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Therapeutic approach to onco-hematology patients with *Candida* isolates

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Abstract

Introduction: Successful treatment of candidiasis requires a specific antifungal treatment (nystatin, clotrimazole, miconazole, fluconazole, amphotericin, echinocandin) to remove or reduce the factors that increase the risk of developing massive colonization of mucous membranes and skin, candidemia and/or disseminated candidiasis. Candida may cause a variety of clinical presentations and involve each organ and system in the human body. Candidiasis is the result of a decline in the host's defense ability, on the one hand, and the invasiveness of microorganisms that cause the disease, on the other.

Materials and methods: The study included onco-hematology patients hospitalized at the Clinic for Hematology at the Clinical Center of the University of Sarajevo with microbiologically proven fungal isolates, in the period from 2009 to 2012. The standard laboratory diagnosis of candida infections is based on the methods: direct microscopy of fresh samples taken from the patient material for the presence of *Candida species* yeasts; isolation of *Candida* yeasts by cultivation of the samples on nutrient media; identification of *Candida* species.

Results: Out of the main sample, 28 or 35% of patients did not receive antibiotic therapy. A majority of patients had a therapeutic plan of one antibiotic (26 or 32.5%). In the group of administered antibiotics, Esbesul was used the most frequently – in 23 or 28.8% of cases, followed by Ciprol in 13 or 16.3% of cases. Antibiotic therapy was taken by 14 or 17.5% of patients. A large number of patients (66 or 82.5%) were not treated with antibiotics before the isolation of *Candida* was confirmed. Out of the total number of patients (N=80), 11.3% received corticosteroids – 7 or 8.8% received one and 2 or 2.5% received two corticosteroids. The most frequently used corticosteroid was Dexamethasone, in 5 or 6.3% of cases. A little less than half of patients (34 or 42.5%) did not receive antifungicidal therapy. Almost half of the total number of patients (39 or 48.8%) received one antifungicide, with 7 or 8.8% of patients receiving two antifungicidal agents during the therapy. In hematology patients from whom *Candida* was isolated, the study found that the most frequently used antifungicidal medicine was Funzol, in 45 or 56.3% of cases. Diflucan was used in 6 or 7.5% of cases, while the least frequently used medicine was Amphotericin B, in only 2 or 2.5% of cases.

Conclusions: Analyzing the therapeutic approach to onco-hematology patients with *Candida* isolates, it was concluded that 14 or 17.5% of patients received antibiotic therapy. The most frequently used corticosteroid was Dexamethasone, in 5 or 6.3% of cases. Antiviral therapy was most frequently used in the group of patients with acute leukemia (2 or 16.7%). As an antifungicide, the most frequently used medicine was Funzol, in 45 or 56.3% of cases. Diflucan was used in 6 or 7.5% of cases, while the least frequently used medicine was Amphotericin B, in only 2 or 2.5% of cases.

Key words: onco-hematology patients, *Candida*, therapeutic approach.

1. Introduction

Candida may cause a variety of clinical presentations and involve each organ and system in the human body. The main virulence factors of Candida are well-known, the most important of which include the ability to adhere to human cells and artificial prosthetic materials, the production of secreted aspartyl proteinases, phospholipase and lipase, as well as the ability of morphogenesis i.e. transformation of a single-celled yeast into multicellular forms (pseudohyphae and hyphae) (1,2).

There are numerous factors that increase susceptibility to Candida infections, the most important of which include: physiological (pregnancy, older age, premature and newborn babies), traumatic (skin and nail maceration, other infections, burns), immunological and hematological (neutropenia, cellular immunodeficiency due to hematological malignancies and HIV infection, aplastic anemia), endocrinological (diabetes, hypoparatireoidism, Addison's disease), iatrogenic (treatment with cytostatic agents, corticosteroids, broad-spectrum antibiotics, use of oral contraceptives, application of catheters, surgical procedures, total parenteral nutrition) and other (malnutrition, malabsorption, intravenous addicts). Candidiasis is the result of a decline in the host's defense ability, on the one hand, and the invasiveness of microorganisms that cause the disease, on the other. Low molecular weight toxins, products of *Candida albicans* strain that produces canditoxin, may cause a shock and lethal outcome (3,4).

Successful treatment of candidiasis requires a specific antifungal treatment (nystatin, clotrimazole, miconazole, fluconazole, amphotericin, echinocandin) to remove or reduce the factors that increase the risk of developing massive colonization of mucous membranes and skin, candidemia and/or disseminated candidiasis.

During the hospitalization in sterile units, control cultures (sweep of pharynx, groin and armpit skin and genital tract mucosa, stool and urine samples) are taken from neutropenic patients on a regular basis, twice a week. Isolation of one *Candida* species from two control culture samples taken on the same day or isolation of two *Candida* species from one control culture sample requires the introduction of antifungal prophylaxis in patients (5).

2. Material and methods

The study included onco-hematology patients hospitalized at the Clinic for Hematology at the Clinical Center of the University of Sarajevo with microbiologically proven fungal isolates, in the period from 2009 to 2012. The samples for mycological procedure were chosen in accordance with clinical features and susceptibility to opportunistic fungal infection in onco-hematology patients. The standard laboratory diagnosis of candida infections is based on the methods: direct microscopy of fresh samples taken from the patient material for the presence of *Candida species* yeasts; isolation of *Candida* yeasts by cultivation of the samples on nutrient media; identification of *Candida* species.

3. Results

Out of the main sample, 28 or 35% of patients did not receive antibiotic therapy. A majority of patients had a therapeutic plan of one antibiotic (26 or 32.5%), followed by patients who received two antibiotics (15 or 18.8%) and patients who received three antibiotics, while the smallest number of patients received four antibiotics (4 or 5.0%).

Examination of the group of onco-hematology patients with *Candida* isolates suggested that, in the group of administered antibiotics, Esbesul was most frequently used in 23 or 28.8%, followed by Ciprol in 13 or 16.3% of cases. The next on the list was Meronem 15%, followed by Amikacin and Xiclav 11.3%, Vancomycin 10%, Gentamicin 7.5%, Triax and Metronidazole 5% and Fortun 3.8%. The least frequently used antibiotics, whether separately or in combination with other medicines, were Maxipime and Doxycycline (1 or 1.3% of cases each).

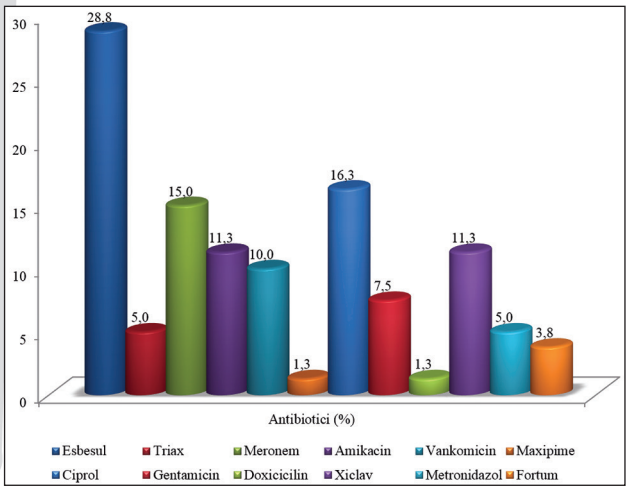

Chart 1. Prevalence of administered antibiotics

Analyzing the therapeutic approach to onco-hematology patients with *Candida* isolates, it was concluded that 14 or 17.5% of patients received antibiotic therapy. That means that a small number of patients were treated with antibiotics before the fungal isolate was obtained. A large number of pa-

tients (66 or 82.5%) were not treated with antibiotics before the isolation of *Candida* was confirmed.

Out of the total number of patients (N=80), 11.3% received corticosteroids – 7 or 8.8% received one and 2 or 2.5% received two corticosteroids. A majority of patients did not receive corticotherapy as a monotherapy (71 or 88.8%). Analyzing the group of onco-hematology patients with *Candida* isolates, it was proven that the most frequently used corticosteroid was Dexamethasone, in 5 or 6.3% of cases. The second most frequently used corticosteroid was Nizon, in 4 or 5% of cases, followed by Solumedrol in 2 or 2.5% of cases. The corticosteroid therapy was mostly used in patients with lymphomas. Corticosteroids were least frequently given to patients with acute leukemia. Observing the administration of antiretroviral therapy, the results suggest that antiretroviral therapy was used in 6 or 7.5% of patients. A large number of patients did not receive antiretroviral therapy (74 or 92.5%). Antiviral therapy was most frequently used in the group of patients with acute leukemia (2 or 16.7%).

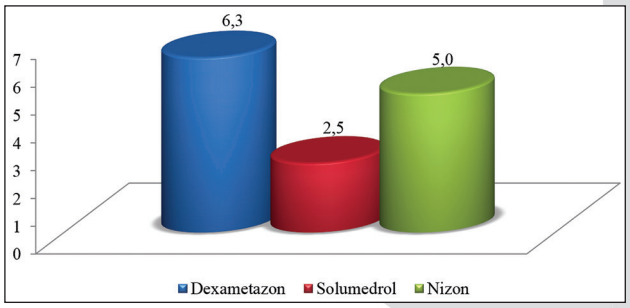

Chart 2. Ratio of corticosteroids used in therapy

A little less than half of patients (34 or 42.5%) did not receive antifungicidal therapy. Almost half of the total number of patients (39 or 48.8%) received one antifungicide, with 7 or 8.8% of patients receiving two antifungicidal agents during the therapy. In hematology patients from whom *Candida* was isolated, the study found that the most frequently used antifungicidal medicine was Funzol, in 45 or 56.3% of cases. Diflucan was used in 6 or 7.5% of cases, while the least frequently used medicine was Amphotericin B, in only 2 or 2.5% of cases.

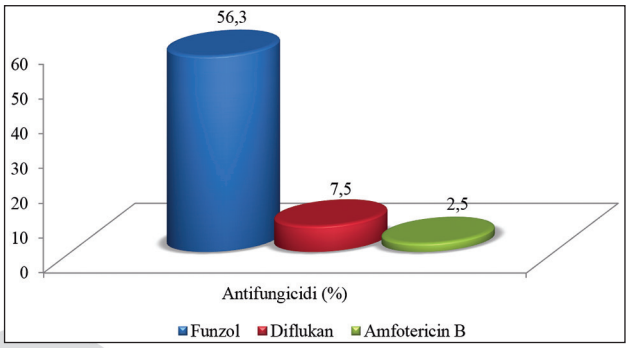

Chart 3. Ratio of antifungal medicines used in therapy

Analyzing the sample of onco-hematology patients with *Candida* isolates, it was established that a large number of patients received antifungal therapy – Funzol for all hematological diseases. As the second most frequently used therapy, Amphotericin B was given to patients with chronic lymphocytic leukemia and chronic myeloid leukemia, as well as to patients with lymphomas. As the second most frequently used antifungal therapy, Diflucan was given to patients with acute leukemia, multiple myeloma. Although there are certain differences in the use of antifungicidal agents by diagnostic entities in onco-hematology patients, these differences are statistically insignificant (p>0.05).

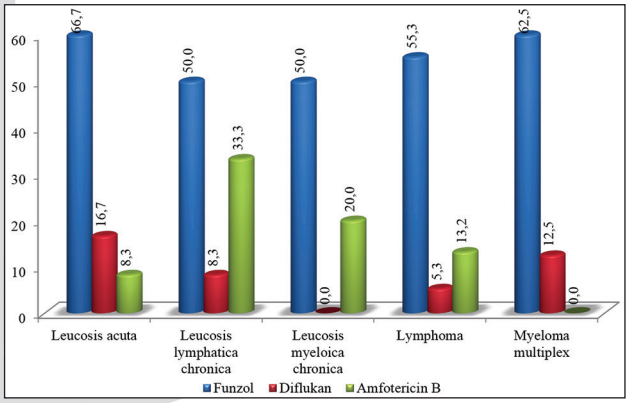

Chart 4. Ratio of used types of antifungal medicines by diagnoses

4. Discussion

Approach to invasive fungal infections requires the following: individual patient risk assessment, early diagnosis and urgent treatment. Any delay in antifungal therapy significantly increases the mortality rate in these patients, which accounts for 30-40% in case of invasive candidiasis and 40% in case

of invasive aspergillosis, as well as depending on the degree of immunological deficiency in patients, primarily neutropenia. In relation to the risk of occurrence of invasive fungal infection, we can classify the patients with hematological malignancies into three groups, primarily based on the main disease and treatment method. Patients who are especially prone to develop an invasive fungal infection include: patients treated with allogeneic transplantation of hematopoietic stem cells, patients with acute myeloid leukemia during all phases of treatment, patients receiving high doses of Cytosar and patients suffering from lymphomas, treated with second- and third-line therapy (6,7). Over the past years, increased frequency of invasive fungal infections has been observed in patients with lympho-proliferous diseases treated with purine analogues, alemtuzumab and rituximab, even in the absence of neutropenia and without included corticotherapy (8,9).

Neutropenia represents the most important pathogenic mechanism that influences the occurrence and the outcome of fungal infections in hematology patients. The role of neutrophils is to cause a lesion of the fungal wall with subsequent destruction by macrophages. They also improve the antifungal activity, all in order to increase the number of neutrophils in a patient's blood count by administering a granulocyte growth factor or a granulocyte transfusion, which could play an important role in controlling the life-threatening complication of the infection (10).

Diagnosis of invasive fungal infections in hematology patients is difficult and tends to be delayed and uncertain. Namely, clinical symptoms and indications are usually nonspecific, while radiological indications are rarely specific. Due to a patient's difficult health condition, tissue biopsies and other invasive procedures are often impossible in early stages of invasive fungal infection. Due to diagnostic difficulties, invasive fungal infections are often classified as "proven" and "probable" (11).

Due to the high risk of lethal outcome, there is usually not enough time to make a final diagnosis of invasive fungal infection before initiating an antifungal therapy. That is the reason why the current approach to invasive fungal infection in immunocompromised patients mostly consists of prophylaxis and early empirical antifungal therapy, while a targeted and specific therapy for a proven infection is rarely applied. Identification of an invasive fungal infection is important for a treatment plan (type and duration of antifungal therapy, surgical procedure and use of secondary prophylaxis) (12).

Antifungal prophylaxis in onco-hematology patients reduces the incidence of fungal opportunistic infections and, at the same time, it reduces the mortality rate after the onco-hematological therapy. It is necessary to emphasize the clinical importance of early initiation of the empirical treatment with antifungal medicines in high-risk patients, as well as the need to define national guidelines for the treatment of fungal infections (12, 13).

Candidae represent the leading cause of opportunistic fungal infections and colonization of mucous membranes and skin in immunodeficient patients. They are part of physiological flora of skin and mucous membranes of mouth cavity, intestines and vagina. Candidae cause the infection of mucous membranes of mouth cavity, pharynx and esophagus in HIV-positive patients and they are also the most frequent fungal infections in this group of patients. They are also the leading cause of hospital fungal infections and they have a significant impact on morbidity and mortality rates in immunodeficient patients (14).

Opportunistic fungal infections in onco-hematology patients are difficult to diagnose and the outcome is often lethal. During the seven-month study (15), 117 cases of onco-hematology patients treated with systemic antifungal therapy were being observed. Fungal infections in patients are classified as possible, probably or proven infections, in accordance with the criteria of the European Organization for Research and Treatment of Cancer. Systemic antifungal therapy is mostly applied empirically or preventively (15).

5. Conclusions

1. Analyzing the therapeutic approach to onco-hematology patients with *Candida* isolates, it was concluded that 14 or 17.5% of patients received antibiotic therapy.
2. The most frequently used corticosteroid was Dexamethasone, in 5 or 6.3% of cases.
3. Antiviral therapy was most frequently used in the group of patients with acute leukemia (2 or 16.7%).

4. As an antifungicide, the most frequently used medicine was Funzol, in 45 or 56.3% of cases. Diflucan was used in 6 or 7.5% of cases, while the least frequently used medicine was Amphotericin B, in only 2 or 2.5% of cases.
5. Antifungal prophylaxis in onco-hematology patients reduces the incidence of fungal opportunistic infections and, at the same time, it reduces the mortality rate after the onco-hematological therapy.
6. It is necessary to emphasize the clinical importance of early initiation of the empirical treatment with antifungal medicines in high-risk patients, as well as the need to define national guidelines for the treatment of fungal infections.

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The prognostic significance of cardiotoxography in the detection of fetal suffocation in the intrauterine period

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Abstract

The aim of the paper was to carry out the diagnosis of fetal asphyxia in the ante and intrapartal period of the pregnancy by means of cardiotocography (amplitude oscillations) and to determine the incidence of cardiotoxographic models in the general and pathological population and especially to examine the prognostic role of cardiotocography in evaluating fetal condition in the intrauterine period.

The study included 812 pregnancies that make up the general pregnancy population. Out of these 172 pregnancies were pathological pregnancies. In both pregnancy groups, clinical, laboratory, ultrasonographic examination and continuous cardiotocography monitoring have been performed.

The undulator model is presented with higher frequency in the general pregnancy population compared to the population of pathological pregnancies while the silent model is presented with higher frequency of pathological pregnancies compared to general pregnancies.

The highest frequency undulator model is presented at IUGR, while the highest frequency silent model is presented to preeclampsia.

Apgar scarier in the interval of (7-10) with higher frequency is presented to the general pregnancy population compared to pathological pregnancies, while apgar scori at intervals of (0-3) is presented with higher frequency in the group of pathological pregnancies compared to general pregnancies.

The highest apgar values of the scoring at intervals of (7-10) are presented at IUGR and apgar scoring values at intervals of (0-3) are presented to preeclampsia.

The silent model presence requires additional examinations: fetal biometry, echoinatomy, doppler ultrasonography, placental hemoglobin analysis), hormone dosing (HPL estriol, HCG), Sp1, amnioscopy and amniocentesis.

It is preferable to: Preeclampsia, pyelonephritis pregnancy diabetes, IUGR and cardiovascular system disease become cardiotoxicity three times a week in the last month of pregnancy.

Cardiotoxography still remains as an important non-invasive method in detecting fetal asphyxia in ante and intrapartal periods.

Key words: Cardiotocography, pregnancy, fetus.

Introduction

Cardiotocophy is an efficient method of detecting fetal asphyxia that occurs during various stress conditions, disorders in pregnancy, and disorders occurring during birth. With the cardiotoxograph, continuous recording of the heart rate of the fetus and the uterine contractions is performed.

Chemoreceptors, baroreceptors and the central nervous system play an important role in the functioning of the fetal cardiovascular system. Other factors also influence the growth of parasympathetic and sympathetic activity (1). Partial CO_2 pressure complicates chemoreceptors who then together with the baroreceptors and the central nervous system regulate and regulate homeostasis of the bloodstream in tissues. Epinephrine and norepenephrine produced

during the suprarenal medulla during stress also affect the cardiovascular system by stimulating heart rate, contracting heart rate, and increased blood pressure (2). The fetal skeletal cortex of the fetus produces aldosterone, which plays an important role in sodium retention and increased blood volume in the intravascular compartment. Vazopresina plays an important role in the fetal hypoxia (3). Some other substances (1) play an important role in the fetal circulation (prostaglandins, renin-angiotensin system, enkephalin and endorphin).

Cardiotrophy is a non-invasive non-invasive method by which fetal choreography detects different pathological states of pregnancy and fetus. Fetal hypoxia is manifested by changing the basal heart rate, changing frequency and amplitude oscillations as well as with periodic changes (accelerations, decelerations) in the fetal heart action.

In addition to fetal hypoxia, which is manifested by pathological models in the cardiotokography, there are several other pathological conditions that are manifested in pathological cardiotocography models that are not related to fetal hypoxia.

The most common pathological conditions of pregnancy that are manifested by fetal asphyxia are:

1. Preeclampsia, arterial hypertension in pregnancy, respiratory illnesses manifested with respiratory surface reduction, respiratory obstructive diseases, cardiovascular diseases (coarctatio aortae, fallot tetralogy, heart failure) diabetes mellitus, pyelonephritis, combined with hypertension, anemia in pregnancy, and systemic lupus erythematosus.
2. The abnormalities and pathologies of the umbilical cordon (funikulus brevis, et longus, torsio funikuli umbilicalis, strangulacio funiculi umbilicalis et nodus verus funiculi umbilicalis) are also presented with pathological models of cardiotocography.
3. Chorioamnionitis manifested with high temperature is also manifested by tachycardia of the fetus.
4. Placenta pathology (placenta praevia, placental abortion, succenturiate placenta) is sometimes manifested by pathological models of cardiotocography.

Purpose of the work

The aim of the paper was to analyze the prognostic role of cardiotocography in the detection of fetal aspiration in the ante and intrapartal period, and to determine the incidence of cardiotocography (amplitude oscillations) in general and pathological pregnancy populations.

Another purpose of this paper was to examine and analyze the role of cardiotocography (amplitude oscillations) in assessing the fetal condition in the ante and intrapartal period with special emphasis on the prognostic evaluation of the fetal and infant health condition.

Material and methods

The study included 812 pregnancies that were selected according to the random selection method. The paper included the population of pregnant women from 2017-2018 who were examined at the Obstetric Gynecology Unit in Peja.

The pregnancy population is grouped into two groups. The group that includes the general pregnancy population and the group that includes the population of pathological pregnancies. The group includes 812 pregnant women, 172 of which constitute the population of pathological pregnancies.

All pregnancies were examined laboratory, ultrasonographic, clinical, as well as continuous monitoring by cardiotocography. Cardiotoxography monitoring was also done during the act of birth. Presentation of modeled cardiotoxograph models in pregnant women at the Obstetrics and Gynecology Unit. Figuratively we have presented four main patterns of amplitude oscillations: the undulator model, the saltator, the narrow, silent undulator.

The undulator model indicates the good functioning of the fetoplasmic unit (oxygenation). It is presented with amplitude frequency of 10 - 25 beats per minute, with the presence of amplitude and frequency oscillations. There is a presence of acceleration.

The narrow wave pattern is represented by amplitude oscillations of 5-10 beats per minute. There is presence of amplitude and frequency oscillations without the presence of accelerations.

If all the causes of the depression of the fetus cardiovascular center are eliminated, and if the use of medications that depress the contracting heart

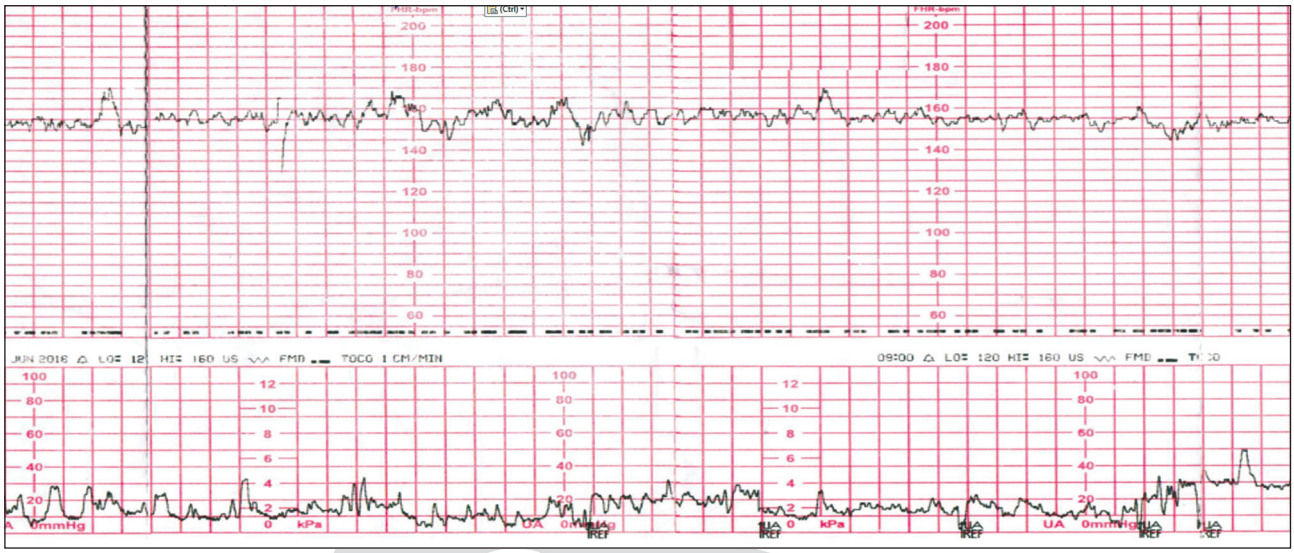


Figure 1. Presentation of the cardiotocogram of pregnancy 38 weeks of gestation: Fetal heart rate (basal heart rate 155/min, in presence of frequency and amplitude oscillations, with presence of accelerator). This is the model of the undulator Tokogram: tonsus basal mm15Hg and presence of Braxton Hick contraction.

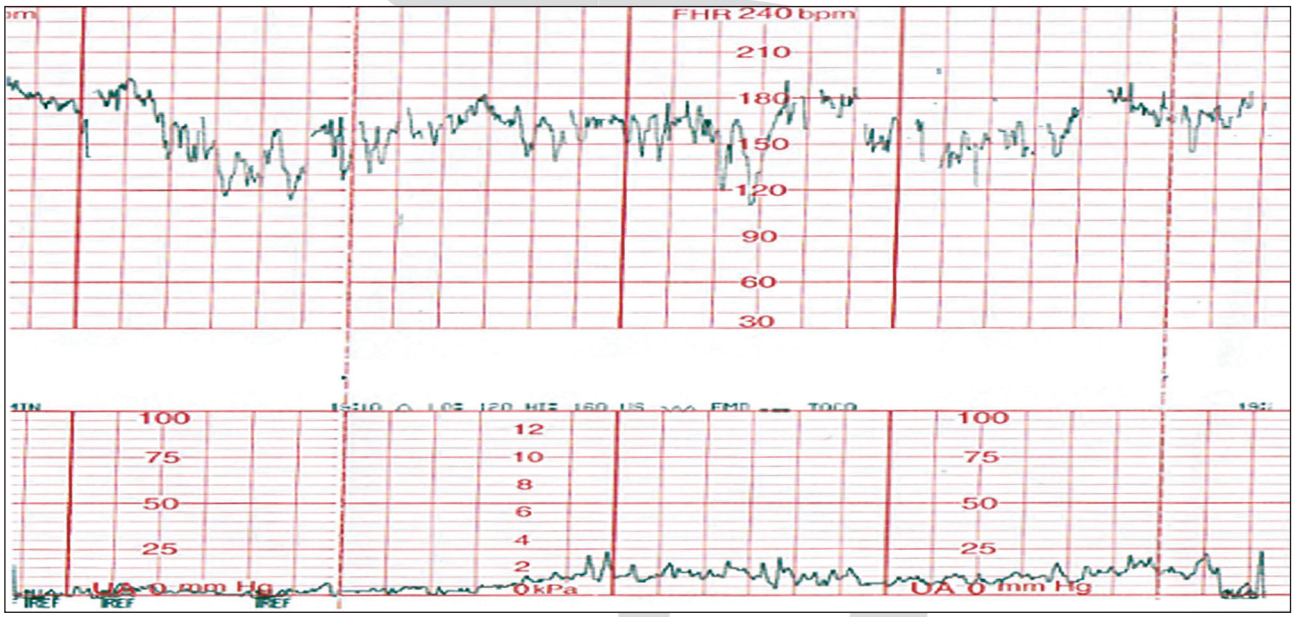


Figure 2. Presentation of pregnancy cardiotocogram 37 weeks of gestation: Fetal heart rate (basal heart rate 150/ min, in presence of ambulatory and oscillatory oscillations, with accelerator presence.) This is the saltator pattern Tokogram: basal tons 5mmHg and presence of Braxton Hick contraction.

of the fetus and the hemodynamic disorders of the fetus are eliminated, we conclude that this pattern is not pathological.

The silent model is presented with amplitude oscillations of less than 5 beats per minute, without the presence of amplitude and frequency oscillations and without acceleration. The silent model is a pathological cardiotocography that suggests fetal fetus.

In the first part of the paper are included all pregnancies in which the primary role was to analyze the role of cardiotocography in the detection of fetal asphyxia in the ante and intrapartal period. This part of the work does not include pregnant women who have used medications (barbiturates, morphine, meperidine, dolanthin, benzedine, magnesium sulphate, tyrosine, propylthiouracil,

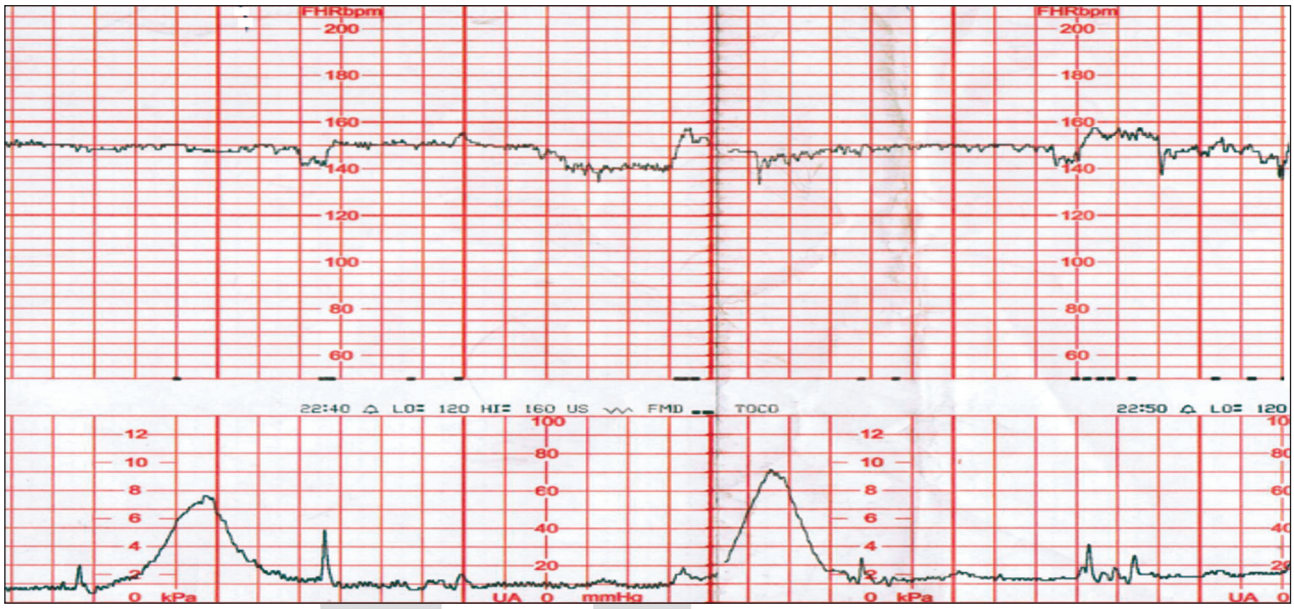


Figure 3. Presentation of the cardiotocogram of pregnancy 39 weeks of gestation: Fetal heart rate (heart rate 150/min, with presence of frequency and amplitude oscillations, without the presence of accelerations. It is about the narrow undulator model. Tokogram: 10mmHg basal tonus with contraction every 12min (bradisistol), with 60mmHg amplitude

Figure 4. Presentation of pregnancy cardiotocogram 40 weeks of gestation: Fetal heart rate 155/min. The absence of amplitude and frequency oscillations is noticed. Well accelerated. Silent models. Tokograms: tonus basal 0mmHg. Three variable contractions are noted, two with 20mmHg amplitude and one with 40mmHg amplitude.

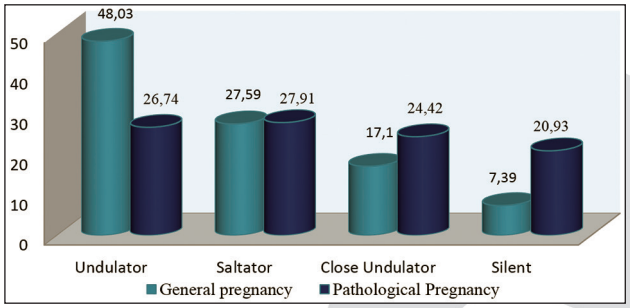
adrenaline, atropine, propranolol, cardiac glycosides, calcium channel blockers).

In the second part of the paper we have presented some special cases of different pathologies of pregnancy and fetus which have been manifested by cardiotocographic pathological models that have shown for severe chronic fetus asphyxia which has resulted in death of fetus, neonatus as well as neurological defects.

Results

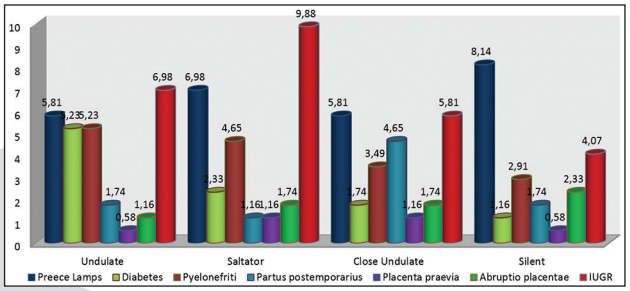
From the table 1 we observe that the undulator model of the general pregnancy population is pre-

sented with frequency 48.00%, while in the population of pathologic pregnancies is presented with frequency 26.74%. The silent model of the general pregnancy population is 7.39% frequency, while in the population of pathologic pregnancies it is presented with frequency 20.93%.



Graph 1. Graphic representation of the frequency of cardiotocography (amplitude oscillations) in the general and pathological population. From the graph we observe that the undulator model of the general pregnancy population is presented with frequency 48.00%, whereas in the population of pathologic pregnancies it is presented with frequency 26.74%. The silent model of the general pregnancy population is 7.39% frequency, while in the population of pathologic pregnancies it is presented with frequency 20.93%.

From the table 2 we observe that the higher-frequency undulator model has been encountered at IUGR, while the silent model of high frequency cardiotoxography is present in preeclampsia.



Graph 2. Graphic representation of the frequency of cardiac imaging (amplitude oscillations) in the pregnant population by type of disease. From the graph we notice that the highest frequency undulator model has been encountered at IUGR, while the silent model of high frequency cardiotoxography is present in preeclampsia.

Table 1. Tabular frequency representation of cardiotocography (amplitude oscillations) in the general and pathological population

Models of cardiotocography (amplitude oscillations)	General pregnancy		Pathological Pregnancy	
	No.	%	No.	%
Undulator	390	48.03	46	26.74
Saltator	224	27.59	48	27.91
Close Undulator	138	17.10	42	24.42
Silent	60	7.39	36	20.93
Total	**812**	**100**	**172**	**100**

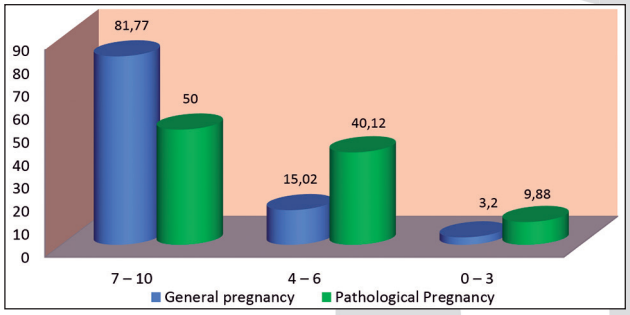
Table 2. Tabular representation of the frequency of cardiotocography models (amplitude oscillations) of the pregnant population by type of disease

Cardiotocography model	Preece Lamps		Diabetes		Pyelonefriti		Partus postemporarius		Placenta praevia		Abruptio placentae		IUGR		Total	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Undulate	10	5.81	9	5.23	9	5.23	3	1.74	1	0.58	2	1.16	12	6.98	46	26.74
Saltator	12	6.98	4	2.33	8	4.65	2	1.16	2	1.16	3	1.74	17	9.88	48	27.91
Close Undulate	10	5.81	3	1.74	6	3.49	8	4.65	2	1.16	3	1.74	10	5.81	42	24.42
Silent	14	8.14	2	1.16	5	2.91	3	1.74	1	0.58	4	2.33	7	4.07	36	20.93
Total	**46**	**26.74**	**18**	**10.47**	**28**	**16.28**	**16**	**9.30**	**6**	**3.49**	**12**	**6.98**	**46**	**26.74**	**172**	**100**

Table 3. Tabular presentation of apgar score values in the general pregnancy population and pathological pregnancies

APGAR SCORI	General pregnancy		Pathological Pregnancy	
	Nr.	%	Nr.	%
7 – 10	664	81.77	86	50.00
4 – 6	122	15.02	69	40.12
0 – 3	26	3.20	17	9.88
Total	**812**	**100**	**172**	**100**

In the general pregnancy population, the apgar scoring at intervals of (7-10) is presented in frequency of 81.77%, while in the apical epidemiologic pregnancy population at intervals of (7-10) has met in 50% of cases. In the general pregnancy population apgar scori at intervals of (0-3) met with frequency of 3.20% of cases while in the apical pathologic pregnancy population scores (0-3) met at 9.88% of the cases.



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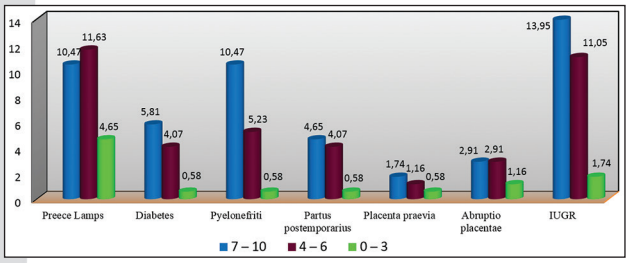
From the table 4 we observe that the apgar peak scoring frequency at intervals of (7-10) of the population of pathologic pregnancies is presented at IUGR while the apgar peak frequency in interval of (0-3) is present in preeclampsia.



Graph 4. Graphic representation of apgar values in the population of pathologic pregnancies by type of illness. From the graph we observe that the apgar peak scoring frequency at intervals of (7-10) in the population of pathologic pregnancies is presented at IUGR while the apgar peak frequency in interval of (0-3) is present in preeclampsia.

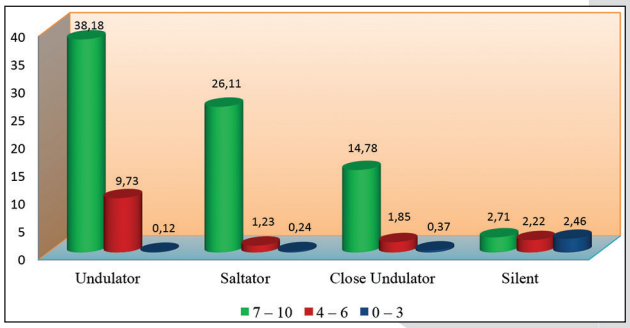
From the table 5 we observe that the frequency of the undulator model corresponding to the apgar score value at the interval of (7-10) is presented at 38.18% whereas the frequency of the undulator model corresponding to apgar score value at intervals of (0-3) is presented to 0.12% of cases. The silent model frequency corresponding to the apgar score value at intervals of (7-10) is represented by 2.71%.

Table 4. Tabular presentation of apgar score values in the population of pathological pregnancies by type of disease

APGAR SCORI	Preece Lamps		Diabetes		Pyelonefriti		Partus postemporarius		Placenta praevia		Abruptio placentae		IUGR		Total	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
7 – 10	18	10.47	10	5.81	18	10.47	8	4.65	3	1.74	5	2.91	24	13.95	86	50.00
4 – 6	20	11.63	7	4.07	9	5.23	7	4.07	2	1.16	5	2.91	19	11.05	69	40.12
0 – 3	8	4.65	1	0.58	1	0.58	1	0.58	1	0.58	2	1.16	3	1.74	17	9.88
Total	**46**	**26.74**	**18**	**10.47**	**28**	**16.28**	**16**	**9.30**	**6**	**3.49**	**12**	**6.98**	**46**	**26.74**	**172**	**100**

Table 5. Tabular representation of the frequency of cardiotocography models in correlation with the apgar score value

Apgar scori	Undulator		Saltator		Close Undulator		Silent		Total	
	Nr	%	Nr	%	Nr	%	Nr	%	Nr	%
7 – 10	310	38.18	212	26.11	120	14.78	22	2.71	664	81.77
4 – 6	79	9.73	10	1.23	15	1.85	18	2.22	122	15.02
0 – 3	1	0.12	2	0.24	3	0.37	20	2.46	26	3.20
Total	**390**	**48.02**	**224**	**27.58**	**138**	**17.00**	**60**	**7.39**	**812**	**100**



Graph 5. Graphic representation of the frequency of cardiotocography models in correlation with the apgar score value. From the graph we observe that the frequency of the undulator model corresponding to the apgar score value at the interval of (7-10) is presented at 38.18% while the frequency of the undulator model corresponding to the apgar value of the scoring at intervals of (0-3) is presented to 0.12% of cases. The silent model frequency corresponding to the apgar score value at intervals of (7-10) is represented by 2.71%.

Presentation of some pathological models of cardiotocography that have to do with fetal hypoxia

The birth was carried out with sectio cesarae, baby weight 2250gr, Amniotic fluid sanguilent., Apgar scori 1. The baby existed after 8 hours.

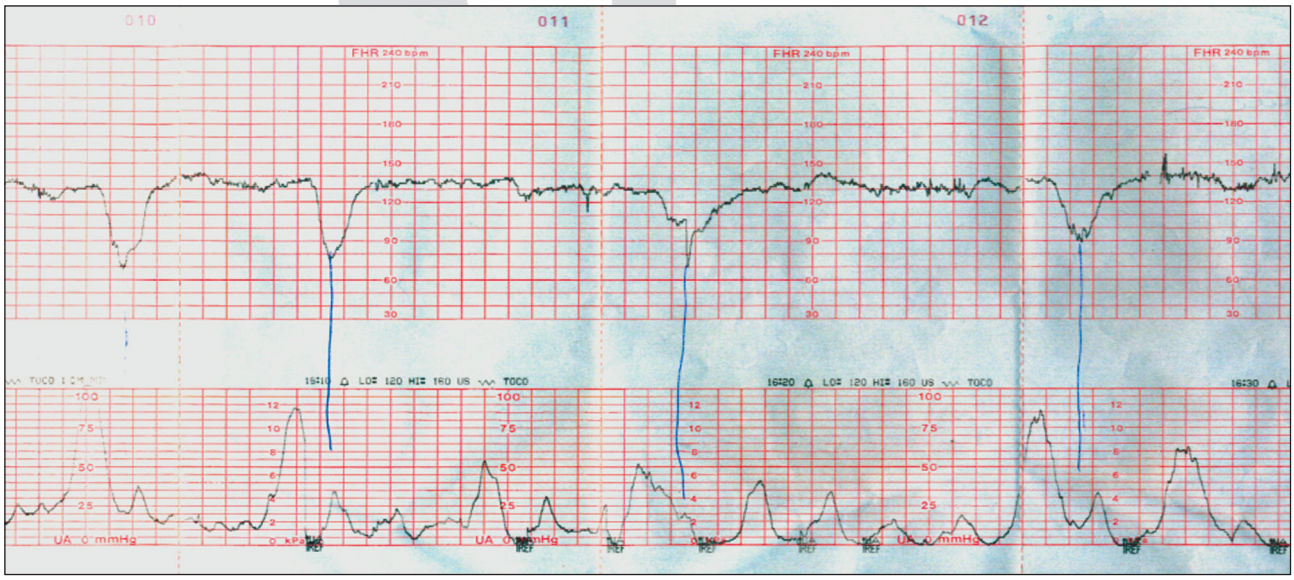


Figure 5. Pregnancy cardiogram of gestation week 40 with Rh-incompathibilia cum immunization with titer of antibody 1: 125. Basal heart rate 135/min, close undulating model with late decelerations (Dip II). The natal is performed with sectio cesarea, dense green amniotic fluid, 3700gr weight, apgar scori 1, baby has existed after 4 hours. It is about hydrops fetalis immunologica.

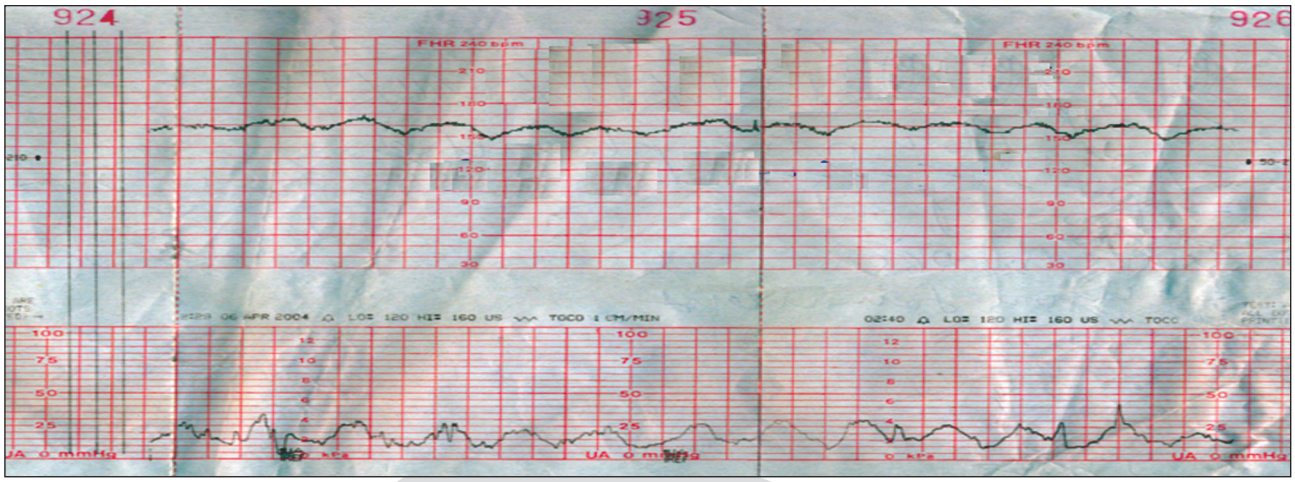


Figure 6. Pre-eclampsia pregnancy cardiogram, IUGR, placental abruption, post-sectio cesarae status. Non-reactive non-stress test (NST), without presence of pathological variability (silent type) similar to the sinusoidal model, baseline frequency 160/min.

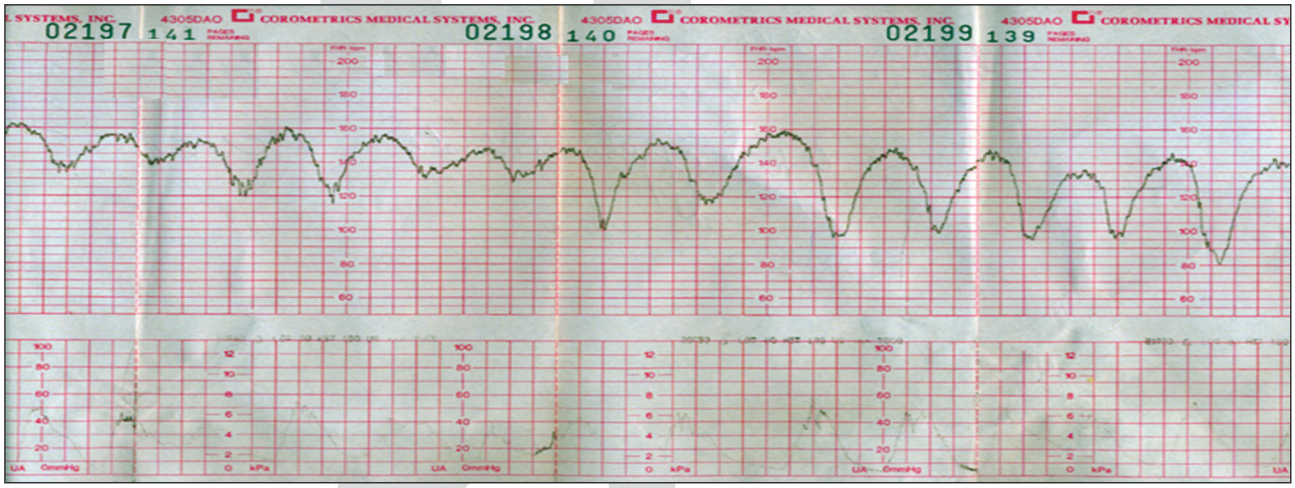


Figure 7. Pathologic cardiogram of pregnancy at birth in the dilation phase, basal frequency 145/min, suspend variability (narrow undulator type), we notice the presence of late decelerations (DIP II). The birth has ended in vaginal routes, dense green water, baby's weight 3750gr, apgar scori 3

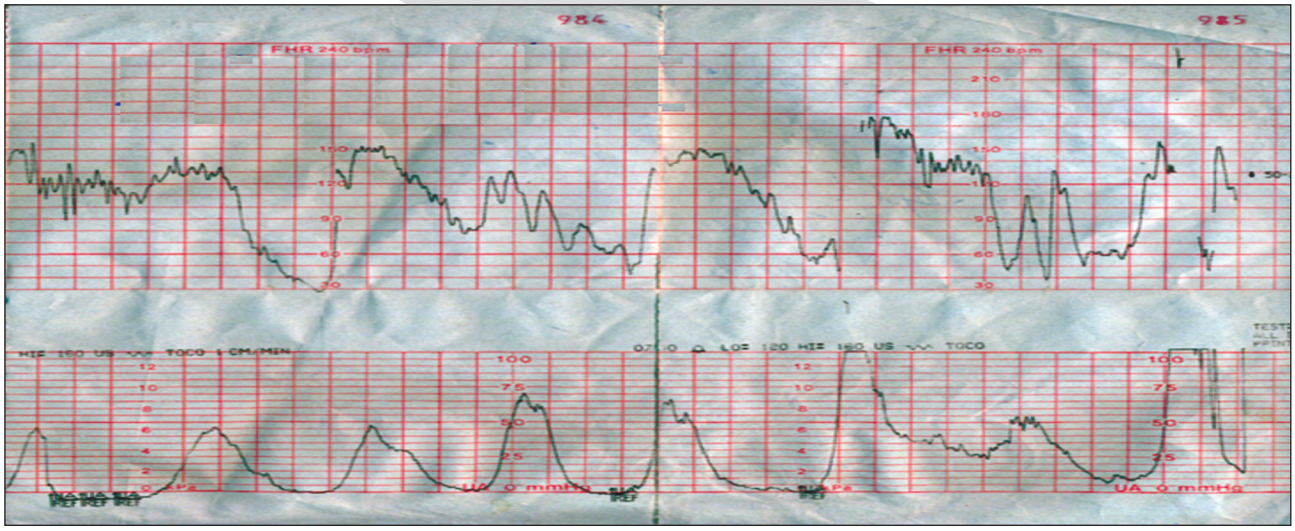


Figure 8. The pregnancy cardiogram in the 42nd week of gestation at birth at the stage of expulsion. Basal frequency 120/min, with normal undulatory model variability, we observe the presence of late decelerations. The birth is carried out in vaginal street, amniotic fluid thick green, baby weight 2800gr, apgar scori 4.

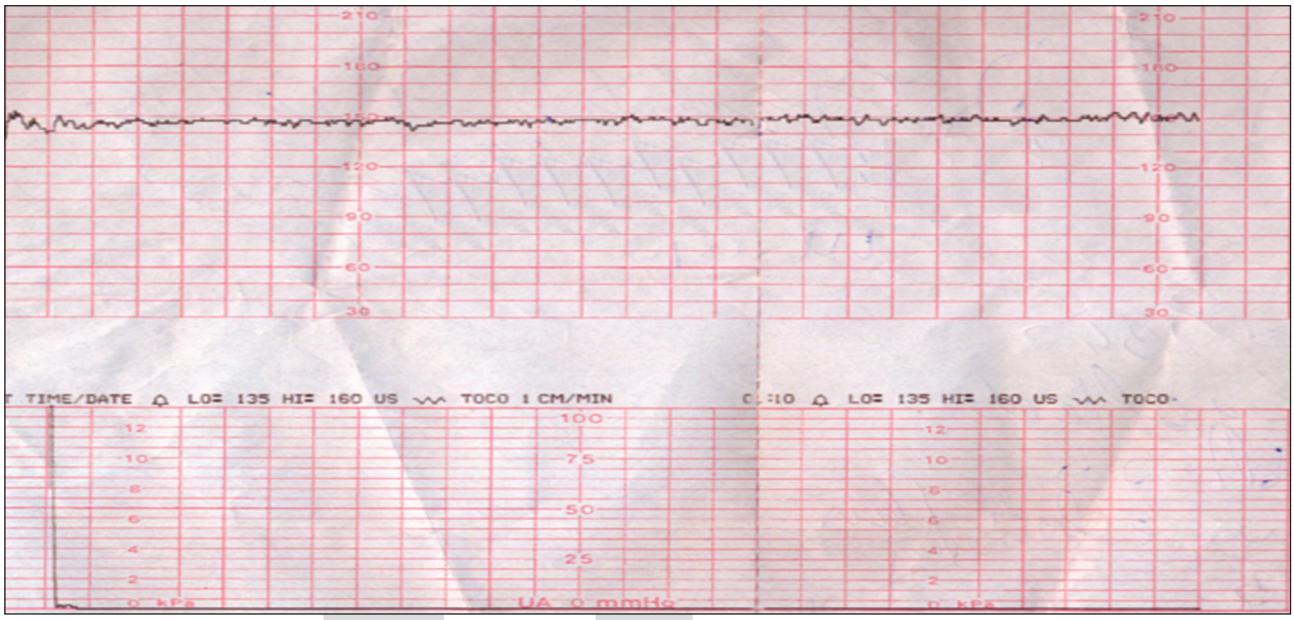


Figure 9. The non-reactive NST of pregnancy in the 39th gestation week with preeclampsia and IUGR. Basal heart rate 150/min, with pathological variability (silent type of oscillation) lack acceleration. The birth was performed with Sectio Cesarea, baby weight 2140gr, dense green amniotic fluid, apgar scori 2, baby has been occurring after 5 hours.

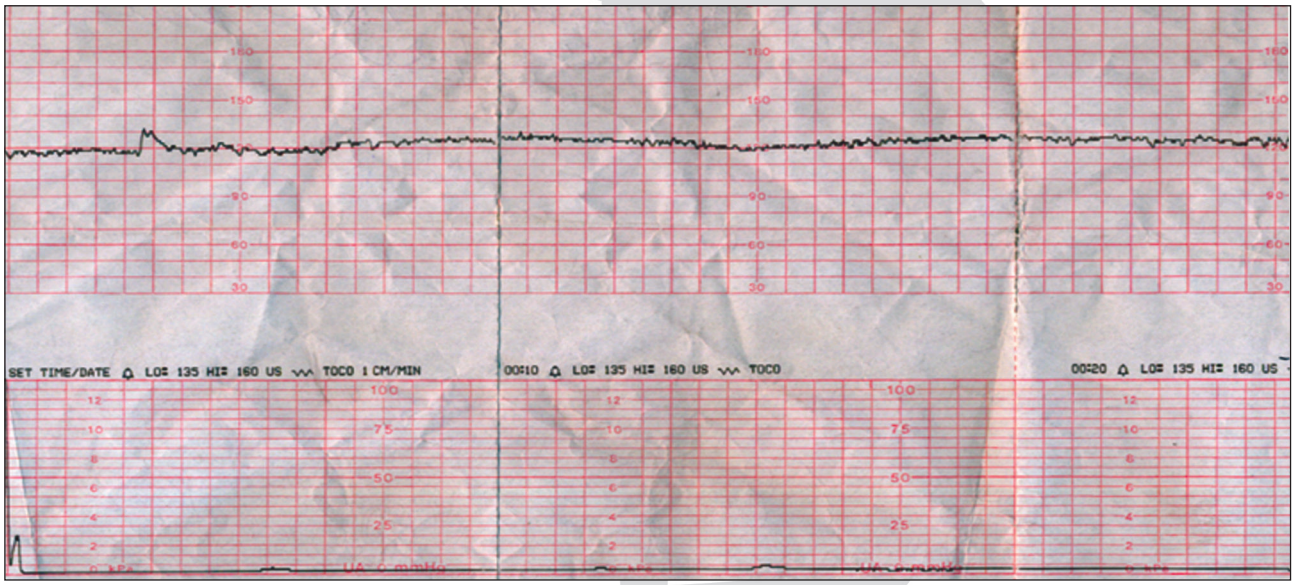


Figure 10. The pregnancy cardiogram in the 39th week of gestation. Basal heart rate 120/min, narrow oscillator undulator model. The nose is carried out in the vaginal route, the dense green amnial fluid, the baby's weight 3200 gr. Apgar scori 1. We are talking about nodus verus funiculi unbilicalis.

Cardiotographic presentation of synthetic vena cava inferior

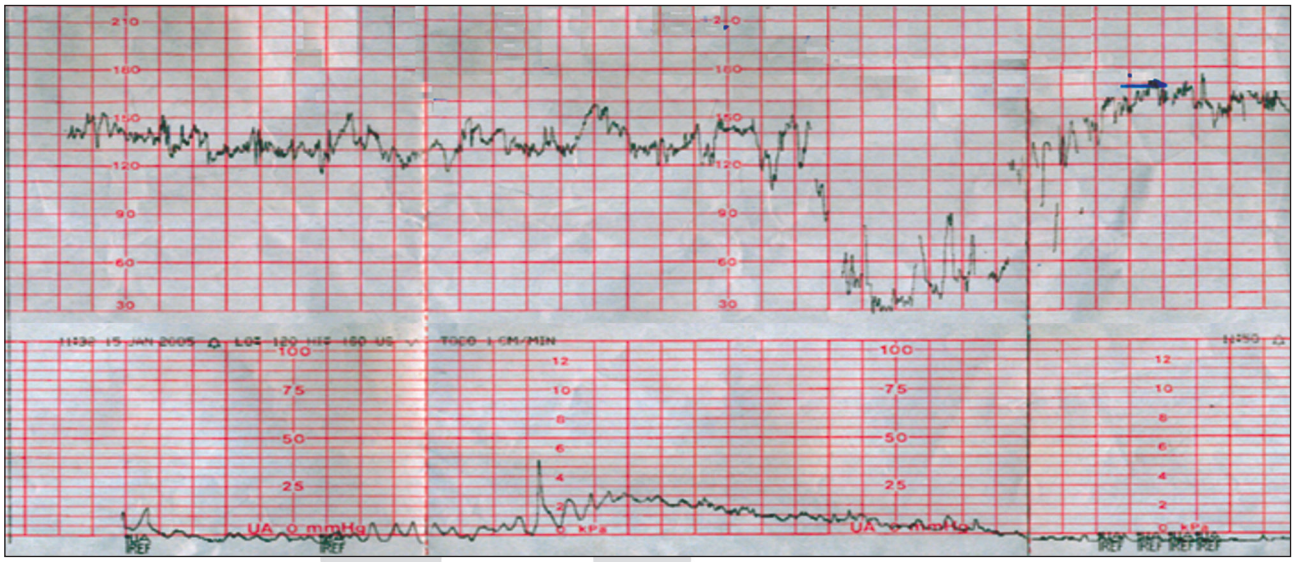


Figure 11. Pregnant cardiogram for the 36th gestation week with inferior cava vein syndrome (SVCI). Basal heart rate 130/min, oscillatory salting pattern.

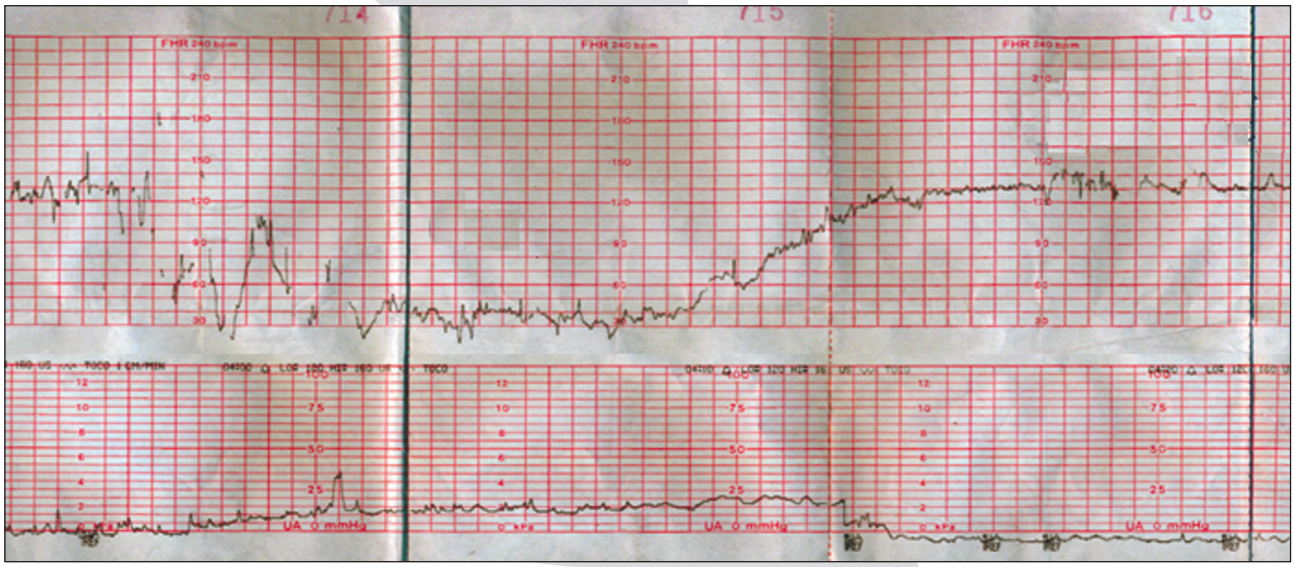


Figure 12. Pregnant cardiogram of gestation week 37 with inferior cava vein syndrome (SVCI). Basal heart rate 130/min, oscillatory oscillator model.

Discussion

Cardiotrophy as a diagnostic method for detecting fetal asphyxia is based on fetal heart activity and cervical contraction activity. The normal heart rate recorded with the fully analyzed cardiotoxograph indicates a good state of vitality of the fetoplasmic unit.

It has been established that placental infants in diabetic pregnancy meet 5 times higher than normal pregnancies. Diabetic pregnancies develop atherosclerotic changes in the coil arteries as well as in the blood vessels of the placenta. The authors (4, 5) propose cardiotocography monitoring once a week in the last quarter. The authors (6, 7, 8) prefer cardiotoxographic control in all cases when suspected of uteroplacental insufficiency in placenta pravia.

In our paper, we found that the undulating model of the pathologic pregnancy population is presented with lower frequency compared to the general pregnancy population. The undulator model is the normal type of oscillatory cardiotocography (10-25) per minute. The presence of the

undulator model indicates a good condition of the uteroplacental unit. The present frequency of the silent model of pathological pregnancies indicates a poor function of the uteroplacental unit as well as the higher risk of fetus for asphyxia. The silent model of the pathologic pregnancy population has met with higher frequency compared to the normal pregnancy population. The presence of the silent model indicates the presence of fetal hypoxia if fetal abnormalities (anencephaly, cephalocel, enterocele) are previously eliminated, the use of certain medications (barbiturates, sedatives, morphines, dolants, phenytoin and magnesium sulphate) and if the presence of sleep of the fetus. The highest frequency of the silent model of the pathologic pregnancies shows the highest risk that the fetus is susceptible to hypoxia. The silent model of cardiotocography is manifested with the fall of the variability below 5 beats per minute. Once upon a time this model can be accompanied by late decelerations. In some severe cases it may be totally unavailable (oscillations) and only appear a silent type that can be manifested by fetal death. These cardiotocography models are explained by the fact that the fetus has gone through a phase of hypoxic crisis that has been manifested by deceleration, but after a while the heart loses its ability to react to hypoxic crisis and becomes cardiac registration without variability. The recording of cardiotoxograph without variability can be characteristic of babies that later manifest neurological sequelae.

In our study we have noticed that the silent model is presented with higher frequency in the group of pathologic pregnancies. The highest presence of the silent model of preeclampsia is explained by the fact that the uteroplacental unit undergoes atherosclerotic changes, and thus reduces the transmission of gasses from the mother to the fetus as well as the appearance of the fetus asphyxia which is initially compensator but more late if asphyxia is present for a long time follows the asphyxia of the central brain and heart tissue which manifests with reduced variability at baseline frequencies and in some cases variability may be lost altogether. The silent model shows the fetal hypoxia if these facts are eliminated:

a) the use of drugs (sedatives, barbiturates, morphines),
b) central nervous system abnormalities (anencephaly, cephalocel),
c) gastrointestinal system abnormalities, and
d) fetal somnolence.

In our study, we notice that only half of the pregnant women of the pathologic population possess apgar scoring values at intervals of (7-10) while in the general pregnancy group apgar score values at intervals of 7-10 are presented with frequency 81.77%.

The apgar score values at intervals of (0-3) in our study in the group of pathologic pregnancies were higher in comparison to the overall pregnancy group. Of the 26 pregnant women with apaches in the interval of (0-3), 17 of them have been with pathological pregnancy.

In our study we have observed that the highest apgar scores in the interval of (7-10) in the group of pathologic pregnancies are presented at IUGR. In half of pregnant women with IUGR apgar skorth values were in intervals of (7-10). This phenomenon is explained by the fact that approximately one third of the instances with increasing stagnation are caused by fetal hyposia due to various pathologies in pregnancy (preeclampsia, pyelonephritis, severe diabetes mellitus, cardiovascular disease and anemia while the other etiologic factors of the growing fetus may be the genetic factors (chromosomes, genes) infectious factors (viruses, bacteria, protozoa) as well as metabolic factors (metabolic defects, endocrine) to which there is no fetal hypoxia.

In the case of silent model introduction, additional diagnostic methods should be applied: ultrasonography biometrics, echoinatomy, doppler ultrasonography, placental hemoglobin analysis, hormone dosing (estriol, human placento-lactogen, choriogonadotropin) amnioscopy and amiocentesis.

The purpose of these methods is to diagnose placental respiratory reserve as well as detecting fetal hypoxia. If amniocentesis is made and L/S ratio in ratio 2:1 is determined, pregnancy is preferred (9).

The highest apgar scoring frequency in intervals of (0-3) has met preeclampsia in the group of pathologic pregnancies. The highest representation of apgar score values at intervals of (0-3) is explained by the fact that in preeclampsia there is uteroplacental insufficiency due to atherosclerosis of blood vessels which is manifested by fetal hypoxia and low Apgar score values.

In our study we have noticed that from the total number of apgar scoring values in intervals of (7-10), half of them presented the undulator model, which means that there is an important correlation between the undulator model and the values of high apgar scoring at intervals of (7-10). While the correlation between the apgar scoring at intervals of (7-10) and the silent model is presented in only 2.71 of the cases. What does it mean that there is no significant correlation between apgar scoring at intervals of (7-10) and silent model. Also, our studies have shown that from 26 cases with apgar scoring with intervals of (0-3), in 20 of them there is a silent model that means that there is a significant correlation of apgar scoring at intervals of (0-3) and the silent model.

In this paper special care has been paid to some serious conditions of pregnancy pathology. Here are some cardiotographs analyzed with these pregnancy pathologies: (Preeclampsia, diabetes, pregnancy pyelonephritis, prolonged pregnancy, placental pracy, abruptio placentae and IUGR). In the study we have illustrated some special cases of cardiotocography which have resulted in severe fetus asphyxia and as a consequence of this (death of fetus in utero, postnatal baby death, appearance of neurological complications and birth of infant with apgar low).

Conclusion

In the general pregnancy group the undulator model is presented with higher frequency compared to the group of pathologic pregnancies, while the silent model in the group of pathologic pregnancies is presented with higher frequency compared to the general pregnancy group.

In the general pregnancy group the highest, requency of the undulator model is presented to IUGR while the highest frequency of the silent model is presented to preeclampsia.

In the general pregnancy group, apgar scoring at intervals of (7-10) is presented with higher frequency compared to the group of pathologic pregnancies, while apgar scoring at intervals of (0-3) is presented with higher frequency in the group of pathologic pregnancies compared to the general pregnancy group.

In general pregnancies the highest values of apgar scoring with intervals of (7-10) are presented to IUGR and the highest values of apgar scoring at interval (0-3) are presented in preeclampsia. By comparing apgar score values with cardiotocography models (amplitude oscillations) we have found that apgar scoring values in intervals of (7-10) are directly related to the undulator model and the apgar values in the range of (0-3) are directly related to the silent model.

From this study we conclude: 1. that cardiotocography models (amplitude oscillations) are important predictors of fetal suffocation in ante and intrapartal periods. 2. We have concluded that there is good correlation between cardiotocography models (amplitude oscillations) and apgar scorit in fetal condition estimation.

We propose that:

a. In all cases of the introduction of the silent model of cardiotocography, additional examinations (fetal biometry, echoinatomy, doppler ultrasonography, placental hemoglobin analysis), hormone dosing (estriol, human placento-lactogen, choriogonadotropin), amnioscopy and amniocentesis.
b. The lecithin/sphingomyelin ratio should be determined and if this ratio is (L/S 2:1) birth is completed.
c. It is preferred that preeclampsia, pyelonephritis pregnancy diabetes, IUGR and cardiovascular system disease be done cardiotoxicity three times a week in the last month of pregnancy.

Based on this we conclude that cardiotocography as a non-invasive method remains further indispensable for the prediction of fetal suffocation.

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Perioperative coagulation changes

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Abstract

Aim: To analyze coagulation parameters in surgical patients.

Methods: A prospective study was conducted with 60 patients undergoing abdominal surgical procedures at the Clinic for Surgery of the University Clinical Center Tuzla in the period from June 2010. to June 2013. The first group consisted of subjects who were prepared for elective abdominal surgery, and the second group of subjects undergo an emergency surgery due to acute abdomen. Several parameters of coagulation were analyzed before surger, 24 and 72 hours after surgical procedure: fibrinogen, D dimer, prothrombin time (PV), INR, activated partial thromboplastin time (aPTV).

Results: The investigated groups had a statistically significant difference in the values of coagulation paameters in all stages, with the elective surgery group lower mean values then in the non-elective surgery group ($p < 0.05$).

Conclusion: Coagulation parameters can be a useful guide in selecting patients that require specific treatments for coagulation disorders. Aim of coagulation disorders treatment should be resolution of the condition that triggered the inflammatory and coagulation cascade, but the supportive therapy of the coagulation disorder is often required.

Key words: Surgery, coagulation, parameter

Introduction

Accidental trauma or surgical treatment triggers a series of physiological reactions of the organism that can be characterized as a psychicological, physical and hormonal response of the organism. This is a part of the systemic response to injury that includes a wide range of endocrine, immunological and haematological effects[1]. Systemic inflammation results in activation of coagulation due to tissue factor mediated thrombin production, disorders of regulation of physiological anticoagulant mechanisms and inhibition of fibrinolysis. Inflammation and coagulation are essential processes of the defense response of the organism. The interaction between inflammation and coagulation is a two way street, inflammation may be caused by inadequate coagulation, and coagulation may caused by inflammation. The onset of coagulation cascade indicates the presence of inflammation and contributes to its pathogenesis through interaction with the immune system[2].

AIM: To analyze coagulation parameters in surgical patients.

Material and methods

A prospective study was conducted with 60 patients undergoing abdominal surgical procedures at the Clinic for Surgery at the University Clinical Center Tuzla in the period from June 2010. to June 2013. Two groups of thirty were formed by the method of consecutive sampling. The first group (group 1) consisted of subjects who were prepared for elective cholecystectomy (laparoscopic cholecystectomy), and the second group (group II) of subjects undergo an emergency surgery due to acute cholecystitis (laparotomic cholecystectomy). The subjects of both groups were both sexes, 18-80 years old, and I-IV group of

anesthesiologic risk according to the classification of the American Association of Anesthesiologists (ASA). All patients signed informed consent to be included in investigation. Excluding factors were deep venous thrombosis (DVT) and pulmonary embolism, malignant diseases, previously coagulation disorders, oral administration of anticoagulant drugs, trauma, and the presence of infection at moment of hospitalization. As a part of the preoperative preparation of patients, in addition to the usual laboratory tests (complete blood count, blood sugar, blood gas analysis, urea, creatinine, urine), parameters of coagulation were analyzed: fibrinogen, D dimer, prothrombin time (PV), INR, activated partial thromboplastin time (aPTV). These preoperative values were signed as t_0. The same parameters were analyzed 24 and 72 hours after the surgical procedure, which represents the value of t_1 and t_2. Blood for the analysis was taken from the peripheral vein into vacutainer tubes. Blood for the analysis of t_0 of coagulation status was taken prior to administration of the first dose of low molecular weight heparin. Surgery was performed in general anesthesia. Introduction to anesthesia was performed by Propofol 1,5 – 2,5 mg/kg, maintence of anesthesia by Sevoflurane 1-1,5 vol%, O2, AIR, analgesia by fentanil 0,005 mg/kg and muscle relaxation by atracurium 0,4-0,6 mg/kg.For the prevention of thromboembolism, the patients were administered reviparin sodium, in a dose that was determined according to the risk factor for deep venous thrombosis (DVT) for each patient. The study was approved by Ethics Committee in University Clinical Center Tuzla and all the procedures used during the research were in accordance with the ethical standards of the responsible committee for human experiments based on the Helsinki Declaration. Statistical tests were done using the SPSS 19.0 software package. All variables were tested for the affiliation with normal distribution using the Kolmogorov-Smirnov test. Statistical data processing was done using descriptive statistics using calculation of mean and standard deviation, and t-test, χ^2 test for calculating the significance of the determined results. Statistical analysis was performed with a confidence interval of 95%, and the value of p <0.05 was considered significant.

Results

The study included two groups, each constituited of 30 individuals. In the elective surgery group, the average life span was 47.53 ± 15.44, while the average life span in the non-elective surgery group was 56.03 ± 20.10 years. Of the 60 analyzed subjects, 26 were male and 34 were female. Analyzing comorbidity in both groups, the majority of patients had no accompanying diseases. In elective surgery group 9 patients had a hypertension, while 7 patients from non-elective surgery group had a hypertension and another 7 subjects had a hypertension with diabetes or cardiomyopathy. The elective surgery group patients were hospitalised 3.40 ± 1 days, while non-elective surgery group patients were hospitalized 8.70 ± 5.88 days (p <0.05). In the elective surgery group, all patients were discharged from hospital, while the 25 patients from elective surgery group were deischarged, and 5 subjects who were elderly died (p = 0.023).

There was a statistically significant difference in the INR values between the two groups. In both investigated groups, the highest mean INR value was noted in t_2. The value of INR in group 1 was a statistically significant in t_0 and t_1, and t_0 and t_2, while in the group 2 this difference exists in t_0 and t_2. Statistically significant difference was also in prothrombin time in all phases. Group 1 subjects had the highest mean prothrombin time in t1, and group 2 subjects in t_2. Activated partial thromboplastin time had a statistically significant difference in all phases (Table 1).

Table 1. Difference in coagulation parameters between groups

	χ^2	T	p
INR	t0 = 1.936 t1 = 1.678 t2 = 1.549	t0 = -3.861 t1 = -3.955 t2 = -3.006	p < 0.05
PT	t0 = 2.453 t1 = 1.936 t2 = 1.936	t0 = -4.173 t1 = -3.668 t2 = -3.505	p < 0.05
aPTV	t0 = 1,549 t1 = 1,549 t2 = 1,1678	t0 = -2,745 t1 = -2,685 t2 = -2,185	p < 0.05
D dimer	t0 = 2.453 t1 = 2.324 t2 = 1.936;	t0 = -5.177 t1 = -4.362 t2 = -4.121	p < 0.05
AT III	t0 = 2.066 t1 = 1.936 t2 = 1.678	t0 = 4.103 t1 = 3.005 t2 = 2.493	p < 0.05

χ^2-hi square test, T – T test, p-statistical sifnificance

The highest mean value aPTV group 1 subjects had in t_0 and for group 2 subjects in t_2. The D-dimer analysis showed that there was statistically significant difference between the tested groups in all phases. Patients of both groups had the highest mean D-dimer value in t_2. A statistically significant difference in the value of D-dimer exists in all phases within each investigated group (Figure 1).

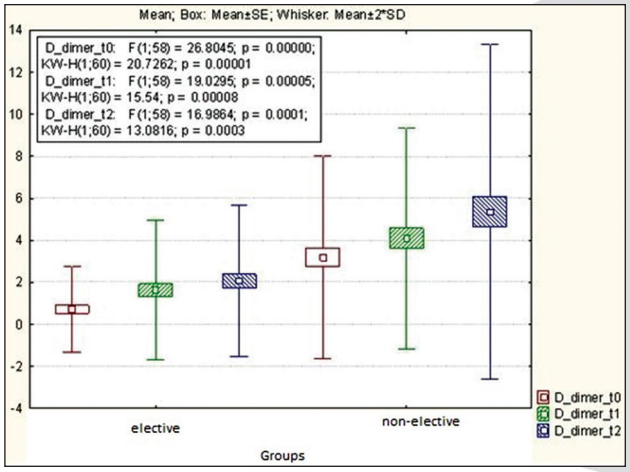

Figure 1. D-dimer values in both group

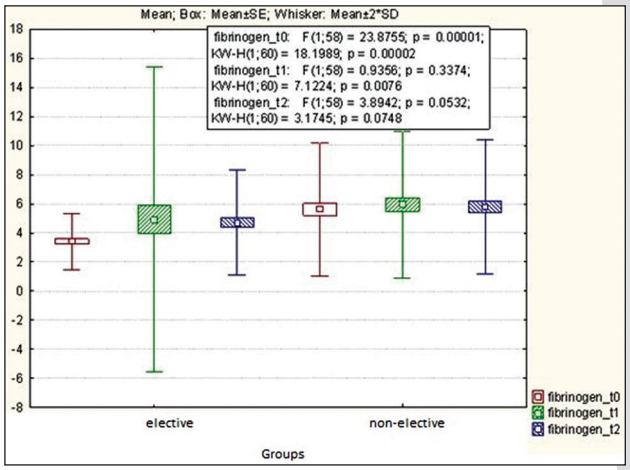

Figure 2. Fibrinogen values in both groups

The investigated groups had a statistically significant difference in the value of antithrombin III in all stages, with the elective surgery group lowest mean values in t_2, and the non-elective group in t_0 (χ^2: t0 = 2.066; t1 = 1.936; t2 = 1.678, t: t0 = 4.103; t1 = 3.005; t2 = 2.493, $p < 0.05$) (Table 2).

Analysis of fibrinogen values among the tested groups showed a statistically significant difference in t_0 (χ^2: t0 = 2.195, t: t0 = -4.886, $p < 0.05$). Both groups of subjects had the highest mean fibrinogen value in t_1 (Figure 2).

Discussion

Stress caused by surgery is due to mental stress, tissue injury, intravascular volume redistribution, organic dysfunction and the consequence of surgical procedures and perioperative complications. In the acute phase of the organism's response to stress, the utilization of amino acids is redirected to the synthesis of proteins involved in the defense of the organism and reparation of damaged tissue. One of these protein-synthesized proteins is fibrinogen, and in the acute phase of stress is most commonly increased[3]. In addition to the role as an acute phase reactant, fibrinogen is a key protein at the beginning of the coagulation cascade, and the primary substrate for coagulation and fibrinolysis[4]. Coagulation disorders are common in critically ill surgical patients. Infection and inflammation interact with the immune and coagulation system and stimulate a procoagulant state, characterized by an increase in the cellular tissue factor and plasminogen activator inhibitors, and reduced fibrinolysis. In addition to the traditional role in haemostasis, the onset of the coagulation cascade is indicator of the existence of inflammation and contributes to pathogenesis through interaction with the immune system. This pleotropism of the coagulation function is of big importance in critically ill surgical patients, who may have an ur-

Table 2. Antithrombin III differences between groups

Wilcoxon paired t-test		Valid	T	Z	p-level
elective	antithrombin_III_t0 & antithrombin_III_t1	30	1.110.000	2.499.053	0.012453
	antithrombin_III_t0 & antithrombin_III_t2	30	970.000	2.787.010	0.005320
	antithrombin_III_t1 & antithrombin_III_t2	30	1.760.000	1.162.111	0.245191
non-elective	antithrombin_III_t0 & antithrombin_III_t1	30	2.105.000	0.452503	0.650907
	antithrombin_III_t0 & antithrombin_III_t2	30	2.040.000	0.586198	0.557743
	antithrombin_III_t1 & antithrombin_III_t2	30	2.320.000	0.010284	0.991795

gent need for postoperative haemostasis, but who also have a systemic inflammatory response with a triggered coagulation cascade. Assessment of the coagulation cascade in these patients requires a careful evaluation of a patient with in-time recognition of changes in coagulation parameters that may affect the patient's tendency to bleed, prognosis, and immediate therapy[5]. Inflammation in endothelial cells and leukocytes leads to activation of thrombin and initiation of the coagulation cascade. Coagulation begins by converting fibrinogen into fibrin[6]. The inflammatory and coagulation cascade of surgical patients results in a hypercoagulable condition that increases the risk of deep venous thrombosis and thromboembolism after surgery or trauma, with a maximum in the first 12 hours[7]. In our study, there was a statistically significant difference in the concentration of fibrinogen in t_0 between the investigated groups, with the elective surgery group within the reference range, and in the non-elective surgery group, due to the increased synthesis and release of the fibrinogen from the liver due to inflammation. In t_1, in both groups there is an increase in fibrinogen value relative to the preoperative value, because the synthesis and release of fibrinogen as an acute phase protein after surgery, which is maintained in t_2. Although non-elective surgery group patients had decreased coagulation factors in the beginning, the fibrinogen concentration is not decreased in the first 72 hours after surgery, because the increased production in hepatocites, induced by cytokines. In 2004, Schietroma and associates[8] published the results of a study to investigate changes in coagulation, fibrinolysis and cytokines in patients undergoing open and laparoscopic cholecystectomy. The results showed that there was a significant post-operative increase in fibrinogen in the open-cholecystectomy group, which was positively correlated with inflammatory cytokines.

Due to the relationship of the inflammation process with coagulation, appropriate laboratory test are conducted in order to measure the beginning of the coagulation cascade. Among these parameters, the prothrombin time used to estimate the external and common coagulation pathway depends on the functional activity of fectors VII, X, V, II (Protrombin) and fibrinogen. The most common methods for displaying prothrombin time are prothrombin time (in seconds) and ratio (INR)[9]. In our study, there is a statistically significant difference in PT values between the examined groups. For the elective surgery group subjects in all phases of the study, the mean value of PT is within the reference range, while in the non-elective surgery group subjects in all stages, it is higher than the upper limit of reference range value due to the already initiated external coagulation pathway. Non-elective surgery group patients, due to acute abdominal events, have initiated an inflammatory reaction with the release of cytokines in the inflamed region, leading to increased tissue factor expression and activation of the external coagulation pathway. The highest PT value was measured in t2 due to the consumption of the coagulation cascade factors. The prothrombin time is positively correlated with DIC (disseminated intravascular coagulation) scores, and negative with the outcome of treatment. In 2010, Walsh and associates[10] published the results of the study, which examined the outcome of patients' treatment in the Intensive Care Departments, who had prolonged prothrombin time. They concluded that prolonged prothrombin time is a frequent laboratory finding in critically ill patients and positively correlates with mortality. We monitored activated partial thromboplastin time, which is an indication of the integrity of the internal and common coagulation pathway. Demiryas[11] and associates in 2017. published the study where they analysed effects of general anesthesia on coagulation and fibrinolysis in elective cholecystectomy, where the results showed that levels of PT, aPTT, INR, D-dimer and fibrinogen dramatically increased postoperatively. In 2002, Nilsson and associates[12] published a results of the study where they had investigated changes in coagulation in patients in the Intensive Care Departments. The results showed that critically ill patients, depending on the severity of the disease that consequently causes a inflammatory response, also have changes in coagulation, with patological values of INR and aPTV. These indicators can predict the outcome of the disease. In particular, aPTV is associated with a poor prognosis. In 2010, Wang[13] published the results of a study examining the coagulation parameters of the subjects divided into two groups - with Systemic Inflammatory Response Syndrome (SIRS)

and without SIRS. The results showed that there is a coagulation dysfunction in SIRS, in which the subjects of this group had significantly higher values of PV, aPTV, D-dimer and thrombin time. In our study, aPTV of elective surgery group subjects in all stages of the trial were within the limits of the reference values, because the localized inflammatory response did not trigger the coagulation cascade. In non-elective surgery group subjects, it was prolonged, with the greatest value in t_2, due to activation of the internal coagulation pathway factors. aPTV of our patients significantly correlated positively with DIC, and negative with the length of hospitalization and outcome of treatment. Activation of the coagulation cascade and formation of a clot made of thrombocyte and interwoven strands of fibrin, leads to the activation of a fibrinolytic system in which a key role is played by plasmin, which results in degradation of fibrin and dissolution of the clot in order to maintain the homeostasis. In addition to plasmin, the organism has additional anticoagulation systems (proteins C and S, antithrombin III) that enable fibrinolysis. Activation of fibrinolysis in the initial phase of the coagulation cascade results in the splitting of fibrin strands and the production of fibrin degradation products whose blood concentration is growing. Among these FDPs is D-dimer, a molecular weight fragment of approximately 180 kDa[14]. The use of D-dimer as an indicator of the degree of coagulopathy, inflammatory response, and mortality of critically ill patients. The increased value of D-dimer shows a risk for the emergence of MOD (multiorgan disfunction) and letal outcome. Surgical procedures also lead to an increase in D-dimer concentration. In 2009, Dindo and associates[15] published a paper, where they analysed the changes in D-dimers following various types of surgery (without entering the abdominal cavity, intra-abdominal and retroperitoneal). They concluded that intra and retroperitoneal operative procedures lead to a postoperative increase of D-dimer concentration, with the peak on the seventh postoperative day, whereby the peak value depends on the type and length of the surgical procedure and the preoperative value. Zesos[16] and associates in 2014. published the results of a study where they investigated coagulation and fibrinolysis activation in standard laparoscopic cholecystectomy, where D-dimers plasma levels were significantly increased 24 hours postoperatively, compared to preoperative levels.

In our study, non-elective group had significantly higher D-dimer values at all stages of the trial. In both groups, in the post-operative period there was an increase in the value of D-dimer, but still in the reference range value for the elective surgery group, and increased in the non-elective surgery group. In the elective surgery group increases in D-dimer values in t_1 and t_2 is due to the surgery, wich triggered the inflammatory response as a stress, and then coagulation and fibrinolysis. Postoperative values are higher, but significantly less in relation to non-elective surgery group. In non-elective surgery group there is an increase in the value of D-dimer in t_0, since an inflammatory and coagulation cascade has already been initiated. The value of D-dimer further increases in t_1 and t_2, as the inflammatory response of the organism continues. Coagulation inhibitors are normally present in blood, and their role is to participate in fibrinolysis and are opposed to the onset of thrombosis. The soluble coagulation inhibitors include antithrombin III, protein C, protein S, and tissue factor inhibitor. Antithrombin III is considered to be the most important inhibitor of the activated coagulation system. In inflammation, its blood concentration is significantly reduced[17]. Decreased concentrations of AT III and other coagulation inhibitors occur in various clinical states that are associated with the onset of disseminated intravascular coagulation, such as sepsis, trauma, and after surgical interventions. Recent studies suggest that in surgical patients admitted to the Intensive Therapy Unit, AT III and Protein C levels are low, and these values may be considered to be potentially relevant to the outcome of the treatment of critically ill patients[18]. In our study, there was a statisticaly significant difference in the concentration of AT III in all the examined groups. In the elective surgery group AT III concentration postoperatively decreases, but it is always within the reference range and neither one patient was given fresh frozen plasma. In the non-elective surgery group subjects, the preoperatively activated coagulation cascade due to acute inflammatory activity leads to the activation of compensatory anticoagulation mechanisms that activate fibrinolysis

and preoperative decrease in AT III blood concentration. There is a gradual increase in AT III postoperatively in this group of subjects, because 15 patients before t_1 and 7 patients before t_2 recieved 4 mg/kg of fresh frozen plasma. But still, these values are lower compared to the control group.

Thus, in both examined groups, the concentration of AT III was significantly reduced in the non-elective surgery group, wich indicates that this test group had a more pronounced coagulation cascade due to cause of acute abdomen, but also due to the type of surgery.

Conclusion

Activation of coagulation within the inflammatory reaction caused by surgical stress and basic surgical disease can result in microvascular thrombosis and multiorgan dysfunction, in particular critically ill patients with pronounced systemic inflammatory response of the organism. Monitoring of coagulation parameters in these patients is important for analyzing the intensity of the coagulation cascade as a part of the inflammatory response, as well as the timely diagnosis and start of the treatment of a possible DIC. Coagulation parameters can be a useful guide in selecting patients that require specific treatments for coagulation disorders. Treatment of coagulation disorders should be directed to the resolution of the baseline condition that triggered the inflammatory and coagulation cascade, but the supportive therapy of the coagulation disorder is often required.

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Rehabilitation protocol after arthroscopic bankart repair

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Abstract

Introduction: Arthroscopic Bankart repair has become a golden standard in the treatment of shoulder instability and changed the rehabilitation approach to patients with Bankart tear. There are a number of different rehabilitation protocols used in practice and despite consensus agreed protocols there is an increasing need towards acceleration of rehabilitation through various advanced rehab protocols. Therefore, it is very difficult to select the best possible rehabilitation protocol which will give satisfactory results as well as faster and better patient recovery.

Objective: This review study provides useful information for physicians and physiotherapists in order to help them in decisions on postoperative protocols after Bankart repair according to the survey of medical evidence from existing literature.

Methods: The study surveyed Cochrane, Medline / PubMed and Google Scholar databases by keywords: Anterior shoulder dislocation, Bankart lesion, Arthroscopic Bankart repair, rehabilitation postoperative protocols, and rehabilitation programs. The search resulted in 13 papers which, according to their content, correspond to the study of rehabilitation protocolsafter arthroscopic Bankart repair. Some of them are meta-analyses and review studies but the majority are original scientific papers.

Results: The studies show that rehabilitation is of great importance after arthroscopic Bankart repair and that postoperative protocols are safe and provide satisfactory results for patients. However, the main issue is that various protocols are used in the field of rehabilitation and they differ in terms of duration of immobilization, duration of specific stage of rehabilitation andtype of exercises carried out at these stages and some studies do not provide information about the time of introduction of certain activities. The existence of many rehabilitation protocols is a consequence of different approaches of medical staff that come into contact with patients which leads to confusion among patients who ultimately find it difficult to participate in the rehabilitation and also causes conflicts between physicians and physiotherapists. We examined the positive factors of these protocols that promote recovery and should be followed and factors that may affect deceleration and have a negative impact on the result of rehabilitation as well as factors that need to be altered.

Conclusion: The majority of protocols are safe and give good results for patients. The main issues of postoperative rehabilitation of this injury is the vast diversity of rehabilitation protocols. In this review study, we identified which rehabilitation protocols recur as good ones in all studies, as opposed to those that appear periodically or give poor results. We also hope to provide specific and clear recommendations based on medical evidence for our institution in order to improve rehabilitation after arthroscopic Bankart repair. The practical purpose of this study is to provide information for the development of an evidence-based rehabilitation protocol at our institution which will be used equally and without distinction by all medical professionals.

Key words: anterior shoulder dislocation, Bankart tear, arthroscopic Bankart repair, postoperative rehabilitation protocol, rehabilitation programme.

Introduction

The shoulder joint is the most mobile joint in the human body due to the glenohumeral joint (humeral head and glenoid) and a very loose joint capsule, but it is also the least stable and most susceptible to dislocation. The most common form of shoulder dislocation is the anterior dislocation which accounts for 95% of all dislocations and due to which most patients develop soft tissue Bankart lesions or bony Bankart lesions. An operative treatment is in-

dicated in recurrent dislocation of the shoulder joint which is associated with younger age, ligament instability and a large Hill-Sachs lesion (1).

A decision regarding surgical intervention should be made on whether there has been a glenohumeral joint dislocation or the lesion extends to the edge of the glenoid as well. This difference in injury is very important for the type of surgical intervention. Arthroscopic repair is indicated in the presence of soft tissue lesionsor minimal bone lesions when GBL exceeds 25% (2).

Arthroscopic Bankart repair is commonly utilized for shoulder stabilization in patients with anterior shoulder instability (2). Arthroscopic repair in comparison to open shoulder stabilization gives better results in terms of postoperative shoulder mobility. The arthroscopic repair consists of installing suture anchors into the front of the glenoid. The ends of suture anchors are threaded through the labral-ligamentous complex which is then attached to the front edge of the glenoid, in fact the labrum returns to its existing position and straining of the glenohumeral ligaments decreases its laxity and increases joint stability (3).

Benefits of arthroscopic Bankart repair are: improved injury visualisation and better treatment, reduction of postoperative pain, accelerated rehabilitation, andimproved mobility in comparison to other treatments. Arthroscopic treatment of posttraumatic frontal shoulder dislocation gives good results and a low rate of recurrent dislocationsand complications regardless of the number of previous repeated dislocations, sex or age (4).

Quality and appropriate rehabilitation treatment is most important for the recovery of patients with Bankart lesion. The result after arthroscopic Bankart repair is highly dependent on the cooperation and involvement of the patient in physical therapy (5). Rehabilitation protocols are different and there is no standard protocol completely based on medical evidence. This ultimately results in confusion among patients and medical professionals although there is consensus of rehabilitation protocols (5).

The objective of this study is to survey the literature on existing physical therapy procedures and protocolsand conclude which is the most optimal rehabilitation treatment for patients after arthroscopic Bankart repair. Today, most physicians prescribe rehabilitation protocols they are best accustomed to, these protocols differ in terms of length of postoperative immobilization, types of exercises, time to achieve full passive and active range of motion, and time until return to sport activity (5).

Methods

The study surveyed Cochrane, Medline / PubMed and Google Scholar databases by keywords: Anterior shoulder dislocation, Bankart lesion, Arthroscopic Bankart repair, rehabilitation postoperative protocols, and rehabilitation programs. The search resulted in 13 papers which, according to their content, correspond to the study of rehabilitation protocols after arthroscopic Bankart repair. Some papers are meta-analyses and review studies but the majority are original scientific papers.

Results

The improvement of arthroscopic surgical technique and materials led to the creation of accelerated rehabilitation protocols based on earlier implementation of active exercises with a favourable final outcome in terms of earlier return to sport activity but without statistically significant differences when compared to standard rehabilitation programs. Standard rehabilitation programs demanded immobilization for 2 to 6 weeks which might be the cause of poor results because of the development of frozen shoulder, limitation of external rotation and poor proprioception (5, 6). It has also been shown that limitation and poor performance of external and internal rotation as well as weakness of the rotator cuff result in recurrent dislocations (7, 8). It has been demonstrated through randomized studies that there was no difference in the incidence of complications in patients who have been immobilized or in those without immobilization in the period of three weeks (9). The data recovered in our study show that the majority of protocols allow pendulum/mobility exercises in the first week of recovery, followed by gradual pain-free passive exercises with anteflexion of 75 to 90°, abduction of 30° and external rotation of 20°, with full restriction of passive external rotation with abduction above 90° in the first 6 weeks. In other words, the first phase of recovery is always the maximal protection phase. This phase in-

cludes maintenance of the repaired labrum structure accompanied by gradual burdening of the same with passive mobility exercises thatsupportfibroblast proliferation and accelerate recovery (10, 13). Active assisted exercises in all directions, isometric exercises and scapular retractionscan be introducedfrom 4 weeks but always in maximum protection and pain-free zone (11, 13). Exercises for strengthening of the periarticular muscles and proprioception exercises are introduced from 6 weeks, the goal of this phase is to restore full range of motion and dynamic shoulder stability (11). In some studies, isometric exercises with orthosis began one day after surgery and were followed by active flexion exercises in a recumbent body position and passive exercises of external rotation from 2 weeks after surgery. Active exercises and exercise for the gradual strengthening of the rotator cuffare introduced from 4 weeks. This type of protocolhas shown to restorestrength of external rotation within 6 months and strength of internal rotation within 4. 5 months and according to the same authors this is the most optimal time for return to sport activity after surgery (12).

Discussion and conclusion

The majority of patients with Bankart tear are young patientsin whom due to high percentages of recurrences, surgery treatment is required. Arthroscopic surgery has become a golden standard in the treatment of shoulder instability and thus of Bankart tear. Arthroscopic treatment of posttraumatic anterior shoulder instability gives good results and low incidence of complications. However, quality physical therapy is of utmost importance for the final outcome of treatment. Although there isconsensus of agreed rehabilitation protocols, they still vary from institution to institution and among physicians. Thus, many protocolsdo not provide relevant information, such as rehabilitation goalsof certain phases, commencement of certain type of exercise nor the time of return to daily, work or sport activity. However, most protocols provide good and statistically identical results considering functional results and quality of life (14). According to extracted data from our survey, we can conclude that all rehabilitation protocols are safe for patients. Furthermore, data suggest that protective orthoses and immobilizations are not of great importance for the final outcome of treatment and that prolonged immobilization negatively affects shoulder joint mobility. However, we consider thatlenient immobilization for three weeks is necessaryfortissue control and maintenance of the repaired site. Within those three weeks, active exercises of contiguous joints are permitted and encouraged. In the first 4 to 6 weeks, it is fully justified to perform passive exerciseswithin the “safe zone” which includeanteflexia between 75-90°, abduction up to 30° and anterior rotation up to 20°; mobility exercises such as mobility of the scapula which stimulaterecovery of the repaired site; passive anterior rotation with abduction above 90° is completely restricted. Passive exercises in a recumbent body position are a better “safe zone” and should be pain-free. Accelerated rehabilitation programs have shown that it is also possible to introduce active exercises early in the first weeks which we completely support as a fact but they also need to be performed within the “safe zone” and pain-free. The same studies have shown that active exercises accelerate recovery of range of motion, muscle strength i. e. dynamic stabilizers and they do not reduce the incidence of complications when compared to standard rehabilitation protocols nor do they accelerate the return to full sport activity. Therefore, accelerated protocols could be used with athletes whose sport is not directly connected to the use of upper extremities, for example football players. According to the above data, active exercises should be introduced when passive ones are in full range and pain-free, which is approximately after 6 weeks. Each rehabilitation phase has its own goals that are not limited by time. Therefore, timeframe should only be an orientation and not a rule in the book. In other words, each phase should meet its goalsand then continue to the next phase. Active exercises to reach full motion and dynamic stability, balance and shoulder strength are introduced from 6 to 12 weeks, these exercises are a prerequisite for normal daily and work activities and also reduce the number of recurrent dislocations (11). In athletes, after this phase specific exercises are gradually introduced depending on sports as well as gradual return to sport activity. The objective of this review study is to provide clear informa-

tion and eliminate any possible dilemmas among medical staff and patients and introduce clear recommendations for rehabilitation after arthroscopic Bankart repair based on medical evidence.

Phase 1. (0-4 weeks)

Goals:

- Patient education
- Protect the anatomical repair
- Diminish pain and inflammation
- Regain active range of movement within safe zone*
- Promote improved proprioceptive acuity/neuromuscular control
- Promote optimal recruitment dynamic stabilisers through safe zone*
- Maintain/minimise impact cardio-vascular fitness

* Safe zone stipulated by Surgeon in operation notes.

Rehabilitation:

- No combined abduction/external rotation
- No forced end range mobilisation especially external rotation with arm by side

- Active assisted/active supported mobilisation within safe zone
- Closed kinetic chain/ proprioceptive exercises
- Cuff /scapula facilitation exercises including isometrics & through range activation
- Incorporate kinetic chain to cuff/scapula exercises
- Encourage use of hand in sling (light activities)
- Cardio-vascular fitness e.g. Bike/incline treadmill (walk)

Phase 2. (3-10 weeks)

Goals:

- Restoration functional range of movement including full elevation range
- Re-educate cuff recruitment and scapula control through full range
- Prevent compensatory movement patterns that may compromise recovery
- Re-educate neuromuscular / proprioceptive function
- Regain optimal strength upper quadrant
- Preserve integrity surgical repair
- Increase/return cardio-vascular fitness and introduce non-contact

Rehabilitation:

Avoid **passive** stretching into combined abduction/external rotation however can encourage active movement/recruitment into this position as long as good control and no apprehension.

- Progress cuff and scapula recruitment through range and emphasise into risk positions (plus load)
- Progress strengthening cuff/scapula muscles with kinetic chain integration
- Preparatory & reactive stabilisation exercises including perturbation work/rhythmic stabilisations in closed and open chain positions
- Closed kinetic chain work into 'risk' positions
- Work opposite arm at high MVC in risk positions
- Increase cardiovascular work- introduce running and non-contact drills

Late stage (6-16 weeks)

Goals:

- Ensure regain optimal range of movement into combined positions
- Optimise proprioception/neuromuscular control
- Ensure preparatory and reactive stabilisation sufficient to withstand load in risk positions
- Restore optimal cuff and scapula control through range and under load
- Optimise function specific power, strength and endurance
- Ensure cuff/scapula strength parameters comparable to opposite arm
- Return to full work/ sport and recreational activities
- Ensure confidence /lack of apprehension in risk positions

Rehabilitation:

- Neuromuscular control through range and incorporated with kinetic chain
- Function specific plyometrics
- Closed kinetic chain exercises into risk positions (increase load and perturbations)
- Function specific strengthening and endurance exercises ensuring local control maintained
- Progress through range strengthening rotator cuff and scapula musculature- isolated and combined with kinetic chain
- Preparatory and reactive stabilisation drills in risk positions
- Controlled falling drills
- Progressive return to full contact training

NB. Players have to achieve key criteria to progress from one phase to the next relating to passive range of movement, pain levels, kinetic chain function (previous injury history) and rotator cuff/scapula muscle function.

Figure 1. Rehabilitation outline

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Gender differences in prevalence of musculoskeletal pain in a cohort of schoolchildren in Bosnia and Herzegovina: survey study

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Abstract

The aim of the study was to determine the incidence and predictors of MSP in the light of gender differences in cohorts of 1315 schoolchildren (652 boys and 663 girls). Screening was carried out using a standard Nordic questionnaire. Girls are significantly more likely suffered acute MSP in neck, right shoulder and both shoulders, and chronic pain in both shoulders compared to boys. The risk ratio for MSP according to gender (being a girl) was OR= 1.629, 95% CI, 1.303-2.016, P = 0.001. This research opens the door to new studies about MSP among elementary school students.

Key words: musculosceletal pain, schoolchildren, gender differences

Introduction

Musculoskeletal pain (MSP) is increasingly common in school-age children. In Asia, prevalence of MSP is high as 86% (1), which can be related to different types of children's work (2-3). MSP prevalence is high as 77% in children in New Zealand as well (4). Different studies have reported very similar rates of prevalence of MSP in school children in South America 51% (5), England 50% (6) and Bosnia and Herzegovina 48% (7). There are gender differences in perception of pain. Girls are more likely to experience back pain than boys (8). Grimmer et al. notes that girls were more likely to suffer from pain in the craniovertebral angle while carrying a school bag than boys, which was more intense in older children (9-10). The school environment is a working environment and it is an important place in childhood and later in life. Determinants of musculoskeletal pain in children are multifactorial such as lifestyles, use of digital technologies, watching television, prolonged sitting, and are studied in many studies (11-15). The aim of our research is to evaluate the frequency and various factors associated with MSP, and to identify potential gender differences in school children.

Methods

The research was conducted in the period between September and December in 2016 in 13 municipalities in the Tuzla Canton. The Tuzla Canton is the most populous canton with 500,000 inhabitants, out of which are 24027 children aged 9 to 14 years old. The research included 1500 pupils from third to seventh grade of the elementary school (6.24% of the children in the total population), randomly selected. Involvement of the respondents in the research was carried out on a voluntary basis and with respect to the ethical provisions of student anonymity. The "sample cluster" method was used to randomly select 2-5 pupils from one grade repeatedly during 1 class (average daily number of classes is 4-5) and there were 20 children selected from each grade and 100 children selected out of every school (total of 13 primary schools). The exclusion criteria for the respondents was the existence of inherited or acquired physical deformities and disorders (children using a wheelchair, children with diagnosed children's musculo-skeletal illnesses, dysfunctions between the lower extremities, problems with foot and similar). The research was approved by the Ministry of Education, Science, Culture and Sport of Tuzla Canton. There was a screening of musculoskeletal pain with a three-part questionnaire, anthropometric measurement and bag weight measurement conducted by two experi-

enced examiners. The first part of the questionnaire included questions about the demographic and individual characteristics of the participants (age, gender, class), the second part referred to assessment of lifestyle, sitting in the school, sitting at home, ways of carrying a school bag, walking to and from school, doing sports, the life in urban and rural environment. The third part of the survey referred to the standard Nordic musculoskeletal questionnaire adapted for the age of children and translated into Bosnian (16). The total sample of respondents was 1315 respondents (652 boys, 49.6% and 663 girls 50.4%), out of a total of 1500 questionnaires divided (response rate 87.66%).

Anthropometric measurements of the following parameters were performed after screening: body height, body weight, the weight of full and empty school bag that students brought to the class that day. The weight of the bag was measured using the Gorenje type OT 180 electronic scale. Body height and body weight were measured with the GIMA model 27310 Astra scale with a precision of 0.001 kg. The scale was calibrated before each measurement. Body weight (kg) and body height (m) values were used for Body Mass Index (BMI) calculation. In order to evaluate the nutritional status of the subjects, BMI values are expressed as percentile value for the appropriate age and gender (17). BMI changes with age in children. The risk of developing obesity in childhood comes with BMI above 85 percentile, and those with BMI above the 95th percentile are obese.

Statistical Data Processing: Statistical analysis was carried out using the Standard Statistical Package for Social Research (SPSS) version 19.0, IBM Corp., and Armonk New York. For testing the statistical significance of the difference in the selected variables $\chi^{٢}$-test, t-test and ANOVA were used. A non-parametric Sperman test correlation was used for multivariate correlation analysis. The variable (prevalence of acute and chronic musculoskeletal pain at different sites) is shown by gender numerically and percentally. The attribute risk (OR) with a confidence interval of 95% was determined for the variation of musculoskeletal pain at different sites with the estimate for female gender. Logistic regression analysis served to illustrate the relationship of independent variables (musculoskeletal pain) and dependent variables (pain predictors). The value of $p < 0.05$ was considered significant.

Results

In our sample of respondents (n = 1315), there were no significant gender differences in number, as there were 663 girls (50.4%) and 652 boys (49.6%). The major number of respondents attended the seventh grade (24.4% of girls and 18.7% of boys). The ideal body mass index was found in 68.4% of the girls and 59.5% of the boys. 3.5% of the boys and 6.2% of the girls were malnourished, 19.5% of the boys and 17.5% of the girls were overweight, while 8.95% of the girls and 17.55% of the boys were obese ($p < 0.001$) . Most respondents carry their bag on both shoulders, 94.6% of the girls and 96% of the boys. Among them, 72% of the girls and 70% of the boys go to school by walking, and nearly half of the respondents live in the rural area. Other descriptive characteristics of the school environment and categories of body mass index among male and female pupils are shown in Table 1.

Mean age of respondents is 11.31 years ± 1.483 years (SD). The average BMI in our subjects is 60.9 ± 30.8 percentile. The average weight of the empty bag is 0.5 ± 0.7 kg (SD). The average weight of the full school bag is 3.98 ± 0.98 kg (SD). The student sits 8.3 hours per day on average (in school 5 ± 0.7 hours, during the course of construction he will work at home 1.9 ± 1.3 hours, and for a computer 1.4 ± 1.3 hours). The carrying time of the bag to school and from school is 2.7 ± 1.3 hours. Descriptive statistics of pain and age predictors are shown in Table 2.

The results of the prevalence of acute and chronic musculoskeletal pain by pain site in boys and girls were assessed (Table 3). Prevalence of musculoskeletal pain no matter the pain site of the girl: boys vs. 53.4%: 41.4% (P = 0.001). There are statistically significant gender differences in prevalence of: acute neck pain, girls: boys vs. 20.4%: 13.5% (P = 0.001); acute pain in the right shoulder, girls: boys vs. 21.7%: 15.8% (P = 0.004); acute pain in both shoulders, girls: boys vs. 16.9%: 12.4% (P = 0.013). It is interesting that there is no statistically significant difference in the occurrence of acute back pain (0.051) and chronic back pain in boys and girls (P = 0.201).

Table 1. Descriptive school characteristics and Body mass index category among male and female students

Characteristics of respondents	Gender	Number (%)	P-value (χ^2)*
School class			
Third	Male	126 (19.3)	0.060 (6.579)
	Female	125 (18.9)	
Fourth	Male	132 (20.3)	
	Female	122 (18.4)	
Fifth	Male	141 (21.6)	
	Female	130 (19.6)	
Sixth	Male	131 (20.1)	
	Female	124 (18.7)	
Seventh	Male	122 (18.7)	
	Female	162 (24.4)	
Body mass index- BMI category			
Underweight	Male	23 (3.5)	0.001 (33.801)
	Female	41 (6.2)	
Normal (healthy) weight	Male	388 (59.5)	
	Female	454 (68.4)	
Overweight	Male	127 (19.5)	
	Female	116 (17.5)	
Obese	Male	114 (17.5)	
	Female	52 (8.9)	
The way of carrying school bag			
Bag carried by parents	Male	2 (0.3)	0.448 (4.742)
	Female	1 (0.1)	
On both shoulders	Male	626 (96.0)	
	Female	627 (94.6)	
On the right shoulder	Male	15 (2.3)	
	Female	25 (3.8)	
On the left shoulder	Male	2 (0.3)	
	Female	4 (0.6)	
In hand	Male	0	
	Female	1 (0.1)	
Holding the bag with both hands	Male	7 (1.1)	
	Female	5 (0.8)	
Go on foot to school			
No	Male	191 (29.3)	0.331 (0.247)
	Female	186 (28.0)	
Yes	Male	461 (70.7)	
	Female	477 (72.0)	
City/ Village			
City	Male	327 (50.2)	0.379 (0.132)
	Female	334 (50.4)	
Village	Male	325 (49.8)	
	Female	329 (9.6)	

**Statistical gender differences between various subgrops of characteristics among respondents were evaluated using chi-square χ^2, values statistically significant at $p<0.05$.*

Table 2. Descriptive statistics for potential musculoskeletal pain risk faktors and age among all respondents (n=1315)

Participant characteristics	Mean	Standard deviation (SD)
Age	11.311	1.483
Body mass index, BMI (m^2)	19.169	3.679
Body mass index, BMI (percentile)	60.897	30.832
Empty weight of school bag (kg)	0.501	0.068
School bag full weight (kg)	3.977	0.973
Hours sitting in school (kg)	5.033	0.731
Time sitting in front of computer (hours)	1.422	0.499
Time work sitting (hours)	1.990	1.304
Time carrying bag to school (hours)	2.721	1.319
Time carrying bag from school (hours)	2.757	1.339

Table 3. Prevalence of acute and chronic musculoskeletal pain on different body regions among female and male respondents (n=1315)

Musculoskeletal pain on different body regions	Number (n)		Prevalence %		P-value (χ^2)*
	Female (n=663)	Male (n=652)	Female (50.4%)	Male (n=49.6%)	
Musculoskeletal pain	354	270	53.4	41.4	0.001
Acute neck pain	135	88	20.4	13.5	0.001
Chronic neck pain	118	103	17.8	15.8	0.185
Acute right shoulder pain	144	103	21.7	15.8	0.004
Chronic right shoulder pain	18	24	2.7	3.7	0.201
Acute left shoulder pain	11	4	1.7	0.6	0.061
Chronic left shoulder pain	13	10	1.9	1.5	0.353
Acute both shoulder pain	112	81	16.9	12.4	0.013
Chronic both shoulder pain	165	126	24.9	19.3	0.009
Acute chest pain	76	62	11.5	9.5	0.143
Chronic chest pain	81	77	12.2	11.8	0.443
Acute back pain	77	57	11.6	8.7	0.051
Chronic back pain	114	100	17.2	15.3	0.201

We established a significant correlation between acute neck pain and chronic pain in both shoulders (Spearman's correlation factor = 0.194, P = 0.001, OR = 2.926, 95% CI, 2.150-3.984); significant correlation between acute pain in right shoulder and chronic pain in both shoulders (Spearman correlation factor = 0.316, P = 0.001, OR = 5.192, 95% CI, 3.851-6.999); and a significant correlation between acute pain in both shoulders and chronic pain in both shoulders (Spearman factor correlation = 0.410, P = 0.001, OR = 9.690, 95% CI, 6.930-13.548), the facts are not tabulated. The adjusted risk ratio OR and 95% confidence interval CI is estimated in the multivariate model by sex (being a girl) in the prediction of musculoskeletal pain at different body locations (Table 4). Odds ratio in girls is statistically significantly higher than boys for: musculoskeletal pain regardless of pain locality OR = 1.621, 95% CI 1.303-2.106; acute neck pain OR = 1.639, 95% CI 1.202-2.198; acute right shoulder pain OR = 1.479, 95% CI 1.118-1.957); and for chronic pain in both shoulders OR = 1.433, 95% CI 1.052-1.952. In boys there is a significantly higher risk for acute musculoskeletal pain in both shoulders OR = -1.076, 95% CI 2.013 -0.138.

According to logistic regression analysis in the domain of individual and demographic factors, the predictors of MSP which are unrelated to the location, and are significantly more frequent in

Table 4. Multivariate models: Adjusted odds ratio OR and 95% Confidence interval CI estimated by sex (to be girl), predicting musculoskeletal pain on different body regions

Musculoskeletal pain on different body regions	OR*	95% Confidence Interval	P-value
Musculoskeletal pain	**1.621**	**1.303-2.016**	**0.001**
Chronic neck pain	1.154	0.864-1.542	0.332
Acute neck pain	**1.639**	**1.222-2.198**	**0.001**
Chronic right shoulder pain	-0.730	0.392-1.359	0.321
Acute right shoulder pain	**1.479**	**1.118-1.957**	**0.007**
Chronic left shoulder pain	1.284	0.559-2.949	0.559
Acute left shoulder pain	1.005	0.999-1.022	0.086
Chronic both shoulders pain	**1.433**	**1.052-1.952**	**0.022**
Acute both shoulders pain	**-1.076**	**-2.013- -0.138**	**0.024**
Chronic right elbow pain	1.005	0.997-1.012	0.462
Acute right elbow pain	0.490	0.089-2.685	0.668
Chronic left elbow pain	0.407	0.079-2.089	0.462
Acute left elbow pain	0.490	-0.713-0.868	0.564
Chronic both elbows pain	1.381	0.436-4.373	0.794
Acute both elbows pain	0.581	0.171-1.976	0.564
Chronic right wrist pain	0.572	0.260-1.259	0.226
Acute right wrist pain	1.060	0.704-0.821	0.965
Chronic left wrist pain	0.489	0.146-1.631	0.369
Acute left wrist pain	0.736	0.164-3.303	0.982
Chronic both wrists pain	0.913	0.040-1.866	0.085
Acute both wrists pain	1.165	0.518-2.621	0.869
Chronic chest pain	1.039	0.745-1.449	0.887
Acute chest pain	1.232	0.985-1.061	0.248
Chronic back pain	1.022	0.975-1.072	0.402
Acute back pain	1.032	0.996-1.071	0.103
Chronic pain in hips	0.990	0.969-1.011	0.435
Acute pain in hips	0.998	0.978-1.018	0.835
Chronic knees pain	1.034	0.664-1.608	0.973
Acute knees pain	1.112	0.682-1,814	0.682
Chronic ankle joint pain	1.292	0.815-2.049	0.330
Acute ankle joint pain	1.216	0.772-1.916	0.465

** The Mantel Haenszel common odds ratio estimate (OR)*

girls are: higher school grade (β = 0.126, 95% CI, 0.002-0.087, P = 0.041); and rising BMI values (β = 0.092, 95% CI, 0.000-0.003, P = 0.026). Predictors of MSP among school-related factors are: weight of an empty school bag (β = 0.062, 95% CI, 0.134-0.759, P = 0.005); weight of the full school bags (β = 0.048, 95% CI, 0.003-0.047, P = 0.028); frequency of pain when carrying a school bag (β = 0.599, 95% CI, 0.215-0.249, P = 0.001); and walking to and from school (β = 0.062, 95% CI, 0.020-0.117, P = 0.006). Predictors of acute neck pain, which are statistically significantly more frequent in girls are: duration of carrying a school bag from school (β = 0.230, 95% CI, 0.026-0.093, P = 0.001); and the frequency of pain while carrying a school bag (β = 0.003, 95% CI, 0.065-0.105, P = 0.001). Since β has a negative sign for factor for the time taken to carry the school bag to school (β = -0.207, 95% CI, -0.088-0.020, P = 0.002), it is not a predictor. The assumption is that the shortened time of going to school (maximum 20 minutes) could be a protector of acute neck pain in this case. The following school-related predictors are responsible for acute pain of the right shoulder, which is also significantly more common in girls: weight of the empty school bag (β = 0.056, 95% CI, 0.027-

0.613, P = 0.032); weight of the full school bags (β = 0.063, 95% CI, 0.005-0.046, P = 0.017); doing sport, the factor that was assumed to be a protector rather than an additional effort (β = 0.064, 95% CI, 0.008-0.093, P = 0.021); the frequency of pain while carrying the school bag (β = 0.268, 95% CI, 0.065-0.097, P = 0.001); the sitting time while using a computer, the nonphysiological position while using a computer mouse control is an additional effort for the right shoulder (β = 0.052,

Table 5. Logistic regression model assessing independent predictors of musculoskeletal pain where a higher frequency was established among all respondents (n=1315)

Predictors of musculosceletal pain (dependent variables)	β*	95% Confidence interval	P-value
Musculoskeletal pain as independent variable			
Age	0.019	-0.032-0.045	0.743
Sex	0.026	-0.021-0.073	0.281
Higher school class	0.126	0.002-0.087	0.041
BMI percentile	0.092	0.000-0.003	0.026
School bag empty weight (kg)	0.062	0.134-0.759	0.005
School bag full weight (kg)	0.048	0.003-0.047	0.028
Be active in sport	-0.004	-0.049-0.042	0.872
Carry a school bag on both shoulders	-0.033	-0.083-0.010	0.127
Time carrying school bag to school	0.003	-0.028-0.030	0.943
Time carrying school bag from school	0.009	-0.026-0.032	0.827
The frequency of pain during carrying bag	0.599	0.215-0.249	0.001
Time sitting in school	-0.039	0.000-0.215	0.249
Time sitting during homework	-0.021	-0.025-0.009	0.361
Time sitting in front of computer	0.014	-0.011-0.021	0.542
Go on foot to school and return	0.062	0.020-0.117	0.006
To live in rural area	0.030	-0.016-0.075	0.197
Acute neck pain			
Time carrying school bag to school	-0.207	-0.088-0.020	0.002
Time carrying school bag from school	0.230	0.026-0.093	0.001
The frequency of pain during carrying bag	0.003	0.065-0.105	0.001
Acute right shoulder pain			
School bag empty weight (kg)	0.056	0.027-0.613	0.032
School bag full weight (kg)	0.063	0.005-0.046	0.017
Be active in sport	0.064	0.008-0.093	0.021
The frequency of pain during carrying bag	0.268	0.065-0.097	0.001
Time sitting in school	-0.039	0.024-0.110	0.002
Time sitting in front of computer	0.052	0.000-0.030	0.050
Acute both shoulders pain			
School bag empty weight (kg)	0.053	0.001-0.549	0.049
School bag full weight (kg)	0.075	0.008-0.046	0.006
The frequency of pain during carrying bag	0.235	0.049-0.080	0.001
Chronic both shoulders pain			
Time carrying school bag from school	0.146	0.004-0.069	0.028
The frequency of pain during carrying bag	0.247	0.043-0.083	0.001
Acute back pain			
School bag full weight (kg)	0.087	0.011-0.044	0.001
The frequency of pain during carrying bag	0.147	0.022-0.048	0.001
To live in rural area	0.075	-0.012-0.079	0.008

* **β,** *Beta coeficient in regression ANOVA analysis of potential predictors of musculoskeletal pain*

95% CI, 0.000-0.030, P = 0.050). The protector of pain of the right shoulder is time spent sitting in the school, so it can be considered as a period of relaxation and muscle relaxation of the right shoulder (β = -0.039, 95% CI, 0.024-0.110, P = 0.002). Predictors of acute pain in both shoulders are: the weight of the empty school bag (β = 0.053, 95% CI, 0.001-0.549, P = 0.049); the weight of the full school bag (β = 0.075, 95% CI, 0.008-0.046, P = 0.006) and the frequency of pain while carrying a school bag (β = 0.235, 95% CI, 0.049-0.080, P = 0.001). Predictors of chronic pain in both shoulders are: the carrying a school bags from school (β = 0.146, 95% CI, 0.004-0.069, P = 0.028) and the frequency of pain while carrying a school bag (β = 0.247, 95% CI, 0.043-0.083, P = 0.001). The results of multifactorial regression analysis reveal the acute back pain predictors, which are: the weight of a full school bag (β = 0.087, 95% CI, 0.011-0.044, P = 0.001); the frequency of pain while carrying a school bag (β = 0.147, 95% CI, 0.022-0.048, P = 0.001) and the life in rural area with the assumption of subsidiary work in agriculture (β = 0.075, 95% CI, -0.012-0.079, P = 0.008) as seen in Table 5.

Discussion

Almost half of pupils aged 11.31 years ± 1,483 years (SD) in Bosnia and Herzegovina feel MSP (48%). Non-specific, unlocalized pain is significantly more common in girls 53% than boys 41% (P <0.001), which is similar to the observation of other authors (18-23). Girls experience higher incidence of MSP in the upper extremities than boys (24-26). Differences in the frequency of MSP between boys and girls (girls are more sensitive) are particularly related to acute neck pain, acute pain in the right shoulder, acute pain in both shoulders and especially chronical pain in both shoulders. The MSP of the neck, shoulders and back in school-age children are associated with a heavy school bag (20-23). We found that the school bag carrying time while going to school is not a predictor of acute pain in the neck in our students (β = -0,207, 95% CI, -0,088-0,020, P = 0,002), but the school bag carrying time from school is the predictor of acute pain in the neck. The assumption is that it is an pain aggravating factor. We established an interesting assumption that sitting at school represents the relaxing and protective factor of the MSP for the right shoulder, and the sporting activit, instead of the expected protective effect has the role of predictor for acute pain in the right shoulder for girl's (β = 0.064, 95% CI, 0.008-0.093, P = 0.021). Significant attributive risk (OR) for MSP was a higher school grade. It is assumed that daily acute neck pain cumulates in time and significantly correlates with chronic pain in both shoulders (Spearman correlation factor = 0.194, P <0.001); daily acute pain in the right shoulder also cumulates in time and is statistically significantly associated with chronic pain in both shoulders (Spearman correlator factor = 0.316, P <0.001); as well as daily acute pain in both shoulders accumulate in chronic pain in both shoulders in higher school grades (Spearman correlator factor = 0.410, P <0.001) long term, and in the future, unfortunately. Malnutrition and lower BMI causes shoulder pain (1) which is contrary to our results that show that the increase in BMI is a predictor of musculoskeletal pain in girls (β = 0.092, 95% CI, 0.000-0.003, P <0.026). Similar results came from researchers in Sweden who examined high school students, and school grade was an important predictor for the development of MSP in particularly vulnerable pupils of lower grades (27). Sitting is an aggravating factor for MSPs of the back, especially sitting posture more than just the time duration of sitting (8, 11, 24). It should be said that an unfavorable school environment can only be associated with chronic back pain (28, 29). We did not detect significant differences in the occurrence of MSP of the back between our boys and girls (P = 0.201). Earlier studies have revealed, contradictory to our results, that MSP occurrance is related to increased physical activity in boys (30-35). Compared to the results in our research data show that influence of physical activity on MSP occurrance is often contradictory, especially for back pain (32).

Conclusion

Researches shows a significant prevalence of MSP in school-age in BiH. The girls suffer more from acute neck pain, acute pain in the right shoulder, acute pain in both shoulders and especially chronic pain in both shoulders compared to boys. Pain in the lumbar spine affects both girls and boys with no significant difference, wich we also didn't find

in the results of previous researches. The association of musculoskeletal pain in school children with female gender, increased BMI, inadequate school environment, inadequate ergonomic postures, carrying of school bags and sitting were identified. We propose similar researches in the future, which will include a more precise analysis of risk factors with the inclusion of preventive interventions in protecting the well-being of this particularly vulnerable group. Discovered possible protectors of MSP are: sitting in school as a protector for acute pain in the right shoulder and limited time duration for wearing a school bag to <20 minutes for acute neck pain in girls should be a new hypothesis for research.

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A comparison study of Real Time Double-Lumen Endobronchial tube placement assisted with Rigid Video Stylet Vs Conventional Blind Procedure during thoracic surgery

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Abstract

Rigid Video Stylet is and effective instrument in performing Double Lumen-Tube insertion during Thoracic Surgery. It has faster intubation time and is less injuries prone than Macintosh Laryngoscope. We evaluated the Intubation time, attempts of intubation and injuries in 99 patients comparison between Rigid Video Stylet and Macintosh Laryngoscope while insert Double Lumen-tube in Tongji University affiliated Shanghai Pulmonary Hospital. Rigid Video Stylet shown better result for better visualization of glottis view and has faster intubation time. Have also less re-attempts and fewer injuries. In our study we found the Rigid Video Stylet has superior to Macintosh Laryngoscope in a field of intubation time, reliable and less-injuries.

Key words: Endobronchial tube, Rigid Video Stylet, Conventional Blind procedure, Thoracic

Introduction

Double lumen tube is one of the most commonly used method for one lung ventilation that is often required during thoracic surgery[1]. Double Lumen Tube (DLT) permits effective lung isolation, CPAP and suction. Placement of double lumen tube remains a challenge even in normal airways let alone in patients requiring difficult intubation because of its larger and less compliant structure[2,3]. In appropriate placement may result in severe trauma and complications leading to increased morbidity and mortality[4]. Direct laryngoscopy can be used to place DLT but the correct placement of DLT through this method is next to impossible in patients with cervical injury, limited mouth opening and tongue injuries. In such patient's failure may result in airway trauma[5]. Instruments have been developed to avoid this complications, such device include flexible Fibro-optic Bronchoscopy (FOB), Rigid Stylets and other video laryngoscope. These tools have aided clinicians to minimized the failure rates as well as complications arising during difficult intubations[5]. Rigid Video Stylet is one of such instrument that can be used to replace Macintosh Laryngoscope during intubation[5]. Because of its large diameter and fixed shape DLT placement obstructs laryngeal view while using Macintosh Laryngoscope[6]. In such cases Rigid Video Stylet can be used to visualized airways structures thus leading to successful tracheal intubation[6,7]. Successful intubation in first attempt reduces manipulation of patients position thus making stylet an effective tool for intubation in patients with cervical stability[7]. Blind intubation attempts while using direct laryngoscope requires very skilled experience. In less experiences users this may lead to multiple attempts and failures where as video stylet laryngoscope is faster and easier to learn [8]. In the study we compare the placement of double lumen tube using Rigid Video Stylet with Macintosh Laryngoscope in 99 patients undergoing thoracic surgery. We hypothesized that Rigid Video Stylet reduces intubation attempts, takes less time to intubate and result in less complications.

Methods and materials

Material used

The Mallinckrodt DLT (Mallinkrodt™ Endobronchial Tube, Covidien Ireland Limited) is an endobronchial tube that is used for one lung isolation.

This tube can be used in both left and right sides but we only use them for left sided intubation. They come in sizes from 28 -41 Fr in left sided and 35 – 41 Fr in right sided tubes. We only used left sided tube of 35 and 39 Fr based on gender [9, 10, 11].We used 35 Fr in female and 39 Fr in male.

Participants

We obtained 99 participants. The age of our participants ranged from 40 to 80 years. They had American Society of Anesthesia (ASA) physical status II and required insertion of DLT. Patients with upper airways abnormalities such as trauma, tumors and inflammations were not included. Also patients with Gastro Esophageal Reflux Disease (GERD), previous airways surgery, pregnancy, and ASA physical status more than II were excluded from the study. These 99 patients were randomly allocated into 2 groups. The group intubated with Macintosh Laryngoscope (Mallinkrodt™ Endobronchial Tube, Covidien Ireland Limited) had 50 patients and group intubated with Rigid Video Stylet) (Zhejiang UE Medical Corp, CHINA) (*Figure 1*) had 49 patients. Two anesthesiologists having experience of more than 4 years randomly intubated the patients.

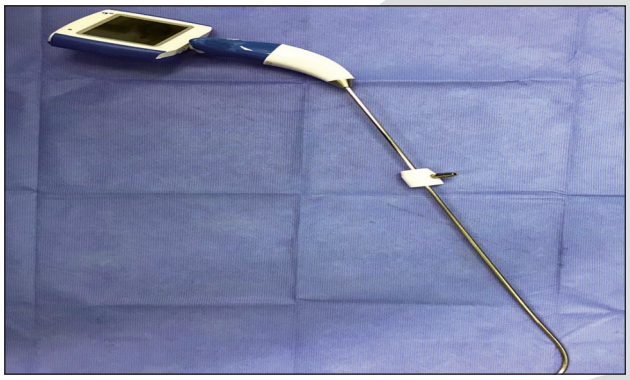

Figure 1. Rigid Video Stylet

Procedure

Patients on arrival to the operating room were monitored for Blood pressure (BP), Oxygen saturation and 5 lead electro-cardiography. None of the patients received pre-medication. Before the induction of anesthesia modified Mallampati score and inter-incisor distance were measured. Then pre oxygenation was given at 100% oxygen via a facemask. All patients were given Midazolam (0.025 mg/kg) for anxiety and block the memory of the procedure. Anesthesia was then induced by Sufentanil (≥8 µg/kg), andpropofol (2-3mg/kg), muscle relaxation to ease intubation was achieved by injecting Rocoronium (0.2mg/kg) 2 min before intubation. Cervical immobilization was also achieved.

Tracheal intubation was then performed either using a Macintosh Laryngoscope or Rigid Video Stylet. In the Macintosh Laryngoscope group, the tube was advanced through the glottis under direct vison of a Macintosh blade, then after removal of inner stylet the double lumen tube was further advanced, while using Rigid Video Stylet the double lumen tube (*Figure 2*) was advanced from mouth to bronchus under video guidance of the stylet (Figure 3). In both groups DLT was then rotated 90-degree counter clockwise until resistance was felt.

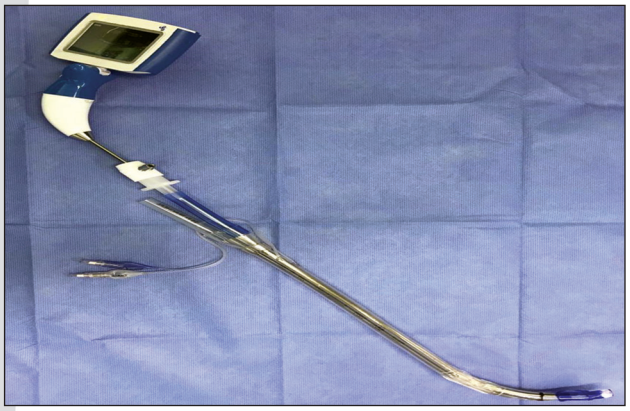

Figure 2. Rigid Video Stylet (Installed with Double Lumen Endobronchial Tube)

Confirmation of successful intubation was achieved by bilateral chest auscultation and bronchial placement was confirmed using a bronchoscope.

Blood Pressure (BP), Heart Rate (HR) was monitor throughout the procedure. After the operation extubation was done, and oral cavity, pharynx and larynx were observed for any bleeding or other trauma.

We then examined the patients to see if there is presence of bronchospasm, arrhythmia or other anesthesia related complications. BP, HR, SPO2 were also monitored after the extubation.

An independent observer took the measure of the time taken for intubation (time taken from picking up the laryngoscope till placement of laryngoscope back after intubation), this observer also took record of intubation attempts and any complications if present.

Figure 3. Rigid Video Stylet (clear view of Carina)

Data collection and statistic

The clinical data we collected included Age, Sex, Body Mass Index (BMI), Cormack and Lehane-grade, Mallampaticlass, ASA,Denture, Thyromentaldistance, Mouth opening, BP, HR, Time taken for intubation, Number of intubation attempts, Present of absent of blood and other complications. These data were expressed as mean. Statistical analysis was done using Chi-square test and p value of <0.05 was considered statistically significant.

Result

We enrolled a total of 99 patients from thoracic surgery department requiring open or closed surgical procedures. They were randomly allocated into 2

Table 1. Baseline characteristics of patients following Real Time Double-Lumen Endobronchial tube placement assisted with Rigid Video Stylet Vs Conventional Blind Procedure

Variables		Direct laryngoscopy	Video Rigid Laryngoscopy	P- Value
Sex		Male: 22	Male: 27	
		Female: 28	Female: 22	
Age		40-80 years	40-80 years	0.075
Height		Mean: 163.254	Mean: 164.97	
Weight		Mean: 61.94	Mean: 63.122	
BMI		Mean: 23.14	Mean: 23.297	0.010*
ASA Status		II	II	
MP Score(I/II/III)		6/30/14	12/32/5	0.042*
Blood present in DLT while extubate		Presence of blood(16)	Presence of blood (6)	0.028*
		Absence of blood(34)	Absence of blood (43)	
Cormack & Lehane grade		I(6) II(30) III(14)	I(7) II(28) III(14)	0.934
Degree of Mouth		50	49	0.305
Thyromental Distance		50	49	0.465
Size of DLT	35	28	22	0.317
	39	22	27	
Successful Attempts	1st Attempts	29	44	<0.001*
	2ndAttempts	21	5	
Lung Ventilation side	Right	27	19	0.160
	Left	23	30	
Change in Heart rate	Before	50	49	0.036*
	After	50	49	0.355
Change in Systolic	Before	50	49	0.009*
	After	50	49	0.005*
Change in Diastolic	Before	50	49	0.001*
	After	50	49	0.002*
Type of Surgery	Open	8	4	0.232
	Closed	42	45	
Duration of Intubation		50	49	0.033*
Total time of Anesthesia		50	49	0.010*

groups, Machintosh intubated group (n=50) and Rigid Video Stylet group (n=49). These two groups were similar in age, sex, BMI, Mallampati class, Cormack Lahene-grade, thyromentaldistance, and ASA grading. They were also similar in changes of BP, HR and SpO2. These data summarized in *Table 1*.

In our study we found that the Rigid Video Stylet assisted placement of Double Lumen Tube had a shorter placement time as compared to Macintosh Laryngoscope assisted DLT placement(1st successful attempt in Rigid Video Stylet = 44,{1st successful attempt in Macintosh Laryngoscope =29, (P= 0.001)}. The DLT was accurately placed on the correct side in all of our procedures but reattempts of intubation were more in Macintosh Laryngoscope group than in Rigid Video Stylet assisted group (P<0.001). Total anesthesia time was also significant lower in the group using Rigid Video Stylet group (P<0.027). There was presence of blood after intubation in 16 patients intubated by Macintosh Laryngoscope and in 6 patients in Rigid Video Stylet group. This shows that rigid video stylet caused fewer traumas to the oral cavity and airways. We also discovered that Rigid Video Stylet provided of better view of the structure than Macintosh Laryngoscope, which is similar to the study done by Jungbauer et al[12]. Complications of intubation such as hoarseness of voice and sore throat were comparable in the 2 groups. HR and mean arterial pressure increased significantly after intubation for both the devices but the differences between them not statistically significant.

Discussion

In this study we showed that the placement of DLT using a Rigid Video Stylet reduces intubation time and reduces reattempts of intubation in comparison to Macintosh Laryngoscope. We also demonstrated that a Rigid Video Stylet reduced the incidence of trauma to the oral cavity and airways.

Placement of a DLT is difficult than placing a single lumen tube because of its larger tube size[4,13]. Studies have shown that the success rate of DLT intubation in first attempt using a video laryngoscope is between 92.8 % and 100%. And using Macintosh Laryngoscope around 67.6 to 86.7[6,14,15,16]. Our study illustrated that the intubation using Rigid Video Laryngoscope had a higher first attempt success rate than Macintosh Laryngoscope. This success rate in first intubation let to reduction in airway trauma and other complications including wasting of expensive DLTs[9]. The success of first attempt intubation while using Rigid Video Stylet may be because it is easier to use than Macintosh Laryngoscope as well as easy visualization of the vocal cord and laryngeal structures[5,17,18].

The incidence of injury while using rigid video stylet was low compared to Macintosh Laryngoscope, we considered presence of blood in mouth or the tube following extubation as well as observing the airways post extubation to identify an injury. This may be attributed to the advantage of proper visualization and less requirement of blind maneuver within the delicate airway space[7]. However, our study was done in patients with normal airways the advantage over Macintosh Laryngoscope in cases of difficult intubation could not been ascertained studies have shown that similar Video Stylet have been successful in intubating in cases with difficult Laryngoscopic scenarios where they provided swift and less injury prone intubation than Macintosh Laryngoscope [8]. In case intubation with patients neck trauma Rigid Video Stylet have shown to be superior than Macintosh Laryngoscope [7]. Several studies demonstrated that postoperative sore throat and hoarseness of voice was less while using a Rigid Video Stylet in comparison with Macintosh blade, the possibilities might be because of less manipulation within the larynx however, our study didn't show significant difference[2]. In conclusion we had limitations in the study. Our patients had normal airways and didn't have any comorbid situations. Our result solely based on the results using left sided double lumen tube which may not apply for right sided double lumen tube. In conclusion Rigid Video Stylet assisted double lumen tube placement is faster, requires less reattempts and less injury prone than compared to double lumen tube placement using a Macintosh Laryngoscope.

Abbreviations

DLT- *Double Lumen Tube*; CPAP- *Continuous Positive Airway Pressure*; ASA- *American Society of Anesthesia*; GERD- *Gastroesophageal Reflux Disease*; BP- *Blood Pressure*; HR- *Heart Rate*; BMI- *Body Mass Index*.

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Instructions for the authors

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Abstract

In this paper the instructions for preparing camera ready paper for the Journal are given. The recommended, but not limited text processor is Microsoft Word. Insert an abstract of 50-100 words, giving a brief account of the most relevant aspects of the paper. It is recommended to use up to 5 key words.

Key words: Camera ready paper, Journal.

Introduction

In order to effect high quality of Papers, the authors are requested to follow instructions given in this sample paper. Regular length of the papers is 5 to 12 pages. Articles must be proofread by an expert native speaker of English language. Can't be accepted articles with grammatical and spelling errors.

Instructions for the authors

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Table 1. Page layout description

Paper size	A4
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Column Spacing	5 mm

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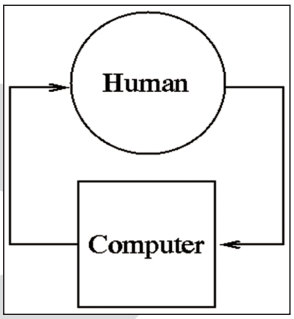

Figure 1. Text here

Conclusion

Be brief and give most important conclusion from your paper. Do not use equations and figures here.

Acknowledgements (If any)

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