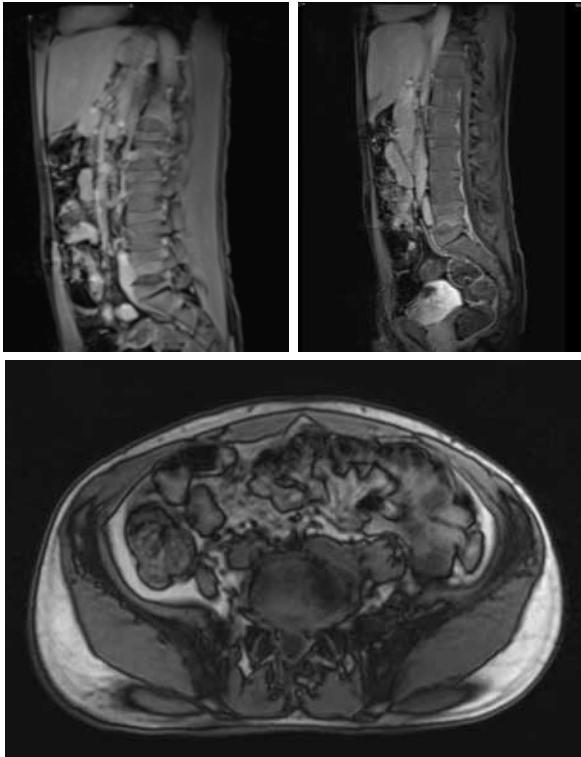


FIGURE 1. MRI Sagittal and Axial View L5-S1 intervertebral disc presented small hyper signals and irregular margins, associated with an oedema of the L5 vertebral body and a slight epidural attenuation.

were negative, too. Electrophoresis of proteins and hemoglobin were normal. MRI: In abdominal images were seen hepatomegaly and splenomegaly. In vertebral column the L5-S1 intervertebral disc presented small hypersignals and irregular margins, associated with an oedema of the L5 vertebral body and a slight epidural attenuation (Figure 1). Widal test repeated after a week were: TO 1:320, TH 1; 640. We started a complex treatment with Levofloxacin, Flagyl, Amikacine i/v and Dexametazon. Temperature returned normal on the sixth day and pain relief in fifteenth day. The patient gradually improved after three weeks of intravenous Levofloxacin (400 mg every 12 hours). Then the antimicrobial was changed to oral Levofoxacin 750 mg daily for two months more. Clinical evaluation two months after oral treatment resulted normal. WBC was 5900 cells/mm³, CRP was 0.8 mg/dL and ESR was 25 mm/h.

3. DISCUSSION

Extraintestinal infections are the rare complications of *Salmonella* bacteremia, accounting for 5-10% of all patient (4, 5). *Salmonella* osteomyelitis has traditionally been associated with

patients following sickle cell crisis where intestinal infarctions due to sickling permits the passage of ordinary salmonella gut flora organisms into the blood stream, and then to bone (6). Our case was without any haemoglobinopathy or immunosuppression. According to (7) *Salmonella* spondylodiscitis accounts for less than 0.5% of all bone infections, it causes significant difficulties in management and can be associated with increased morbidity and mortality. The major clinical manifestations and laboratory findings include fever, back pain, leukocytosis and elevated ESR and CRP as in our case.

Cases are thought to occur secondary to hematogenous spread after an episode of bacteremia (1, 2, 4, 7) as in our patient. Blood culture was positive in 48% of cases (4).

According to (5) no patients in the literature can recognize a history of diarrhea prior to their present illness, probably due to a long incubation period of the disease and the ability of *Salmonella* Typhi to penetrate the intestinal wall without causing the diarrheal symptoms, but in (5) diarrhea was present only in 16% of cases, as in our case with a septic form of the disease. Most patients in the literature had symptoms of illness of less than 3 months, with the range from two days to three months. The mortality of spondylitis caused by *Salmonella* spp. or pyogenic bacteria in other studies varied between 5% and 40% (4). In our case the patient had high temperature three days before started pain in lumbar region. MRI ten days after beginning complains, showed irregular margin associated with an oedema of the L5 vertebral body and hypersignals in L5-S1 intervertebral disc, but without epidural abscess and surgery intervention as in (8, 11). In osteomyelitis patients without sickle-cell anemia the infection is attributed to *Salmonella* in only 0.5% of the cases,

one forth of which involves the spinal column (9). The most common infection sites of typhoid spondylitis were the lumbar region (5) and our case was one of them. Treatment applied with i/v Levofloxacin for three weeks and more than two months with oral Levofloxacin resulted successful. *Salmonella* is sensible to Ciprofloxacin, Ceftriaxon, Levofloxacin (2, 8, 10, 11, 12). Summary of ten patients with Typhoid spondylitis from English literature showed in Table 1 (3).

4. CONCLUSION

We presented a successful treatment with Levofloxacin in a 26 years old immunocompetent male with a septic form of salmonellosis complicated with lumbar spondylodiscitis without surgery intervention.

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BOOK REVIEW

Basics of Maxillofacial Surgery

Authors: Tarik Masic and associates: Muhamed Ajanovic, Emina Babajic, Kemal Dizdarevic, Dino Dizdarevic, Almir Dervisevic, Rusmira Efendic, Ivor Lincender, Meliha Causecic-Vucak and Lejla Zunic

Publisher: AVICENA d.o.o. Sarajevo, B5 format, hard cover, year 2011., 280 pages. ISBN 978-9958-720-46-8, COBISS BH-ID 18959366

Textbook BASICS OF MAXILLOFACIAL SURGERY by Tarik Mašić and associates is a novelty in the textbook literature in the field of maxillofacial surgery. Previous books, monographs and manuals in selective, partial and scattered manner presented this topic, which was a certain flaw in the approach, concepts and understanding of this specialized discipline in medicine and dentistry. These were important reasons that graduate and postgraduate students of medical and dental faculties encountered many difficulties in preparing for the examination at the undergraduate and postgraduate studies and specialized exams when study medicine and dentistry

For the preparation of this textbook was used the most modern textbooks of domestic and foreign authors, then the text of published papers in national and international indexed journals, which are based on the approach to medical education by the Bologna concept/model of study. In its preparation participated several reputable experts from different disciplines that are related to the maxillo-facial surgery; which makes the textbook more complete and comprehensive. Contributions have been made, in addition to maxillofacial surgery specialists, also specialists in neurosurgery, ENT, oral surgery, prosth-

odontics etc. Assistant Professor Tarik Masic, PhD from Faculty of Dental medicine of University of Sarajevo with his colleagues has accepted the task to be responsible for his students, but also for the students of other medical faculties to write a textbook of Maxillofacial surgery that will help them to more easily cope with this very important and extensive subject. The book is written as a university textbook intended for students as for all these faculties with health orientation, physicians who specialized maxillofacial surgery, oral surgery, otorhinolaryngology, plastic surgery, prosthetics etc. The book is divided into 11 chapters. These are:

1) Inflammatory conditions in the maxillofacial surgery, 2) Maxillofacial traumatology; 3) Temporomandibular joint disease, 4) Diseases of nervus trigeminus; 5) Diseases of nervus facialis; 6) Preprosthetic surgery; 7) Salivary gland disease, 8) Tumors of the maxillofacial region; 9) Congenital anomalies of soft tissues and skeletal deformities of the maxillofacial region, 10) Reconstructive procedures in maxillofacial surgery; 11) Cosmetic surgery of the face.

Students and physicians will finally get an excellent basic textbook of Maxillofacial surgery that will help them to more quickly and more easily cope with this very extensive material and give them a good basis for the following subjects that await them, and which require a solid knowledge of this subject. The book is written in simple and easily understandable way, although the matter is very diverse and complex. Book is richly illustrated by schemes, tables,



charts, figures that help to better understanding of the text. The nomenclature is appropriate and correct. We should congratulate Assistant Professor Tarik Masic and his colleagues who has a very pronounced pedagogical ambitions and abilities and who has written this important and very successful book.

The textbook is written in simple and understandable language, Latin terms are used mostly where it was really necessary, in order that for the students of medicine and dentistry the textbook material in this book is more accessible and easier to prepare for the exam, but also for practical use in their future medical practice.

*Sarajevo, August 2011.
Prof Izet Masic, MD, PhD*

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