INSTRUCTIONS FOR THE AUTHORS

All papers need to be sent to: Editorial board of journal “Acta Informatica Medica”, Faculty of medicine, Cekalusa str. 90, 71000 Sarajevo, B&H. Every sent article AIM gets its number, and author(s) will be notified if their paper is accepted and what is the number of paper. Every correspondence will use that number. The paper has to be typed on a standard size paper (format A4), leaving left margins to be at least 3 cm. All materials, including tables and references, have to be typed double-spaced, so one page has no more than 2000 alphanumerical characters (30 lines). Sent paper needs to be in the form of a diskette or a CD-ROM, so editing of your paper will be easier.

Title page. Every article has to have a title page with a title of no more than 10 words: first name(s), last and first of the author(s), name of the institution the author(s) belongs to, abstract with maximum of 45 letters (including space), footnote with acknowledgments, name of the first author or another person with whom correspondence will be maintained.

Summary. The paper needs to contain structured summary, 200 words at the most. Writing summary is in English language. Summary needs to hold title, full name(s) and surname(s) of author and co-authors, work institution, and all essential facts of the work—introduction, formulation of problems, purpose of work, used methods (with specific data, if possible) and basic facts. Summaries must have review of underlined data, ideas and conclusions from text. Summary has no quoted references. Four key words, at the most, need to be placed below the text.

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

References. Quoting references must be in a scale in which they are really used. Quoting most recent literature is recommended. Only published articles (or articles accepted for publishing) can be used as references. Not-published observations and personal notifications need to be in text in brackets. Showing references is as how they appear in text. References cited in tables or pictures are also numbered according to quoting order.

Statistical analysis. Tests used for statistical analysis need to be shown in text and in tables or pictures containing statistical analysis.

Tables and pictures. Tables have to be numbered and shown by their order, so they can be understood without having to read the paper. Every column needs to have title, every measurement unit (SI) has to be clearly marked, preferably in footnotes below the table, in Arabic numbers or symbols.

Pictures also have to be numbered as they appear in text. Drawings need to be enclosed on a white paper or tracing paper, while black and white photo have to be printed on a radiant paper. Legends next to pictures and photos have to be written on a separate A4 format paper. All illustrations (pictures, drawings, diagrams) have to be original and on their backs contain illustration number, first author last name, abbreviated title of the paper and picture top. It is appreciated if author marks the place for table or picture.

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

Supplement. If paper contains original contribution to a statistical method or author believes, without quoting original computer program, papers value will be reduced, Editorial staff will consider possibility of publishing mathematic/statistic analysis in-extenso. Papers with the following failure will not be accepted for publishing: grammatically or technically incorrect, materials do not represent original work by author and author(s) have to sign statement that submitted paper has not been published, nor is it currently under consideration.
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The Gen5 Software and Automated Microreader ELx800 in analysis of Anti-CCP Antibodies

Sekib Sokolovic, Jasenko Karamehic, Dzemal Subasic, Zahida Drace, Lamija Zecevic, Marina Delic-Sarac
Clinic for heart and rheumatic diseases, Clinical center of Sarajevo University, B&H1, Institute for Immunology, Clinical center of Sarajevo University, B&H2

SUMMARY
Aim: Detection of Anti-CCP antibodies in rheumatoid arthritis patients using Automated Microreader and Gen5 Software for analysis and data processing. Material and method: Total of 776 blood samples from inflammatory arthritis patients were obtained. Statistical analysis for positive and negative results was calculated and test values were compared. Results: Anti-CCP test was found positive (>25U/ml) in 32.8% of blood samples. The all positive test results were in rheumatoid arthritis patients with 95% specificity. Negative test results was found in 67.2% of blood samples that were drawn from all IgM RF negative individuals, reactive arthritis and osteoarthritis patients as well as in some end-stage rheumatoid arthritis disease. Mean value of positive results was very high: 599.62 U/ml. Conclusion: The anti-CCP test is highly specific test in Rheumatoid arthritis. The positive test in early undifferentiated inflammatory polyarthritis provides new laboratory diagnostic inflammatory marker and helps practitioners to confirm diagnosis of early rheumatoid arthritis. Microplate reader and Gen5 Software using ELISA method is essential automotive tool for extensive on-board data obtained analysis.

Key words: Gen5 software, Anti-CCP antibodies.

1. INTRODUCTION
Citrullinated antibodies are immune proteins linked to amino acid citrullin, and is derived from aminoacid arginin residues through the enzymes peptidilarginin deiminase pathway (PAD). This enzyme as well as its iso-enzymes causes citrullination of synovial proteins triggering autoimmune reaction. This protein binds more to HLADR4 antigen binding sites than other arginine products. These findings provide more details into immunopathogenesis of RA. Their specific value is in early rheumatoid arthritis and they are mainly responsible among other co-factors in the latent joint inflammation. Prospective cohort study showed that 93% of anti-CCP positive antibodies in undifferentiated early arthritis patients develop rheumatoid arthritis afterwards. This shows very high predictive value of these antibodies.

The Gen5™ is a software that provides a logical interface to all automated BioTek plate readers. It’s constructed for reading the necessary parameters and to plate layout to powerful data reduction finally to flexible data output options. The intuition of such contemporary design, including the exclusive StepWise™ protocol and tools for data processing, results in the higher work laboratory efficiency and capability. Gen5 software includes flexible multi-user levels, electronic protocol and data signing. For clinical laboratories using BioTek’s ELx800 and ELx808 micro plate readers, Gen5CL utilize preprogrammed clinical diagnostic assays with PC-based unit. Its QuickExport function transfeere's data directly to Excel and to LIMs or other programs. Data viewing, reporting and exporting options are available as well.

- Microsoft® Windows Vista™; Windows® XP (SP2) or Windows 2000 OS,
- Intel Pentium III-class PC or compatible processor (500 MHz or faster),
- 512 MB RAM,
- 2 GB hard drive space designed for XGA resolution at 1024 x 768
- CD-ROM drive
- Keyboard and mouse, Microsoft Internet Explorer v 5.0 or higher for online, Microsoft Excel 2000 or later for QuickExport or PowerExport

2. TECHNICAL NOTES
- Installing Gen5™ on a Mac Computer
The ELx800 interfaces with BioTek’s Gen5™ Data Analysis Software provides Extensive on-board data analysis, Memory that stores 55 assay defini-
The Gen5 Software and Automated Microreader ELx800 in analysis of Anti-CCP Antibodies

The Gen5 Software and Automated Microreader ELx800 in analysis of Anti-CCP Antibodies

while >25U/ml are considered positive. Reader detect positive results up to 1969,831U/ml.

5. RESULTS AND DISCUSSION

Results are shown on table 1.

The Anti-citrullin i.e. Cyclic Citrullin Peptide antibodies is the new specific marker in early diagnosis and prognosis of early Rheumatoid Arthritis.

The importance of these antibodies is in more specificity than IgM rheumatoid factor in early RA. In a definite RA, a significant titer of these antibodies is a marker of erosive and evolutive RA.

The significance of anti-CCP test is mainly having in an early undifferentiated inflammatory arthritis detected even a few years before onset of RA.

Positive test found in healthy individuals can predict eventual disease. The negative values also plays significant role in differential diagnosis, since test negativity exclude onset of RA and also correlates more with end stage disease.

In the last 12 months, total of 776 laboratory tests for anti-CCP were analyzed. Test was positive in 32.8 of examined samples in all RF positive RA patients with 95% of specificity. Negative test was found in 67.2% and it correlates in all IgM RF negative individuals, reactive arthritis, osteoarthritis and also in some late stage RA disease. Other authors, like Tadesco and his colleagues (1) gave a new strategy for the early diagnosis of Rheumatoid arthritis patients based on new inflammatory biomarkers.

6. CONCLUSION

Data obtained in this study showed that Anti-CCP test is the most reliable biomarker for disease activity in a diagnosis and prognosis of Rheumatoid arthritis. Its high positivity correlates strongly with inflammatory rheumatic condition and also this test is highly specific for early Rheumatoid Arthritis.

Anti-CCP test is also predictor of more destructive disease. The most important value of this test is in early undifferentiated inflammatory polyarthritis helping practitioner to establish and confirm diagnosis of Rheumatoid arthritis.

Automated Microreader as hardware and Gen5 Software is necessary for functioning, detection and analysis of many laboratory tests, including high specific antibody test.

REFERENCES


3. Lakos G, Soós L, Fekete A, Szabó Z, Zeher M, Horváth...


Corresponding author: Prof Sekib Sokolovic, MD, PhD. Clinic for rheumatism and heart diseases. Sarajevo, Bolnica 25. Tel.: 00 387 33 297 000.
Comparison of Laboratory and Clinical Parameters of Patients Suffering from Rheumatoid Arthritis

Mevludin Mekić1, Faris Gavrankapetanovic1, Miomir Ristic2
Clinical Centre, University of Sarajevo, B&H 1,
Faculty of medicine, University in Prishtina, Kosova2

OBJECTIVES OF RESEARCH

To compare laboratory and clinical parameters between two groups of examinees who live in different material, hygienic conditions and have different levels of health protection.

METHODS OF WORK

One hundred and forty five patients suffering of rheumatoid arthritis were observed at the department for rheumatology of the Clinic for internal medicine in Prishtina (core group) and 50 patients from the closest vicinity of Belgrade at the polyclinic TED1 (control group).

The criteria for selection of examinees were as follows:
- classical and certain signs of RA
- validly processed data of patients with RA

The criteria for exclusion of examinees were as follows:
- probable and possible RA
- patients who for any reason could not be subjected to valid examinations.

We monitored the following on the examinees:
- anamnesis data and ARA criteria served as the base
- clinical examination took place pri-

SUMMARY

Rheumatoid arthritis is a multi systematic progressive illness of connective tissue, mostly with joint changes, but also with non-joint changes. The objective of the paper is to compare laboratory and clinical parameters between two groups of examinees, who live in different material, hygienic conditions and different level of health protection. One hundred and forty five patients (core group) were examined and 50 patients (control group). Laboratory and clinical monitoring shows differences in the core group and control group. It is primarily reflected in the status of cell immunity, clinical forms of rheumatoid arthritis, but also other parameters. Cell immunodeficiency is dominating in the core group, heavy clinical forms of rheumatoid arthritis but also visceropathy. The reasons for higher potential of evolution of rheumatoid arthritis in the core group should be sought in the bad material, hygienic living conditions, as well as the level of health protection in the core group compared to the control group.

Key words: Laboratory and clinical parameters, rheumatoid arthritis.

1. INTRODUCTION

Rheumatoid arthritis (RA) is a multi systematic progressive illness of connective tissue, mostly with joint changes, but also with non-joint changes. It is of unknown, probably of autoimmune pathogenesis. Persons of female gender between the ages of 20 and 50 acquire it most often. Around 1% of the population suffers from RA (1,2,3,4,5). Diagnosis of RA should be made as soon as possible, as correctly as possible and with the least possible use of time and money, which is especially important in outpatient clinic working conditions. A correct diagnosis implies one with the possibility of certainty of around 90-95%. Diagnostic value of anamnesis is around 50%, physical exam around 25% and other additional examinations 25%.

From anamnesis we get the data on the manner of beginning of illness (sudden or gradual), the first symptoms (most usually it is pain), their weight, sequence of appearance, development, general symptoms and signs (increased temperature, weakness, loss appetite, weight loss), disorder of functioning, applied treatment and its success, remissions and relapses. Symptoms and signs of disorders of other organs and systems should also be asked about (3,4,5,6).

Pain is usually the first and most significant symptom. One should ask about its location, intensity and duration, propagation, accompanying symptoms and signs, disorder of functioning and influence of rest, physical straining and me-

Original paper

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Key words: Laboratory and clinical parameters, rheumatoid arthritis.
Comparison of Laboratory and Clinical Parameters of Patients Suffering from Rheumatoid Arthritis

Marriedly based on ARA criteria

- routine laboratory results
- nonspecific biological syndrome of inflammation (SE, Le, fibrinogen, CRP, electrophoresis, immune-electrophoresis)
- specific biological syndrome of inflammation (Walter-Rose test, Latex test, ASOT, Le-cells)
- immunological variables of cell immunity: total number of T and B lymphocytes, lymphoblast transformation with fithemoglobinuine, reaction of immune alteration of leukocytes (RIAL), PPD.

We would like to note that we did the number of B and T lymphocytes using the rosette technique in accordance with the instructions of the Institute for immunology Zagreb, RIAL in accordance with the Academy (Dekaris) M.N. of Russia.

We did lymphoblast transformation in accordance with the instructions of P. Stukalov.

Everything was done at the biochemical institute of the Faculty of Medicine Prishtina (D. Miric).

The control group was finally observed using the same method on VMA, and the conclusion was made by the group which processed the control group.

Statistical processing: T test, hi-square test and McNemar's test were applied. During the process of testing the hypothesis it is taken that p<0.05 for the level of significance. Statistical analysis was done in EXCEL and INSTART programs.

4. RESULTS

Results are presented by tables and graphs.

<p>| Table 1. Age structure of RA patients |</p>
<table>
<thead>
<tr>
<th>Age groups (years)</th>
<th>Core group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 20</td>
<td>15 / 10.3</td>
<td>5 / 10.0</td>
</tr>
<tr>
<td>20 – 30</td>
<td>32 / 22.1</td>
<td>20 / 40.0</td>
</tr>
<tr>
<td>30 – 40</td>
<td>39 / 26.9</td>
<td>11 / 22.0</td>
</tr>
<tr>
<td>40 – 50</td>
<td>40 / 27.6</td>
<td>7  / 14.0</td>
</tr>
<tr>
<td>50 – 60</td>
<td>12 / 8.3</td>
<td>6  / 12.0</td>
</tr>
<tr>
<td>over 60</td>
<td>7  / 4.8</td>
<td>2  / 2.0</td>
</tr>
<tr>
<td>Total</td>
<td>145 / 100.0</td>
<td>50 / 100.0</td>
</tr>
</tbody>
</table>

Table 1 and graph 1 show the age structure of patients suffering from RA. The average age in the core group was 37.0 years (SD 11.5), and 33.8 years (SD 10.2) in the control group. The difference is not statistically significant (t=1.74, DF=193, p=0.083).

<p>| Table 2. Gender of patients suffering from RA |</p>
<table>
<thead>
<tr>
<th>Gender</th>
<th>Core group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>53 / 36.6</td>
<td>21 / 42.0</td>
</tr>
<tr>
<td>Female</td>
<td>92 / 63.4</td>
<td>29 / 58.0</td>
</tr>
<tr>
<td>Total</td>
<td>145 / 100.0</td>
<td>50 / 100.0</td>
</tr>
</tbody>
</table>

Table 2 and graph 2 show the structure by gender of core and control group. There is no statistically significant difference between the core and control group based on frequency of gender (hi-square=0.266, DF=1, p=0.606).

<p>| Table 3. Occupation of patients suffering from RA |
|----------------|------------|------------|</p>
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Core group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>32 / 22.1</td>
<td>11 / 22.0</td>
</tr>
<tr>
<td>Farmers</td>
<td>51 / 35.2</td>
<td>5  / 10.0</td>
</tr>
<tr>
<td>Housewives</td>
<td>28 / 19.3</td>
<td>10 / 20.0</td>
</tr>
<tr>
<td>Office/clerical workers</td>
<td>16 / 11.0</td>
<td>19 / 38.0</td>
</tr>
<tr>
<td>Students</td>
<td>11 / 7.6</td>
<td>3  / 6.0</td>
</tr>
<tr>
<td>Unemployed</td>
<td>7  / 4.8</td>
<td>2  / 4.0</td>
</tr>
<tr>
<td>Total</td>
<td>145 / 100.0</td>
<td>50 / 100.0</td>
</tr>
</tbody>
</table>

There is a statistically significant difference between the core and control group in frequency of patients’ occupation (hi-square=23.46, DF=5, p<0.001). The most frequent occupation in the core group is farmer and the most frequent occupation in the control group is office/clerical worker.

<p>| Table 4. Place of residence of patients suffering from RA |
|----------------|------------|------------|</p>
<table>
<thead>
<tr>
<th>Place of residence</th>
<th>Core group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>88 / 60.7</td>
<td>14 / 28.0</td>
</tr>
<tr>
<td>Urban</td>
<td>57 / 39.3</td>
<td>36 / 72.0</td>
</tr>
<tr>
<td>Total</td>
<td>145 / 100.0</td>
<td>50 / 100.0</td>
</tr>
</tbody>
</table>

In the core group there is higher frequency of patients from rural areas, while in the control group there is higher frequency of patients from urban areas, and that difference is statistically significant (hi-square=14.64, DF=1, p<0.001). This is presented in table 4.

| Table 5. Anamnesis parameters core group and control group suffering from RA |
|----------------|------------|------------|
| Intensity of pain | Core group | Control group |
| Strong           | 89 / 61.4  | 9  / 18.0   |
| Medium           | 38 / 26.2  | 30 / 60.0   |
| Weak             | 18 / 12.4  | 11 / 22.0   |
| Localization of pain | PIP joints | Other joints |
| PIP joints       | 131 / 90.3 | 21 / 42.0   |
| Other joints     | 44 / 30.0  | 29 / 58.0   |
| Other symptoms in joints | Morning stiffness | Parasthesia |
| Morning stiffness | 125 / 86.2 | 22 / 44.0   |
| Parasthesia      | 21 / 14.5  | 11 / 22.0   |
| Swelling of joints | 144 / 99.3 | 31 / 62.0   |
| Vysceropathies   | Heart symptoms and signs (disnoia, palpita- | Lung symptoms and signs (coughing) |
| Heart symptoms and signs (disnoia, palpita- | 31 / 21.4  | 7  / 14.0   |
| Other symptoms (dys- | 29 / 20.0  | 5  / 10.0   |
| peptic problems, ulcer and other problems) | 29 / 20.0  | 11 / 22.0   |

Table 6 shows the parameters of examinations of patients suffering from RA. It is noticed that the highest frequency of strong pain is present in the core group, while medium pain is most frequent in the control group. The difference between groups is statistically significant (hi-square=11.45, DF=2, p=0.003).
In the core group on individual scale also there is highest frequency of strong pain and in the control group of medium pain. The difference of frequency between the two groups is statistically significant (hi-square=8.87, DF=2, p=0.012).

Table 6 shows the frequency of swelling of joints. There is no statistically significant difference between the two groups in terms of frequency of swelling of joints (hi-square=1.72, DF=1, p=0.189).

Table 6 shows the frequency of hand squeeze. The highest frequency of decrease of hand squeeze is in the core group, and in control group the decrease of hand squeeze is lower. The difference between frequencies of the groups is statistically significant (hi-square=8.87, DF=2, p=0.012).

Table 6 also shows the frequency of other parameters of reviews of patients suffering from RA. There is no statistically significant difference between the groups according to frequency of rheumatoid subcutaneous knots (hi-square=3.1, DF=1, p=0.078). Frequency of shiny skin is statistically significantly higher in the core group (hi-square=25.82, DF=1, p<0.001). Frequency of Genslens’s sign is statistically significantly higher in the core group (hi-square=48.20, DF=1, p<0.001). There is no statistically significant difference between the groups in terms of frequency of warm joints (hi-square=2.82, DF=1, p=0.093). Frequency of cold joints is statistically significantly higher in the control group (hi-square=11.98, DF=1, p<0.001). Frequency of moist joints is statistically significantly higher in the core group (hi-square=63.02, DF=1, p<0.001).

Frequency of polyarticular affection of joints is highest in the core group, and frequency of oligoarticular affection of joints is highest in the control group – the difference is statistically significant (hi-square=65.34, DF=2, p<0.001). Frequency of affection on lymph glands is statistically significantly higher in the core group (hi-square=8.52, DF=1, p=0.003). There is no statistically significant difference between the groups in terms of frequency of signs of pleuropulmonal infection (hi-square=2.59, DF=1, p=0.107). Frequency of signs of cardiovascular changes is statistically significantly higher in the core group (hi-square=13.11, DF=1, p<0.001).

Table 7 shows a non-specific biological syndrome of inflammation and other elements of para-clinical minimum. The highest frequency of medium and high increase of SE is present in the core group, while the frequency of low increase of SE is present in the control group – the difference is statistically significant (hi-square=40.39, DF=2, p<0.001).

Appearance of increased number of leukocytes is more frequent in the core group. The difference is statistically significant (hi-square=7.66, DF=2, p=0.022). Appearance of reduction or increase of T lymphocytes is more frequent in the core group. The difference is statistically significant (hi-square=29.219, DF=2, p<0.001). Appearance of reduced hematocryte is more frequent in the core group. The difference is statistically significant (hi-square=54.98, DF=2, p<0.001).

In the core group the frequency of reduced hemoglobin is statistically significant (hi-square=30.56, DF=1, p<0.001). There is no statistically significant difference between the groups in terms of moderate-
ly and highly positive CRP (hi-square=0.92, DF=1, p=0.338). In the core group the higher frequency of increased alpha 2 globulin is statistically significant (hi-square=29.15, DF=1, p<0.001). In the core group the higher frequency of gamma globulin is statistically significant (hi-square=16.54, DF=1, p<0.001). There is no statistically significant difference between the groups in terms of frequency of reduction or increase of IgA (hi-square=2.74, DF=2, p=0.272). Appearance of reduction or increase of IgG is more frequent in the core group in comparison to the control group. The difference is statistically significant (hi-square=14.58, DF=2, p<0.001). In the core group the higher frequency of increased IgM is statistically significant (hi-square=14.58, DF=1, p<0.001). There is no statistically significant difference between the groups in terms of frequency of reduction or increase of IgD (hi-square=1.69, DF=1, p=0.429).

In the core group the frequency of increased fibrinogen is statistically significant (hi-square=81.14, DF=1, p<0.001).

Table 8. Specific biological syndrome of inflammation and immunological variables Table 8 shows the specific biological syndrome of inflammation and immunological variable. Table 8 shows the results of W. Rose for patients suffering with RA. There is no statistically significant difference between the groups in terms of frequency of W. Rose positivity (hi-square =4.12, DF= 2, p=0.127). Reduced LBT is statistically significantly more frequent in the core group (hi-square=16.03, DF=1, p<0.001). Positive Mantoux is statistically significantly more frequent in the core group (hi-square=21.16, DF=1, p<0.001). Reduced RIAL is statistically significantly more frequent in the core group (hi-square=39.51, DF=1, p<0.001). Table 8 also shows the results for T and B lymphocytes in patients suffering from RA. Reduced T lymphocytes are statistically significantly more frequent in the core group (hi-square =18.98, DF=1, p<0.001). Increased B lymphocytes are statistically significantly more frequent in the core group (hi-square =14.30, DF=1, p<0.001).

5. DISCUSSION

Rheumatoid arthritis is a poly-systematic inflammation illness of still unknown etiology, and most probably of autoimmune pathogenesis in which base there is the connection of still unknown antigen and cell and humeral response.

M. Ristić and a group of his associates spent many years studying the problem of rheumatoid arthritis, including theoretical and practical problems and medical historiography of this illness.(1,2,3,4)

When comparing laboratory and clinical parameters in the core and control group, we notice that the average age in the core group is somewhat higher than in the control group, there is no statistically significant difference between genders, but there is a statistical difference in occupation. The most frequent occupation in the control group is farmer, while in the control group it is office/clerical workers.

Within this research we looked for the relationship between living conditions, level of health protection and evolution of RA (of core and control group). If we monitor the non-specific biological syndrome of inflammation between the core and control group, we notice there is a statistical difference in occupation. The difference is statistically significant (hi-square=81.14, DF=1, p<0.001).

### Table 8. Parameters of examinations of patients suffering from RA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Core group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td><strong>SE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High increase</td>
<td>60</td>
<td>41.4</td>
</tr>
<tr>
<td>(over 50 mm/h)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium increase</td>
<td>66</td>
<td>45.5</td>
</tr>
<tr>
<td>(20 – 50 mm/h)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low increase</td>
<td>19</td>
<td>13.1</td>
</tr>
<tr>
<td>(10 – 20 mm/h)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LEUKOCYES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased (&gt; 10 x 10⁹/L)</td>
<td>41</td>
<td>28.3</td>
</tr>
<tr>
<td>Reduced (&lt; 5 x 10⁹/L)</td>
<td>32</td>
<td>22.1</td>
</tr>
<tr>
<td>Normal (5-10 x 10⁹/L)</td>
<td>72</td>
<td>49.7</td>
</tr>
<tr>
<td>Increased (&lt; 4 x 10⁹/L)</td>
<td>46</td>
<td>31.7</td>
</tr>
<tr>
<td>Reduced (&lt; 1.5 x 10⁹/L)</td>
<td>70</td>
<td>48.3</td>
</tr>
<tr>
<td>Normal (1.5-4 x 10⁹/L)</td>
<td>29</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Hematocryt</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately reduced</td>
<td>62</td>
<td>42.8</td>
</tr>
<tr>
<td>(m: 30%-40% ž: 30%-37%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal (m: 40%-52% ž: 37%-47%)</td>
<td>11</td>
<td>7.6</td>
</tr>
<tr>
<td>Hemoglobin reduced</td>
<td>111</td>
<td>76.6</td>
</tr>
<tr>
<td>(&lt; 120g/L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Urine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumins in urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very reduced (m: 25%-30% ž: 25%-30%)</td>
<td>72</td>
<td>49.7</td>
</tr>
<tr>
<td>Reduced (&lt; 1.5 x 10⁹/L)</td>
<td>70</td>
<td>48.3</td>
</tr>
<tr>
<td>Normal (1.5-4 x 10⁹/L)</td>
<td>29</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>CRP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately positive</td>
<td>24</td>
<td>16.6</td>
</tr>
<tr>
<td>Very positive</td>
<td>121</td>
<td>83.4</td>
</tr>
<tr>
<td>Moderate reduction</td>
<td>62</td>
<td>42.8</td>
</tr>
<tr>
<td>Reducing (&lt; 100 mg/dL)</td>
<td>111</td>
<td>76.6</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Alpha 2 globulin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased</td>
<td>112</td>
<td>77.2</td>
</tr>
<tr>
<td>Normal</td>
<td>33</td>
<td>22.8</td>
</tr>
<tr>
<td><strong>Gamma globulin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased</td>
<td>76</td>
<td>52.4</td>
</tr>
<tr>
<td>Normal</td>
<td>69</td>
<td>47.6</td>
</tr>
<tr>
<td><strong>IgA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased</td>
<td>17</td>
<td>21.8</td>
</tr>
<tr>
<td>Reduced</td>
<td>20</td>
<td>25.6</td>
</tr>
<tr>
<td>Normal</td>
<td>41</td>
<td>52.6</td>
</tr>
<tr>
<td><strong>IgG</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased</td>
<td>22</td>
<td>28.2</td>
</tr>
<tr>
<td>Reduced</td>
<td>20</td>
<td>25.6</td>
</tr>
<tr>
<td>Normal</td>
<td>41</td>
<td>52.6</td>
</tr>
<tr>
<td><strong>IgM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased</td>
<td>30</td>
<td>38.5</td>
</tr>
<tr>
<td>Reduced</td>
<td>11</td>
<td>14.1</td>
</tr>
<tr>
<td>Normal</td>
<td>37</td>
<td>47.4</td>
</tr>
<tr>
<td><strong>IgD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased</td>
<td>9</td>
<td>11.5</td>
</tr>
<tr>
<td>Reduced</td>
<td>19</td>
<td>24.3</td>
</tr>
<tr>
<td>Normal</td>
<td>50</td>
<td>64.1</td>
</tr>
<tr>
<td><strong>Fibrinogen</strong></td>
<td>139</td>
<td>95.9</td>
</tr>
</tbody>
</table>
control group, we notice that SE is very increased in 60 patients of the core group or 41.4%, while in the control group it is 10 or 20%. Very increased CRP in 121 patients or 83.4%. This says that even in conditions of fall of immunobiological capability, CRP is a more sensitive variable than SE. CRP is more adequate for monitoring activities than RA, because it is not influenced by a series of additional factors which increase SE, but is certainly a sign of inflammation and necrosis. Very low hemoglobin in RA says that it is a very heavy RA. We confirmed that in 111 cases or 76.6%. Anemia is very frequent in Kosovo (inadequate nutrition, frequent labors, etc.), so other sources of anemia should also be taken into consideration. Rheumatoid factor is 19 S component of gamma-globulin and represents antibodies against own gamma-globulin. In RA it appears between 35% and 80%.

Of our patients 78 or 53.8% had it. In literature it is described that a high value of W.Rose is a significant indicator of RA (142). In Kosovo, M. Ristic found in his doctorate thesis that even in conditions much more often than in the control group, we notice that SE is very increased in 111 patients or 49%. Mantoux was negative in 109 or 75.2%, RIAL low in 88 or 60.7%. All of this clearly speaks of remarkably frequent cell immunodefiiciency in patients suffering of RA in Kosovo, in the described Cosmetic conditions much more often than in the control group (3 out of 50 or 6%), but also in literature. From the research it is clear that cell immunodefiiciency dominates on Kosovo, heavier forms of RA but also of visceropathy (4,5,6,7,8,9,10).

Research shows a high level of cell immunodefiiciency proven by a decrease of the number of T lymphocytes and their weakness. Reduced number of T lymphocytes was present in 71 patients or 49%. Mantoux was negative in 109 or 75.2%, RIAL low in 88 or 60.7%. All of this clearly speaks of remarkably frequent cell immunodefiiciency in patients suffering of RA in Kosovo, in the described Cosmetic conditions much more often than in the control group (3 out of 50 or 6%), but also in literature. From the research it is clear that cell immunodefiiciency dominates on Kosovo, heavier forms of RA but also of visceropathy (4,5,6,7,8,9,10).

5. CONCLUSIONS
Based on the implemented research, RA on Kosovo has a specific characteristic that it appears in patients who are somewhat older, but also in men more often than in other environments. This could be described by accumulation of unfavorable external factors which are characteristic of this area and this gender. Laboratory and clinical monitoring shows differences in the core and control group. It is reflected in the status of cell immunity, clinical forms of RA, but other parameters as well.

It is clear that cell immunodefiiciency dominates on Kosovo most often, heavier forms of RA, but also of visceropathy. Higher evolution of RA in the core group compared to the control group should be sought in the bad living conditions and the level of health protection.

### REFERENCES

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13. Corresponding author: Mevludin Mekic, MD, PhD. Clinic for Heart diseases rheumatism. Clinical center of Sarajevo university. Bolnicka 25. Tel: 00 387 33 297 000.
Color Doppler in Evaluation of Erectile Dysfunction and Its Diagnostic Value

Dzelaludin Junuzovic
Clinic for Urology, Clinical center of Sarajevo University, B&H

SUMMARY
INTRODUCTION: Erectile dysfunction (ED) is primarily vascular disease, which can be diagnosed with the Color Doppler ultrasonography, and using vasoactive medication (locally PG E1 and general Sildenafil citrate) this state can be treated. GOAL: To answer the question of which color Doppler technique used by urologist can reveal and evaluate treatment of the erectile dysfunction, and create clinically applicable diagnostic and treatment protocol for erectile dysfunction. RESEARCH METHOD: Testing of patients with erectile dysfunction is completed with color Doppler exam with application of pharmacology testing. Ultrasonic color Doppler is screening of blood flow in corpora cavernosa performed with linear probe of 3.5 MHz and 7.5 MHz (‘Aloka’ 1700) with examination in flaccid phase of the penis and transversal scanning of the dorsal, cavernous arteries and corpus cavernous.

RESULTS AND DISCUSSION: Color-Doppler scanning gaining more importance and it is more and more used. Through this technique available is the best quality data on penile blood vessels. Best quality data on penile blood vessels can be gained with the Color Doppler. Advantage of Doppler technique is its versatile application and possibility to measure absolute flow velocity in the blood vessels. Key advantage of the Color-Doppler spectral analysis compared to other, non color duplex techniques is in fact that it makes easier and faster identification of the blood flow in the certain moment. Flow anomalies and occlusions are more easily visualized, and recording in certain time intervals after pharmacology induced erection provides accurate monitoring of the blood flow dynamics during tumescence and erection.

2. RESEARCH GOALS
Goal of this research was to study and determine possibility for Color Doppler sonography application in diagnostics and medication therapy of the erectile dysfunction, and applicability of the multi parameter measurements with Color-Doppler in etiology and therapy of the erectile dysfunction (2). Research should provide following effects: a) verification of the adequate diagnostic method for erectile dysfunction; b) evaluate safety and reliability, as well as cost efficiency of the Color-Doppler method in diagnosis of erectile dysfunction; c) evaluate influence of the locally applied prostaglandin in treatment of erectile dysfunction.

3. METHODOLOGY
Testing of patients with erectile dysfunction is completed with color Doppler exam with application of pharmacology testing. Ultrasonic Color Doppler is screening of blood flow in corpora cavernosa done with linear probe of 3.5 MHz and 7.5...
MHz ("Aloka" 1700) with testing in:

- Flaccid penis phase: longitudinal and transversal scanning of the dorsal and cavernous arteries, and corpora cavernosa
- A-Local application of the vasoactive substance (intracavernous injection of Alprostadil (prostaglandin E1) in dose of 20 micrograms; Applied is Caverject made by Pharmacia&Upjohn)
- B-Systemic application of vasoactive substance in form of tablets Sildenafil-citrate; Viagra manufacturer Pfizer
- C-Control group of 30 patients with verified psychological erectile dysfunction
- Pharmacologically induced penile erection: system scanning of the vascularization of the penis in longitudinal and transversal plan.
- Color-Doppler testing is done on a group of 90 patients in total:
  - 30 patients is treated with the local application of Caverject as intracavernous injection (ICI)
  - 30 patients tested with Sildenafil citrate

### 3.1. Protocol for color-Doppler examination

Examination is done in peaceful atmosphere which respect emotions and stressful nature of this situation. Patient is placed in comfortable position, Color-Doppler of the penis is performed in anatomic position which means dorsum of the penis facing abdomen, and ventrum exposed. Ventral approach has advantage in maximal erection, while lateral approach demonstrates both cavernous arteries.

Flaccid phase: longitudinal and transversal image (initial scanning)

- identification of dorsal and cavernous arteries on penis base
- follow the flow of the arteries dorsally
- measure diameter of the right and left cavernous artery
- examination of corpora cavernosa searching for non homogenous and hyperechogen areas (calcifications, fibrosis)

### 3.2. Induction of erection:

- Intracavernous injection of Caverject-20 micrograms of PGE1 in 1 ml of physiological solution, applied in side part of corpus cavernosum with thin needle (26 or 28 Gauge)
  - Place of injection should be compromised; patients should be instructed to massage penis base with gentle manual pressure, in order to improve distribution of vasoactive substance.
  - If after 15 minutes there is poor erectile response, patient should be advised to use manual self stimulation(1,2,3).
- Induction of erection with the orally applied dose of Sildenafil citrate 20, 50 or 100 mg depending of erectile response. In case of negative response on small dose recommended is gradual dose increase during second and third evaluation.

For the patients with ICI, color-Doppler begins immediately after injection, and monitoring of the flow features in time intervals starting at 5, 10, 15 and 20 minutes after injection.

For the group of patients treated with systemic application of vasoactive substance which means Sildenafil – citrate (Viagra), Color Doppler evaluation starts 30 minutes after orally taken adequate dose, so in time of expected tuminescence.

Color-Doppler scanning of the erectile tissue and blood vessels, and measuring its features in case of these patients is done in longer time periods (10-15 min.) compared to the patients with ICI PGE1 with maximal duration of evaluation of 60 minutes.

### 4. RESULTS

Research problem can in shortest be formulated as the need for accurate medical diagnosis and adequate therapeutic approach to erectile dysfunction. By classic ultrasound urology testing and ultrasonic Color Doppler test on a total sample of 60 patients. With application of these two diagnostic methods on our sample, and with analysis of the obtained data we received results which we processed with the standard statistical non parametric tests and show parallel, by tables and charts as follows(4).

#### 4.1. Results of the Ultrasonic urology tests

**Table 1. Ultrasound of the testicles**

<table>
<thead>
<tr>
<th>Ultrasound of the testicles</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>%</td>
<td>No. of patients</td>
<td>%</td>
</tr>
<tr>
<td>Normal</td>
<td>27</td>
<td>90.0%</td>
<td>26</td>
</tr>
<tr>
<td>Pathological</td>
<td>3</td>
<td>10.0%</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
<td>100%</td>
<td>30</td>
</tr>
</tbody>
</table>

Differences between groups A and C, B and C are not statistically significant so the value of the $x^2$ test is 0.531 and 1.963.

**Table 2. Ultrasound of the prostate gland**

<table>
<thead>
<tr>
<th>Ultrasound of the prostate gland</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>No. of patients</td>
<td>%</td>
<td>No. of patients</td>
</tr>
<tr>
<td>Normal</td>
<td>25</td>
<td>83.3%</td>
<td>24</td>
</tr>
<tr>
<td>Pathological</td>
<td>5</td>
<td>16.7%</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
<td>100%</td>
<td>30</td>
</tr>
</tbody>
</table>

Differences between groups A and C, B and C are not statistically significant so the value of the $x^2$ test is 1.455 and 2.307.

**Table 3. Ultrasound of the kidneys**

<table>
<thead>
<tr>
<th>Ultrasound of the kidneys</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>No. of patients</td>
<td>%</td>
<td>No. of patients</td>
</tr>
<tr>
<td>Normal</td>
<td>25</td>
<td>83.3%</td>
<td>24</td>
</tr>
<tr>
<td>Pathological</td>
<td>5</td>
<td>16.7%</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>30</td>
<td>100%</td>
<td>30</td>
</tr>
</tbody>
</table>

Difference between patients from group A and
Color Doppler in Evaluation of Erectile Dysfunction and Its Diagnostic Value

4.2. Analysis of the results obtained by Color – Doppler

Initial value of the diameter $x = 1.37$, $SD = 0.286$.

According to the testing results shown on the previous table at all time periods there is a significant increase of diameter compared to the initial state, basal diameter of the aa cavernosa in all cases is in range from $1 – 1.9$ mm. After application of PgE1, there is an increase in diameter by 0.3 up to 0.8 mm. But, differences between results for the individual time periods are not statistically significant, so we can say which is the time period with the significant, major incensement ($6,7,8$).

Coefficient of the linear correlation of diameter increase between measurements in individual time periods: a) $R_{5' – 10'} = – 0.153$; b) $R_{5' – 15'} = 0.591$; c) $R_{5' – 20'} = 0.308$.

5. DISCUSSION AND CONCLUSION

According to results of testing significance of differences within our respondents groups, there are no significant differences in change of EDV values compared to time periods. Coefficients of linear correlation for EDV, between measurements according to time intervals are: $R = 0.836$, $R' = 0.699$, $R = 0.777$.

Statistical tests, which we applied in the analysis of our results, show significant sensitivity in application of Color Doppler diagnostic technique compared to the classic ultrasound urology technique,

**Table 4. Diameter of aa cavernosa after PgE1 application**

<table>
<thead>
<tr>
<th>Time</th>
<th>Initial diameter</th>
<th>Average increase</th>
<th>Standard deviation SD</th>
<th>$t$ – test of diameter increase significance compared to initial state</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'</td>
<td>1.37</td>
<td>0.50</td>
<td>0.155</td>
<td>$t = 2.865; \text{sign. p&lt;0.05}$</td>
</tr>
<tr>
<td>10'</td>
<td>0.836</td>
<td>0.46</td>
<td>0.168</td>
<td>$t = 2.817; \text{sign. p&lt;0.05}$</td>
</tr>
<tr>
<td>15'</td>
<td>0.985</td>
<td>0.55</td>
<td>0.185</td>
<td>$t = 2.842; \text{sign. p&lt;0.05}$</td>
</tr>
<tr>
<td>20'</td>
<td>1.141</td>
<td>0.53</td>
<td>0.168</td>
<td>$t = 2.860; \text{sign. p&lt;0.05}$</td>
</tr>
</tbody>
</table>
in case of diagnosis and therapy of the erectile disorders, especially of vascular genesis (9,10,11,12). With this we confirmed our hypothesis of this research. Prospective analytic research, which results are previously presented allows us to make follow-

- The term impotence should be replaced with the term erectile dysfunction which stands for incapability to achieve and/or maintain penile erection sufficient for penetration (1,13,14).
- Erectile dysfunction is a medical problem in B&H. Contrary to public, and to some mount also professional opinion many cases of erectile dysfunction can be sufficiently treated with adequate selected therapy (15,16)
- Erectile dysfunction requires specific, urology, but also multidisciplinary evaluation.
- Development of quantification methods for degree of the erectile dysfunction makes this problem and treatment outcome objective.
- Information lack on many aspects of the erectile dysfunction, because it is necessary to conduct wide population studies on diagnostic and therapy plan.
- Incidence of erectile dysfunction in B&H with this research could not be accurately determined, partially due to small sample, and partially lie to opinion about this problem.
- Erectile dysfunction is important problem of public health and deserves support of basic sciences researchers.
- Urologist is specialist (medical profession) which is closest to solving the problem of the organic erectile dysfunction (1,17,18,19).
- Urologist can: a) conduct diagnosis; b) conduct and determine treatment; c) evaluate therapy effects; d) solve complications after therapy.
- Color Doppler test is a powerful diagnostic tool in diagnosis of erectile dysfunction, because it is a form of dynamic tests.
- Color Doppler test enable separation of the organic erectile dysfunction from the non organic one.
- Color Doppler test provides diagnosis of the arterial and vein reasons of the erectile dysfunction (16,17)
- With the dynamic imaging of the changes on the erectile penis part arterial insufficiency and vein incompetence can be separated.
Diameter of aa. cavernosa, PSV, IPKP are valid features for diagnosis of the arterial reasons of the erectile dysfunction.

EDV and persistence of the diastolic flow are valid features for determination of the vein reasons of the erectile dysfunction.

Arterial reason for erectile dysfunction is statistically significantly more present at the age group over 35 years. Vein reasons for the erectile dysfunction are statistically more frequent at the age group up to 35 years.

Application of oral therapy is more comfortable.

Therapeutic effects of PgE1 and Sildenafil citrate are better in the group of patients with the arterial erectile dysfunction.

Therapeutic effects of PgE1 are more rapid (feature “Acceleration of blood flow”) compared to effect of Sildenafil citrate.

Therapeutic effect in risk groups (diabetes, conducted prostatectomy, hypertension medications and similar) are important both in case of PgE1 and Sildenafil citrate.

Problem of vein decompensation with current medication are only half solved (20).

Many urology and andrology diseases which we tested are not cause for erectile dysfunction. That is not the reason that the treatment of the organic erectile dysfunction does not belong to urologists.

Frequency of erectile dysfunction has progressive increase with age, but it is not inevitable consequence of aging (other occurrences related to old age increase frequency of erectile dysfunction).

Erectile dysfunction can be a consequence of medication due to other medical problems or result of medication abuse (15,18).

Erectile dysfunction besides direct effect on sexual functions can have severe psychological consequences.

There is no statistical significance, nor significant correlation between degree of arterial dilatation and peak of the systolic velocity.

Peak of the systolic velocity in aa. cavernosae is the most sensitive feature in identification of patients with arterial insufficiency (13).

Color Doppler is partially reliable method in diagnostics of vein drainage as etiology factor for occurrence of erectile dysfunction (5,6,7).

Peak of systolic velocity (PSV) 25–35 cm/s indicated mild to moderate arterial insufficiency.

PSV below 25 cm/s is severe arterial insufficiency.

PSV value above 35 cm/s indicates normal arterial function.

Index of penile blood flow (IPBF) is important feature in evaluation of the erectile dysfunction arterial etiology.

Value of IPBF below 250 undoubtedly means that the erectile dysfunction have arterial etiology.

Sensitivity of IPBF is 95%, and specificity 75% in diagnosis of the arterial erectile dysfunction (3,9,15).

Acceleration of blood flow is important feature in evaluation of the therapy effect and has good correlation with the subjective feeling of erection.
• Evaluation of diastolic flow values on sonogram of the a. cavernosae is excellent indicator for evaluation of the vein decompensation.
• Value of diastolic flow greater than 10 cm/s in cavernous arteries, is reliable indicator of vein decomposition as etiology factor for erectile dysfunction.
• Normal vein drainage exists when the value of the diastolic flow on the sonogram of the cavernous arteries is not larger than 5 cm/s.
• Persistent diastolic flow, with normal peak of systolic velocity (normal arterial supply) is the sign of the vein occlusion caused dysfunction, so vein drainage in dynamic sonography image.
• Color Doppler as a method cannot give the answer about the anatomy of drainage, nor which veins are involved.
• Color Doppler as the method in diagnosis of erectile dysfunction provides etiology distinction into arterial problem, vein drainage and normal results.
• Color Doppler enables therapy evaluation of different medication success in case of erectile dysfunction.

Ultrasound technique with color Doppler and pulse Doppler, at least in theory can answer in which amount, with which quantity and quality vasoactive substance influence on treatment of erectile dysfunction (10,20). Application of this method can detect all changes in the penis blood vessels, acute and inherited, that the changes in erectile tissue of the corpora cavernosa and other morphology, as well as functional details which influence on erectile function. Due to this I think that color Doppler is a test, method of choice in diagnosis and evaluation of the therapy effects in case of erectile dysfunction.

REFERENCES

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Imaging in Detection of Meningiomas of the Basis Crani Anterior

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Original paper

SUMMARY

Meningiomas are slow growing tumors, with a huge substructure in dura mater, which constitute from neoplastic meningothelial cells. Computed tomography (CT) is the basic technique for evaluating the pathological processes in the brain. While, magnetic resonance imaging (MRI) is the most effective technique for the evaluation of brain structures and their pathologies. This study presents the effectiveness of CT and MRI in imaging the development of meningiomas of the basis crani anterior during 2005-2008 year period in UCCK, in Prishtina, as well as the importance of CT and MRI in their diagnostics. From a total number of 27 cases of meningiomas, 8 cases were meningiomas of basis crani anterior out of which 1 case was olfactory meningioma, 4 cases were sphenoidal and 3 cases were suprasellar meningiomas. It is observed that female sex dominates in relation with male sex (66.7%). The highest percentage of meningiomas was found at the group age 51–60 (48.1%). CT and MRI enable a correct diagnosis of basis cranii meningiomas in most of cases, but are impossible to predict the patients’ outcomes.

Key words: meningioma, computed tomography, magnetic resonance imaging

1. INTRODUCTION

Meningiomas are usually slow-growing (benign) tumors that develop from the meninges. They are nonglial (extraaxial) tumors consist of 20-25% intracranial tumors, which are among the most frequent ones. Majority of meningiomas are benign and are classified in 1 grade according to the WHO grade. Some of the histological subtypes have not a very good prognosis and they belong to the WHO II and WHO III grade. They are shown in two classic forms as a round mass or as a plate (en-plaque), in which 90.0% is emphasized, in uniformed mode (1,2,3,4).

In 20-25% of cases calcifications are present. There are tumors that are completely calcified (psammomatous meningioma), accompanied with bone change in form of hyperostosis or erosion. 60% of meningiomas is accompanied with peritumoral edema. These are well vasculised tumors therefore they are well enhanced after the I.V. contrast (5,6).

A part of the tumors remain undiagnosed because they show no clinical symptoms, however there are cases, where a part is diagnosed accidentally during CT or MRI examinations. The major part of the tumors is diagnosed after clinical symptoms. They possess well determined localism, according to the incidents, they occur in cranial convexity, parasagittal, sphenoidal, pontocerebellar angle, suprasellar, fossa olfactoria, cerebellar convexity, parasellar, clivus, tentorium, ventral lateral, foramen magnum, pineal region, optic nerves and extracranial (nose, sinus, cranial bone).

The tumor mass in CT and MRI examinations are shown in two different forms: as a round mass or outspread as a plate (en plaque). Without intravenous contrast, the mass occurs as a well limited round mass, extraaxial, which shift the brain to the opposite side. The tumor mass is usually homogeneous, hyperdense, contains Ca++ deposits (20-25%), and calcificated tumors are present (Meningioma psammomatous). Edema is present in 60% of meningioma, which is linked to the toxic effect of tumor, with the compromise of venous drainage and the speed of tumor increase. In the examination of intravenous contrast the well vascularized tumor, in 90% of cases, is emphasized uniformly. The mass is usually homogeneous, hyperdense, and rare small hypodense zones are present. Besides the intracranial mass, osseous modifications in the form of hyperostosis or erosions are evident. In MRI, meningioma is well differentiated from the brain tissues, where there is a small amount of cerebrospinal liquor between them. In T1, they represent isodense or hyperdense compared to brain cortex. MRI is important in detecting small meningiomas that have the same density as the brain cortex, and the flat plaque, too. In some cases, tumor mass shows emphasis and thickness of dura (dural tail), the presence of this image serves for a secure diagnose of meningiomas. Some authors interpret dural tail as a reaction; some others interpret it as an extension of tumor (1,7,8).

2. MATERIALS AND METHODS

We retrospectively studied evolution of basis cranii anterior meningiomas during 2007–2008 at University Clinical Center in Prishtina and the importance of fast and proper diagnosis of CT and MRI.

The study includes all patients of ages 12-75 years old, of both genders, who were deferred to radiological examinations in our clinic during this period. The age, gender, and the location of meningiomas in patients were examined. The medical records, surgical records, imaging studies, and histological diagnosis were analyzed. The study comprises only the meningiomas of the basis anterior cranial (M-
Imaging in Detection of Meningiomas of the Basis Cranii Anterior

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BCA), which contain olfactory meningiomas, sphenoidal meningioma, and suprasellar meningioma.

Statistical analysis of results was performed by using the InStat 3 programme. The measured statistical parameters were index structure, arithmetic mean and standard deviation. Nonparametric data including age and sex were compared by using X²-test. All tests were considered significant if $P < 0.05$.

3. RESULTS

In Table 1 demonstrates the total number of meningiomas during period 2005-2008. The leading number of meningiomas was registered during year 2007, with 9 cases (33.3%), however the smallest number was recorded during year 2008 with 5 cases (18.5%).

The increased rate of morbidity was recorded during year 2007, with 0.43:100000 populations, the reduced rate was evident during year 2008 with 0.24:100000 populations.

During the period 2005-2008, from the total number of meningiomas, 8 cases were detected as basis cranii anterior meningiomas. The largest number of these meningiomas were detected during year 2007, with 3 cases (37.5%), and only 1 case (12.5%) during year 2005.

The increased rate of morbidity was recorded during year 2007, with 0.14:100000 populations, the reduced rate was evident during year 2005 with 0.05:100000 populations.

From the total number of meningiomas (n=27) detected in our clinic during 2005-2007 year period, female patients dominate with 18 cases (66.7%), in correlation with male gender, 9 cases (33.3%). It is evident that proportion female/male was 2:1.

The mean age of patients with meningioma was 55.9 yr. (SD ± 11.3 yr.). The mean age for female was 54.5 yr. (SD ± 12.1 yr.), and age for male was 58.8 yr. (SD ± 18.6 yr.). The calculation with the t-test shows no significant difference in patients with regards to gender ($T = 0.726$, $p>0.05$).

From the total number of meningiomas (n=8) localized in anterior basis cranii, detected in our clinic...
during 2005-2007 year period, female patients dominate with 6 cases (75.0%), in correlation with male gender, 2 cases (25.0%).

The mean age of patients with anterior basis crani meningioma was 37.9 yr. (SD ± 13.0 yr.). The mean age for female was 38.8 yr. (SD ± 15.0 yr.), and age for male was 35.0 yr. (SD ± 5.7 yr.). The calculation with the t-test shows no significant difference in patients with regards to gender (T = 0.33, p>0.05) (Table 2). However the mean age of patients with basis crani meningioma was significantly lower, according to total number of meningiomas (T=3.82, p<0.01). In our study, the localization of basis crani meningiomas was sphenoidal in 50% of patients, suprasellar in 37.5% and olfactory in 12.5% of patients (Table 3).

4. CONCLUSIONS
Meningiomas of the basis crani anterior are not rare tumours, accounting for approximately 29.6% of all intracranial meningiomas, identified during the four year period in our country. CT and MRI enable a correct diagnosis of basis crani meningiomas in most of cases, but are impossible to predict the patient outcomes. MRI revealed superior anatomic detail compared with CT-scan. Surgery is the gold standard of treatment, but recidivs and residues of tumours are not uncommon.

REFERENCES

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Influence of Insulinemic Curve Changes on Parameters of Median and Ulnar Nerves

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Original paper

SUMMARY
Research goal of study is to examine which electroneurographic (ENG) parameters of median and ulnar nerves are changed with changes of insulinemic curve (IC). Patients and methods: Study was done during January 2007–March 2008. Examined group consisted of 50 patients (17 or 34% males) with average age of 56.9 ± 9.2 (43-79) years and with changed shape of IC. The most frequent finding was “slow and incomplete descendant part of IC” observed in 30 (60%) patients. Control group consisted 50 healthy volunteers (17 males) with average age of 52.2 ± 7.6 (38-73) years. In this group IC was not determined. Motor conduction velocities (MCV) in forearm with terminal motor latency (TML), and areas of compound muscle action potentials (CMAP), and sensory conduction velocities (SCV) with amplitudes of sensory nerve action potentials (SNAP) in palm of median and ulnar nerves on both sides were measured with bipolar electrodes for superficial stimulation and registration. Electroneurographic criteria were determined in control group with subtraction or adding of two standard deviations on average values of electroneurographic parameters. Results: Slowing of motor conduction velocities of left ulnar nerve was present in 14 (28%) patients, and right ulnar nerve in 13 (26%) patients. Left median nerve was affected in 10 (20%), and right in 5 (19%) patients. TML was increased in 9 left median, 5 right median, 3 left ulnar, and 4 right ulnar nerves in examined group, and area of CMAP was decreased in one left and one right ulnar nerve. Slowing of sensory conduction velocities of left median nerve was present in 15 (30%) patients (in one additional SNAP was not received), and right median nerves in 12 (24%) patients (in 4 additional SNAP was not received). Left and right ulnar nerve was affected in 13 (26%) patients (with one additional not received SNAP in both sides). Decreased amplitude of SNAP was observed in one left median, 4 right median, 6 left ulnar and 5 right ulnar nerve in examined group. Conclusion: Electroneurographic (ENG) parameters of median and ulnar nerves might be changed with changes of IC. We recommend analysis of IC like important diagnostic tool in patients with neuropathic changes.

Key words: ulnar nerves, electroneurographic (ENG) parameters.

1. INTRODUCTION
Diabetes mellitus (DM) is the most common cause of peripheral neuropathy, accounting for approximately half of cases, but up to 1/3rd of neuropathy patients have no identifiable etiology. Worse glycemic control and insulin use were independently associated with neuropathy in people with non-insulin-dependent diabetes mellitus (1).

The exact nature of the relationship between Impaired Glucose Tolerance (IGT) and neuropathy is debated. The demonstration of neuropathic dysfunction in patients with prediabetes or impaired glucose tolerance emphasizes the susceptibility of peripheral nerve fibers, especially small A delta fibers and C fibers, to relatively mild, short-duration hyperglycemia. New testing can reveal peripheral nerve dysfunction prior to clinical neuropathic symptoms and signs (2).

This has been shown to be a relevant pathomechanism in diabetic polyneuropathies (PNP): binding of ligands to the receptor for advanced glycation end products (RAGE) results in activation of the transcription factor nuclear factor kappa B (NF-(kappa)B, and subsequent expression of NF-(kappa)B-regulated cytokines. These data suggest that activation of the RAGE pathway may be one of the first steps in the pathogenesis of PNP even before chronic hyperglycemia occurs (3).

An underlying cause is found in only 7% to 30% of patients with chronic idiopathic axonal polyneuropathy (CIAP). There are emerging evidence that abnormal glucose metabolism may be a risk factor for CIAP (4). A variety of evidence suggests IGT causes neuropathy. Neuropathy may occur early in diabetes. The neuropathy associated with IGT is milder than the neuropathy associated with DM. Small nerve fibers are prominently affected and may be the earliest detectable sign of neuropathy in glucose dysmetabolism. Glucose tolerance testing (OGTT) is appropriate in patients with idiopathic neuropathy (5).

It is generally assumed that insulin benefits human and experimental diabetic neuropathy indirectly by lowering glucose levels. Insulin also provides potent direct support of neurons and axons, and there is a possibility that abnormalities in direct insulin signaling on peripheral neurons relate to the development of this disorder (6).

2. AIMS

Research goal of the study is to examine influence of insulinemic curve (IC) changes on electroneurographic (ENG) parameters of median and ulnar nerves.

3. PATIENTS AND METHODS
Study is made on Department of Neurophtysiology, Primary Health Centre Tuzla, during January 2007–June 2008. Control group consisted of 50 healthy volunteers (17 or 34% males) with average age of 52.2 ± 7.6 (38-73) years. In this group insulinemic curve (IC) was not determined. Examined group consisted also 50 patients (34% males), and average age of
Influence of Insulinemic Curve Changes on Parameters of Median and Ulnar Nerves

56.9 ± 9.2 (43-79) years with changed shape of IC (normal values after 120 minutes: 2.0–25.0 µIU/ml). No one had previous diagnose of diabetes mellitus.

In all members of examined group are determined blood glucose level and glucose tolerance testing (OGTT). Those examinations were not made in control group. After short anamnesis and clinical observations neurophysiological examinations were performed. Only patients with negative history of excessive alcohol intake and without peripheral nerve lesions are included in study.

Examination is performed with examinees in supine position. Room temperature and “physiological” temperature of skin are required. Medelec Synergy (EMG and EP Systems -OXFORD INSTRUMENTS 2004) machine is used for measurements of electoneurographic parameters.

Motor conduction velocities (MCV) in forearm and sensory conduction velocities (SCV) in palm of both median and ulnar nerve were measured with surface bipolar stimulation and registration (Large touch proof) electrodes. Terminal motor latency is measured with stimulation of wrist and registration in thenar and hypothenar, more precisely with stimulation 6 cm proximally from registration electrode above belly of abductor pollicis brevis muscle for median nerve, and adductor digiti minimi muscle for ulnar nerve. Proximal stimulation for both nerves is performed in segment above elbow. Sensory conduction velocity of median and ulnar nerve is measured by stimulation of wrist and registration in second and fifth finger above fold of first interphalangeal joint.

Electroneurographic (ENG) analysis included sensory nerve velocity with amplitude of sensory nerve action potential (SNSP), motor nerve velocity with terminal motor latency of median and ulnar nerves of both sides with highest amplitude of Complex Motor Action Potential (CMAP) after primary deflexion from isoelectric line after stimulation artifact till final return to isoelectric line. Electrical stimulation of motor and sensory nerve is performed until maximal increasing of amplitude of CMAP and SNAP.

Values recorded in healthy volunteers are used like standard values subtracting (in determination of conduction velocities and amplitudes of CMAP and SNAP), and adding (in determination of terminal motor latencies in wrist) of two standard deviations (SD).

4. RESULTS

Average peripheral glucose level in examined group was 6.3±1.1 (4.3-9.8) mmol/L, although highest number of patients (26 or 52%) had normal values. Average values of OGTT after 2 hours was 6±2.2 (2.5-12.3) mmol/L. High-

**Table 1.** Parameters of motor neurographic analysis of median and ulnar nerves in 50 clinically healthy volunteers.

<table>
<thead>
<tr>
<th>Motor velocity (m/s)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus sin.</td>
<td>57.8</td>
<td>3.55</td>
<td>51.1</td>
<td>67.1</td>
</tr>
<tr>
<td>n.medianus dex.</td>
<td>58.6</td>
<td>4.5</td>
<td>47.2</td>
<td>68.1</td>
</tr>
<tr>
<td>n.ulnaris sin.</td>
<td>56</td>
<td>3.75</td>
<td>50.4</td>
<td>66.7</td>
</tr>
<tr>
<td>n.ulnaris dex.</td>
<td>56.3</td>
<td>3.7</td>
<td>51.8</td>
<td>69.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor latency (msec)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus sin.</td>
<td>3.3</td>
<td>0.5</td>
<td>2.5</td>
<td>4.6</td>
</tr>
<tr>
<td>n.medianus dex.</td>
<td>3.35</td>
<td>0.5</td>
<td>2.45</td>
<td>4.3</td>
</tr>
<tr>
<td>n.ulnaris sin.</td>
<td>2.7</td>
<td>0.45</td>
<td>2.1</td>
<td>3.95</td>
</tr>
<tr>
<td>n.ulnaris dex.</td>
<td>2.7</td>
<td>0.4</td>
<td>1.95</td>
<td>3.45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CMAP dist. (mV)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus sin.</td>
<td>6.7</td>
<td>3.1</td>
<td>2.2</td>
<td>14.3</td>
</tr>
<tr>
<td>n.medianus dex.</td>
<td>6.6</td>
<td>2.2</td>
<td>2.9</td>
<td>12.9</td>
</tr>
<tr>
<td>n.ulnaris sin.</td>
<td>6.7</td>
<td>2.1</td>
<td>2.8</td>
<td>12.4</td>
</tr>
<tr>
<td>n.ulnaris dex.</td>
<td>5.5</td>
<td>2</td>
<td>2.3</td>
<td>10.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CMAPproks.(mV)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus sin.</td>
<td>6.1</td>
<td>2.8</td>
<td>2.3</td>
<td>14.3</td>
</tr>
<tr>
<td>n.medianus dex.</td>
<td>5.85</td>
<td>1.9</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>n.ulnaris sin.</td>
<td>5.9</td>
<td>1.8</td>
<td>2.1</td>
<td>9.6</td>
</tr>
<tr>
<td>n.ulnaris dex.</td>
<td>5.1</td>
<td>1.95</td>
<td>2.4</td>
<td>10.4</td>
</tr>
</tbody>
</table>

SD: standard deviation; Min.: minimal; Max.: maximal; CMAP: complex motor action potential.

**Figure 1.** Distribution of values (in mmol/L) of peripheral blood glucose and value of glucose after two ours in glucose tolerance test (OGTT) in divided intervals patients with changed insulinemic curve.

**Figure 2.** Distribution of changes of shapes of insulinemic curve in patients with changed insulinemic curve.
er values than standard values are observed in 26 (52%), and lower in 13 (26%) members of examined group (figure 1). The most frequent pattern of insulinemic curve was good response and slow descendance (30 or 60%), followed with continually increased pattern (8 or 16%), slow response and descendance, and high response and slow descendance (3 or 6% in both cases) (fig. 2).

All neurophysiologic parameters of median and ulnar nerves in 50 clinically healthy volunteers are showed in table 1 and 2. From average values, subtracting, and adding of two standard deviations, diagnostic criteria for motor conduction with terminal motor latencies and areas of CMAP on distal motor stimulations, and sensory conduction with amplitude of SNAP, are determined (tab. 3).

**Table 2.** Parameters of sensory neurographic analysis of median and ulnar nerves in 50 clinically healthy volunteers.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Median (m/s)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus sin.</td>
<td>50.9</td>
<td>4.3</td>
<td>43.9</td>
<td>62.2</td>
<td></td>
</tr>
<tr>
<td>n.medianus dex.</td>
<td>51.1</td>
<td>4.5</td>
<td>43.2</td>
<td>62.2</td>
<td></td>
</tr>
<tr>
<td>n.ulnaris sin.</td>
<td>48.8</td>
<td>3.75</td>
<td>42.9</td>
<td>59.5</td>
<td></td>
</tr>
<tr>
<td>n.ulnaris dex.</td>
<td>48.4</td>
<td>3.8</td>
<td>43.6</td>
<td>59.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Amplitude SNAP (µV)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus sin.</td>
<td>17.3</td>
<td>8.5</td>
<td>4.2</td>
<td>51.4</td>
</tr>
<tr>
<td>n.medianus dex.</td>
<td>16.1</td>
<td>7.9</td>
<td>3.6</td>
<td>30</td>
</tr>
<tr>
<td>n.ulnaris sin.</td>
<td>19.9</td>
<td>6.8</td>
<td>3.25</td>
<td>49.3</td>
</tr>
<tr>
<td>n.ulnaris dex.</td>
<td>18.9</td>
<td>6.6</td>
<td>9.1</td>
<td>33.6</td>
</tr>
</tbody>
</table>

SD: standard deviation; Min.: minimal; Max.: maximal; SNAP: sensory nerve action potential.

**Table 3.** Electro diagnostic criteria of median and ulnar nerves disturbances based on 50 healthy volunteers measurements.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Median (m/s)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus motor</td>
<td>&lt; 50.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td></td>
<td>&lt; 49.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td></td>
<td>&gt; 4.3</td>
<td></td>
<td>&lt; 0.5</td>
<td></td>
</tr>
<tr>
<td>TML (ms)</td>
<td></td>
<td>&gt; 4.35</td>
<td></td>
<td>&lt; 2.2</td>
<td></td>
</tr>
<tr>
<td>sensory</td>
<td></td>
<td>&lt; 42.3</td>
<td></td>
<td>&lt; 0.3</td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td></td>
<td>&lt; 42.1</td>
<td></td>
<td>&lt; 0.3</td>
<td></td>
</tr>
<tr>
<td>Side</td>
<td></td>
<td>&lt; 4,3</td>
<td></td>
<td>&lt; 0.5</td>
<td></td>
</tr>
<tr>
<td>SNAP Amplitude (µV)</td>
<td></td>
<td>&gt; 4,35</td>
<td></td>
<td>&lt; 2,2</td>
<td></td>
</tr>
</tbody>
</table>

| n.ulnaris motor            | < 48.5       |         |     |      |      |
| Left                       | < 48.9       |         |     |      |      |
| TML (ms)                   | > 4.3        |          |     | < 0.5|      |
| sensory                    | > 4,35       |          |     | < 2.2|      |

SNAP: sensory nerve action potential; CMAP: complex motor action potential.

Disturbed motor and sensory conduction velocities of median and ulnar nerves are found practically in all nerve structures of examined group. Changes of CMAP and SNAP amplitudes were less convincing (tab. 4, and tab. 5). Nerve structures most often disturbed, 16 or 32% on both sides, were sensory part of median nerve. Complete axonal degeneration of these structures with non elicited sensory response was observed on right side in four nerves, and in left side in one nerve structure.

Sensory component of ulnar nerve was disturbed on both side in 14 (28%) of cases. On both side one sensory response was totally absent. Motor part of ulnar nerve was more often changed than in median nerve bilaterally. It is necessary to emphasize that changes of TML and amplitude of CMAP are present in nerve structures with decreased conduction.

**Table 4.** Changes of motor neurophysiologic parameters of median and ulnar nerves in 50 patients with changed insulinemic curve.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Median (m/s)</th>
<th>Average</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.medianus Slowing</td>
<td>&lt; 50.7</td>
<td></td>
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<tr>
<td>Left</td>
<td></td>
<td>&gt; 4.3</td>
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<td>&lt; 0.5</td>
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<tr>
<td>Right</td>
<td></td>
<td>&gt; 4.35</td>
<td></td>
<td>&lt; 2.2</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Increased TML</th>
<th></th>
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<tbody>
<tr>
<td>n.medianus Slowing</td>
<td>&lt; 50.7</td>
<td></td>
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<tr>
<td>Left</td>
<td></td>
<td>&gt; 4.3</td>
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<td>&lt; 0.5</td>
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<tr>
<td>Right</td>
<td></td>
<td>&gt; 4.35</td>
<td></td>
<td>&lt; 2.2</td>
<td></td>
</tr>
</tbody>
</table>

| Decreased amplitude I CMAP |               |         |     |      |      |

| n.ulnaris Slowing          | < 48.5       |         |     |      |      |
| Left                       | < 48.9       |         |     |      |      |
| TML (ms)                   | > 4.3        |          |     | < 0.5|      |
| sensory                    | > 4,35       |          |     | < 2.2|      |

| Decreased amplitude SNAP   |               |         |     |      |      |

| n.ulnaris Slowing          | < 48.5       |         |     |      |      |
| Left                       | < 48.9       |         |     |      |      |
| TML (ms)                   | > 4.3        |          |     | < 0.5|      |
| sensory                    | > 4,35       |          |     | < 2.2|      |

SNAP: sensory nerve action potential; CMAP: complex motor action potential.

5. DISCUSSION

Our results designate that changes of insulinemic curve might decrease motor and sensory conduction velocities of median and ulnar nerves. Similar observations are described in literature and might offer some explanations for our findings. For example, it is described that prediabetes is associated with a length-dependent polyneuropathy that typically is sensory predominant and painful (2).

An evolving literature links other aspects of the metabolic syndrome to peripheral neuropathy. Impaired glucose tolerance is common in peripheral neuropathy patients. The extent to which IGT directly causes nerve injury as opposed to being a covariant with other equally or more important features (e.g., obesity, metabolic syndrome) remains to be determined. Preliminary data suggest diet and exercise counseling may be a useful treatment strategy (7).
But, what is the possible importance of such observations? Is it possible in persons with changed insulinemic curve and without neuropathy to avoid nerve damage? Another question is also, if initial nerve damage exists, is it possible to prevent further nerve damage?

It is described that in the absence of effective medications to halt or reverse nerve damage or promote nerve regeneration, early diagnosis of polyneuropathy, followed by tight glycemic control with diet and exercise, offers the best opportunity to prevent progressive symptoms of sensory loss, pain, autonomic dysfunction, ulcerations, and amputations. Also, tight glycemic control is the best approach to minimizing the prevalence and severity of polyneuropathy (8). In the same context, we recommend analysis of IC like important diagnostic tool in patients with neuropathic changes.

6. CONCLUSION
Changes of IC worsen MCV and SCV of median and ulnar nerves, that, in due time observation, might determine further therapeutic strategy.

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Diagnostic Efficiency of Trans-abdominal Ultrasound and CT in Diagnostics of Gall and Gall Tract Diseaesa in General Hospital Tesanj

Rifat Sejdinovic, Suad Sivic, Ljiljana Sejdinovic, Nizama Salihefendic, Besim Prnjavorac, Omer Bedak, Jasmin Fejzic, Jusuf Mehic

Original paper

SUMMARY
Gall disease and gall tract diseases, except anamnesis characteristics, physical examination and biochemical findings, require application of modern visual technology which with its high sensitivity and specificity allows quick, accurate and verifiable diagnosis and favorable outcome of disease, a false positive and false negative findings are reduced to a very low percentage. Data from the literature shows the sensitivity of Transabdominal ultrasound (TUS) up to 90% and specificity from 20 to 85%, while CT shows sensitivity up to 87% and specificity up to 90%. In our research, which included 366 patients with gall and gall tract pathology and 147 of them were treated surgically, shows TUS sensitivity up to 87.5%, but the low specificity of 28.5%, mainly caused by a large number of patients with gall tract pathology. CT shows high sensitivity of 100% and 100% specificity, which diverge from data from the literature because CT was done after TUS and with the selection of diagnostically complicated cases. In all these complicated cases surgical findings have confirmed CT diagnosis. From this we can conclude that the application of image technology allows fast and accurate diagnostic and treatment of gall and gall tracts.

Key words: gall disease, gall tract disease, TUS, CT, specificity, sensitivity

1. INTRODUCTION
Gall and biliar tree diseases are significantly represented in the gastrointestinal tract pathology and have a increase tendency (1,2,3). According to the autopsy results on 20% of women and 8% of men over the age of 40 years we have found out the existence of gall and biliar tree stone (4.)

Clinical flow of gall and gall tract disease can be manifested in the form of acute or chronically cholecystitis, with all its potential complications, and begins with biliar colic which progressively adulterate.

The diagnosis of gall and gall tract diseases are based on the basis of characteristic anamnesis data, physical examination of patients and biochemical laboratory findings (3,5,6,7).

New phenomenon of modern visual techniques and technology today provides confirmation and objectivity in clinical diagnosis, not only surgical and autopsy findings as it used to be for several decades. Today we have available latest medical devices, which along with application of information technology enable visualization of organs in 3D view (1).

TUS (Trans-abdominal ultrasound) is in use since 1952 in gastroenterology. It has a sensitivity of 80–90% and specificity of 20–85% in the gall and gall tract diseases (1,8,9,10).

Spiral CT has a sensitivity of 87% and specificity of 90% (9).

RCP has diagnostic and therapeutic use in the biliar tract diseases but because of aggressiveness and the complications it is stressed by mortality up to 6%.

MRCP–magnetic cholangyopancreatoctography–has a sensitivity of 81–100% and specificity of 85–100%–counter indicated in application with patients with metal bodies in the organism, clips, shrapnel, stents and other (7).

EuS–endoscopic ultrasound–the modern method, which has a sensitivity of 93–97% and specificity 97–100%. (10)

Listed modern technologies are not available in a large number of health care institutions, and their results are greatly dependent on education and qualifications of those who use them.

In General Hospital Tesanj, TUS modern device is used in daily work; “Toshiba Corevision” which with presentation has D2 and Color–Doppler TUS and spiral CT device; “Siemens Somatom Emotion.”

Radiologist with great experience works on TUS as well as internists who had several educations in TUS diagnostics.

On the CT device works experienced radiologist who is continuously educated in CT diagnosis.

2. GOAL
• Determine the effectiveness of used diagnostic procedures trough determination of specificity, sensitivity and predictive values of diagnostic tests separately
• Determine the cumulative (total) technology efficiency
• Determine which technology is more efficient
• Determine the validity of expert cumulative diagnostics in relation to more effective diagnostic technology

3. HYPOTHESES
• Spiral CT shows greater specificity and sensitivity in diagnostics of gall and biliar tree
Cumulative diagnostic capabilities of ultrasound and computerized tomography are more efficient than individually, and their supportive use is justified.

4. MATERIAL AND METHODS
The research included all patients who came, in the period from 1st January 2008 until 31st October 2008, at surgical clinic with suspicion on the disease of hepatobiliary tract. From the total of 692366 patients that was admitted at the surgical department, TUS diagnosis was made on 360, CT is done with 28 patients. 147 of them have undergone surgical procedure. For the statistical data analysis we have used Person’s X² test.

Of those who were examined by any diagnostic technology, 147 of them have surgical procedure. The diagnosis was confirmed with ultrasound in the 136 cases, CT in 26 and with both in 22 cases. Confirmed findings by the individual cases for individual technologies are given in the following table:

In case of ultrasound number of correct results was 121 from a total of 143 exams, which represents 85% efficiency. Test gives correct results because kappa of 0.089 represents a great agreement with correct results. Test have sensitivity of 87.5% and specificity of 28.5%, therefore the test is highly sensitive, but poorly specific. Possibility of diagnostic relations as a measure of discriminative test is 2.8 and shows that the test resolves well disease from healthy.

For computerized tomography out of 28 examinations done, all of them showed the correct results, so efficiency is 100%, kappa is also excellent, sensitivity and specificity 100%, and possibility of diagnostic relationship is infinite which means that the diagnosis is absolutely correct. X² test is 28 with p <0.001, which tells us that there is a very small possibility that observed result is by accident. CT is here as a control diagnostic technology demonstrated with 100% efficiency, where sensitivity and specificity is 100%.

6. DISCUSSION
Gall and gall tract disease is a common pathological entity with the increasing prevalence among people in Central Europe and females between 40 and 70 years of age. Regardless of the structure of stone, cholesterol, pigments or mixed, cause the same clinical picture and complications. Can be solitary at the larger dimensions and multiple which is more often case. Gall stones are often asymptomatic. Anamnestic is important to establish the origin and character of pain with typical localization and propagation very often develop complications in scope of acute cholecystitis, pancreatitis, bilihepatitis, peritonitis and gall bladder tumors, gall tracts, while obstructive icterus except calculose often caused by pathological changes papillae Watery, pancreas, pathological substrates of duodenum and periportal area.

Anamnestic, physical findings, biochemical findings are not sufficient to diagnose and to decide about optimal therapeutic procedure.

From different imaging methods most common in use is ultrasonography which is available in many health care institutions, easy applicable and safe for the patient, which despite of the high sensitivity has often very low level of specificity, between 20–85%, a qualified stone size (<3 mm), the position of stone in the gall neck, ductus cysticus, and display of periportal area with vascular structures and gas collections, and unfavorable angles which fall under ultrasonography waves in the area, significantly lower specificity of this method, but it is still important because of its easy observation of ductus choledochus and intrahepatal gall tracts. CT, MRCP, ERCP, EUS are efficient methods to display biliar tree, but they are rarely used and mostly used with negative findings of ultrasonography. They have a high level of sensitivity and specificity.

Our research has shown that broad application of ultrasonography in the biliar tract diseases has a significant diagnostic value, which is confirmed by
test of sensitivity of 87.5%, but the specificity was low 28.5% as a result of objective constraints in applying this technology in periportal area and the pancreas area, and diagnostic response of obstructive icterus. On 28 patients after TUS, CT was done to reveal the cause of bilar obstruction. CT clearly shows a high degree of specificity and sensitivity in diagnostics of hepatobilipancreatis tract. Taking into consideration that the CT was done on patients who had previously TUS, specificity and sensitivity in our pattern is with reason over those which are described in the literature (1, 3, 9, 10), while specificity and sensitivity of TUS on our sample was identical to those from the literature. (1, 2, 3, 8, 10). Other image technologies in our institution are not available and were not done on our patients in a significant percentage. To emphasize, this clearly shows that the application of TUS in pathology of hepatobilipancreatis tract significantly accelerates and makes diagnosis easier, while the justification of the application of CT after TUS has confirmed a very low number of false negative CT findings.

7. CONCLUSION

Our research, which included 692 patients, out of which 366 have been hospitalized and 147 with surgical procedure, has demonstrated necessity of applying modern technologies in the diagnostics of gall and gall tract diseases.

In the daily work used are both TUS and CT, the results of this survey indicating a high sensitivity of both imaging diagnostic technologies. We can conclude that both diagnostic methods that are used for diagnosis of gall and gall tract disease in General Hospital in Tesanj give efficient results. Maximum efficiency is in case of CT (100%) and slightly lower of TUS (85%), it should be pointed out that the CT was done in those cases where TUS did not give a final answer in the diagnosis and CT is used mainly in the diagnostic of gall tract and obstruction icterus. Thus lower TUS effectiveness in combination with CT can be justified as it was a diagnostic of more complicated cases, which have required further investigation. Sensitivity of technology is high in all cases, which means that the technology is very sensitive in terms of recognition of illness, specificity with CT and TUS when it comes to the diagnostic of more complicated cases 100% but very low for TUS which tell us that ultrasound have a weak ability to recognize healthy, while warn us on very significant results of X² test with CT and combination, and non significant on TUS.

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Evaluation Treatment of the Rotator Cuff Injury: Correlations Between the Insertional Anatomy Site Lesions and a Functional of Postoperative Results

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Clinic for Emergency medicine, Clinical center of Sarajevo University, Bosnia and Herzegovina1,
Clinic for Physical medicine and rehabilitation, Clinical center of Sarajevo University, Bosnia and Herzegovina2

ORIGINAL PAPER

PURPOSE: The purpose of this study was to define the correlations between the insertional anatomy of the rotator cuff lesions (Neer II & III) and a functional of postoperative results.

METHODS: In University Clinical Center of Sarajevo (Clinic of orthopaedic and traumatology, Plastic and reconstructive surgery, Emergency department) (12:4:1) in retrospective descriptive study evaluated (n=17) patients with rotator cuff lesions. All patients are operated in period January 2000. – January 2007. Relation male : female was 15:2, average age 43,7 years (35,2–53,6). Functional tested was in period 3, 6 months and 1, 2 years after surgery. Evaluated comparative radiography, pain and function (Shoulder Pain & Disability Index–SPADI) and muscles strain lateral rotator shoulders with manual methods. All dates are statistical evaluated.

RESULTS: Large heterotropic ossification detect from subacromial space in one case after acromioabassion with restriction abduction (25°) and internal rotation arm. Humeroscapular rhythm are positive. After final tested 64,7% (n=11) patients was excellent and lover in adduction. Outer rotation of the forearm is according to muscle power weaker movement compared to the inner rotation.

Injuries of the RC can be expressed in form of partial or complete rupture or asymptomatic as subacromial impingement syndrome which is expressed with the characteristic signs which involves subacromial pain, crepitating and impossibility to elevate limb. Prevalence of RC increases with age: so that the patients without RC rupture are at the average age of 19 years, and with the unilateral rupture 59 year, and with bilateral rupture at 68 years (1). Main cause of impingement is repeated touching (collision) of humerus head with lower surface of the frontal part of acromion and coracocromial ligament. Most often involved tendons are one of supraspinatus and infraspinatus. But similar symptoms can be caused by other important anatomic structures such as subacromial burs and tendon of the biceps long head.

Clinical tests which are specific for determining impingement and RC lesion are functional tests; Neer, Hawkins – Kennedy and adductive (drop arm) tests which determines the degree of limitations for active adduction of the upper arm. Painful adduction, subacromial painful arch in range from 30° to 120° (involved structures of the subacromial joint) goes in favor of partial rupture and painful impossible initial adduction of the upper arm to complete rupture. Noticeable is the disorder of the humoroscapular rhythm.

Verification of the muscle strength weakness should be evaluated by the group test for the lateral rotators of the shoulder which is performed and evalu-
Evaluation Treatment of the Rotator Cuff Injury:

**Figure 1. Protocol for evaluation of muscle strength of the lateral rotators by manual method**

<table>
<thead>
<tr>
<th>Mark 3</th>
<th>Mark 4.5</th>
<th>Mark 2</th>
<th>Mark 1 (in traces)</th>
<th>Mark 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position: Patient prone. Upper arm is in adduction of 90° and forearm in flexion of 90° over the table edge</td>
<td>Position: Patient prone. Upper arm adducted for 90° and forearm in flexion of 90° over the table edge</td>
<td>Position: Shoulder is at the edge of the table. Upper arm is in neutral position between outer and inner rotation and hangs. Forearm is extended</td>
<td>Position: Shoulder is at the edge of the table. Upper arm is in neutral position between outer and inner rotation and hangs. Forearm is extended</td>
<td></td>
</tr>
</tbody>
</table>

Evaluation: Examiner fix the shoulder belt with one arm and with the other arm gives resistance of the upper arm above elbow in direction of inner rotation through full amplitude of movement against gravity; moderate additional resistance is marked as 4, and stronger one as mark 5

Evaluation: Examiner with one arm fixes the shoulder. Patient performs active movement of outer upper arm rotation in horizontal space plain trough full amplitude of movement which is „liberated“ from the gravity

Evaluation: Patient tries to perform active movement of outer upper arm rotation. Examiner with one arm palpate m. infraspinatus below spine scapulae, and with other palpitate m. teres minor on the outer scapula edge

Evaluation: Examiner with one hand fixes the upper arm above the elbow. Patient makes active move of outer rotation of the upper arm trough complete amplitude against gravity

Evaluation: Examiner with one arm tries to feel by palpation muscle contraction of outer upper arm rotation while avoiding adduction. Examiner palpates. m. teres minor on the outer scapula edge

Evaluation: Patient tries to perform active movement of outer upper arm rotation. Examiner with one arm palpate m. infraspinatus below spine scapulae, and with other palpitate m. teres minor on the outer scapula edge

Evaluation. It is not possible to feel by palpation muscle contraction

Dynamometric evaluation is performed with the patient in supinated position. Upper arm is in adduction of 90° and neutral position between inner and outer rotation, while the forearm is flexed by 90°. Shoulder is fixed. Dynamometric ribbon is fixed at the forearm above the wrists in 90° angle on parallel forearm axis. Patient keeps position of the forearm with static muscle contraction, while the examiner is providing resistance by pulling dynamometer in direction of the inner forearm rotation while reading values on the dynamometer (2).

For accurate diagnosis of these injuries important role have radiography, US, MRI, CT as well as aortography of glenohumeral joint which was used much more in the past.

Indications for selection of type, or form of treatment of RC lesions depends on the stage of the lesion as classified by Neer (3).

There are several surgical techniques which are performed in form of arthroscopy or open with or without subacromial decompression (ablation) depending whether is the case of impingement, partial lesion or complete rupture (4,5). McLaughlin, Smith Petersen, Armstrong believes that with acromioplasty or acrominectomy with subacromial bursectomy in shoulder adduction produce less friction and by that also creates smaller lesion of the rotator cuff. Due to this it is often use as isolated procedure for intra-mural ruptures. In case of complete rupture which affected full tendon thickness according to Harryman & Mack (type 1: only one tendon and always SSP, type 2: usual SSP and ISP, and type 3; SSP, ISP and sub scapular) majority of surgeons prefers reconstruction or suture of the tendon – tendon plate under the bone flap or sliding of the suture trough transoseal tunnels (“side to side”) or so called use of suture anchors (anchorage) (6).

After the surgery patient is placed on adduction immobilizing sling during the first 6 weeks. During this time it is very important to restrict passive external rotation with elbow laterally with possibility to perform pendulum exercises. Between 6 and 12 week, start passive exercises with flexion forward and external rotation while avoiding adduction. After 12 weeks starts muscle strengthening with focus on scapular stabilization of the rotator cuff muscles. Six months after the surgery patient starts with full movements without restriction (7).

<table>
<thead>
<tr>
<th>Stage</th>
<th>Edema and hemorrhage. Patients younger than 25 years. Pain during activities – disappears in resting phase Th. conservative (physical therapy) and NSAID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>Fibrosis and tendinitis. Typical for patients ages between 25 and 40 years. Feels pain during activity, but which does not disappear always in resting phase Th. If the conservative methods does not produce result necessary is subacromial decompression</td>
</tr>
<tr>
<td>Stage II</td>
<td>Bone spur and tendon rupture. Characteristic of patients older than 40 years which have progressive problems due to rupture of RC Th. surgical repairation of RC</td>
</tr>
<tr>
<td>Stage III</td>
<td>Cuff rupture–arthropathy. Patients older than 60 years with data on RC rupture Th. Surgical – RC reparatory, semi or total arthroplastic of the shoulder</td>
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<tr>
<td>Stage IV</td>
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</table>
Ruptures of the rotator cuff are usually determined according to the size (e.g. small rupture), location (e.g. supraspinatus) or rupture wide (for example partial rupture in depth). Size of the rupture can be determined during the surgery by measuring size of the rupture diameter. But the size of rupture does not show which tendons are involved. Supraspinatus (SSP) and infraspinatus (ISP) tendons are firmly joined near insertion at the large tuberositas and tendons are covers with burs or fibers of the coracohumeral ligament. According to this it is difficult to identify interval of these tendons during the surgery except if some anatomic features are available.

Location of rupture is especially important in selection of treatment and prognosis because the rupture can cause more devastation then some other of the same size at the different location (8,9)

Majority of anatomy textbooks mention that SSP insertion is within high impression of the large tuberositas and ISP within medial impression.

Clark and Harryman showed that the fibers of SSP and ISP are fused and there is difficulty to separate them, which is a problem in their diagnosis and identification during surgery (10)

Some ruptures which are limited to superior facet contains only SSP tendon. But superior facet maybe cannot be identified during surgery due to osteoarthritis changes of the great tuberositas. In same cases distance between frontal margin of the great tuberositas and the frontal margin of the ISP connection helps in identification whether rupture involves the ISP tendon. Medium facet provides anchorage for SSP and ISP tendons. Overlap of these tendon is shown but not at the referral facets (11,12,13) . That is why when the rupture in full thickness in superior or half of the medial facet or when it’s spreading for more than average 12.6, from the frontal margin of the great tuberositas, ruptures involved SSP and ISP tendons. Rupture smaller than the wide of the SSP tendon (average 22.5 mm) involves only SSP tendon. But the results of some studies indicates that for example rupture of the full thickness of 20 mm involves both tendons (study conducted on 113 shoulders in case of 64 cadavers) (14) . In case of shoulder with SSP rupture, often is noticed atrophy of the ISP muscle and not only weaker adduction strength but also external rotation (15,16,17). Potential involvement of the ISP tendon can be one of the explanations for this phenomenon.

Muscular atrophy of ISP sometimes can be noticed in patients with what it seems isolated SSP rupture, and this atrophy is noticed by researchers in several studies (18, 19, 20). Authors of these clinical trials which resulted in ISP atrophy combined with the rupture of the rotator cuff in majority of patients which did not show dysfunction of the suprascapulatory nerve (15,16,17).

Based on anatomic finding of the mentioned studies it is necessary to perform reconstruction of the rotator cuff not only SSP but also infraspinatus in wide of shade on the high impression of the great tuberositas. Also there is a difficulty in differentiation of ISP and SSP during surgery. But the length, thickness of the tendoid portion of SSP and ISP can help in identification of each muscle. Reparation of thick tendons portions into original insertions is extremely important to restore shoulder function.

2. RESEARCH GOAL
The aim of the research is to determine in accordance with the diagnostic studies correlations between anatomic locus, which is involved in lesions within the group of surgically treated (stages II, III) and received final results after the functional tests and manual tests for assessing muscular strength and atrophy.

3. MATERIAL AND RESEARCH METHODS
At the Clinical for orthopedic and trauma surgery. Plastic and reconstructive surgery and Clinic for Urgent Medicine of the Clinical Center of Sarajevo University (12:4:1) by retrospective descriptive

<table>
<thead>
<tr>
<th>Surgical procedures</th>
<th>number</th>
<th>%</th>
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<tbody>
<tr>
<td>SRC</td>
<td>4</td>
<td>23.5</td>
</tr>
<tr>
<td>SDACP</td>
<td>5</td>
<td>29.4</td>
</tr>
<tr>
<td>SDACP + SRC</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>SDACN + TOF + SRC</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>SDACN + SRC</td>
<td>2</td>
<td>11.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>100</td>
</tr>
</tbody>
</table>

SRC (sutureation RC “side to side” reparation ), SDACP (open subcromial decompression; acromioabrasia–acromioplasta), SDACN (open subcromial decompression – acromionectomia), TOF (transoseal fixation)
study we evaluated (n=17) patients with selected unilateral stage II and III of the rotator cuff lesions according to Neer which are surgically treated in the period from January 2000 until January 2007. Male to female ratio was 15:2, and the average age of the patients was 43.7 years (35.2 – 53.6).

In case of 8 patients in anamnesis existed occasional painful limited sensations during adduction of the upper arm (subacromial pain syndrome) which developed to full reduction of movements (impingement with intramuscular rupture RC). In 9 cases there was a recent ruptures without retraction of the tendons ends (5 partial and 4 complete). After complete clinical, Rtg. US, CT and MRI evaluation indications were set for surgical treatment of all patients.

Evaluation of the muscle strength before surgery was estimated as mark 1 (n=3), reduced strength in outer upper arm rotation marked with 2 points (n=3), and with 4 points (n=9). Stronger additional manual test for muscle strength could be verified with 5 points (n=2).

Evaluation and functional testing were conducted in time period of 3, 6 months and 1, 2 years after the surgery. After control radiography which is done in each case there was a (comparison) evaluation of the pain and functioning (Shoulder Pain & Disability Index–SPADI), followed by evaluation of atrophy and muscle strength of the lateral rotators by manual method as well as determination of possible working restrictions. All obtained data are processed statistically.

4. RESULTS

Radiography examination in case of 4 patients we notices osteophytes at the RC insertion. In case of one patient there was a larger heterotopic ossification in subacromial space after acromiabrasion. At the same time diagnosed in significant reduction of the shoulder adduction (movement up to 25 °) with total limitation of the inner rotation of the upper arm and positive humeroscapular rhythm. Patient has difficulties to use arm which is in position of outer rotation. Shoulder joint is contracted.

Reduction of painless movement after opposing the dorsal pressure from the examiner over 90 ° of adduction (adduction test; “drop – arm test”) in case of (n=11) respondents was still positive after 3 months, (n= 4) patients after 6 months, and (n=1) after 1 year. In 3 patients with reconstruction of the complete RC rupture there was a hypotrophy of the shoulder muscles. Reduced strength of the outer rotation of the upper arm when performing manual test in 4 patients was evaluated with 2 points.

In case of 12 patients strength of the outer rotators is estimated as follows; (n=1) 3 points, (n=8) with moderate additional resistance 4 points and with stronger additional manual resistance 5 points (n=3). By conducted testing 64.7% (n=11) patients had excellent results, good 17.6 % (n=3), 11.7 % (n=2), modest functional recovery, and 5.8 % (n=1) poor.

Neer test was discretely emphasized in case of 2 patients.

There was a significant difference in SPADI total score after the surgery in comparison to state before the surgery (p=0.029). Also the functional activity was significantly better after the surgery in comparison to time before the surgery (p=0.026). A reduction of pain is noticeable but not significant (p=0.063).

Analysis of work activities; 2 patients retired, 4 was occupationally disables for more than a year, 4 changed their work place. Five respondents mentioned that they have reduction in everyday life activities.

5. DISCUSSION

Gerber et al., suggest that the ideal reparation will be conducted if there is a high initial fixation of tension, minimal gap and support of mechanical stability until sufficient healing occurs (21). This implies adequate anatomic visualization and identification of the lesion spot, positioning or reinsertion of the tendon place. In opposite there is a high risk for functional failure.

Medial facet with the overlapping tendons SSP and ISP in interval of 0.5 to 10.00 mm represent referral anchorage for both tendons which means that full dept rupture or wider (average f 12.6 mm from the frontal margin of great tuberoses) involves both tendons. Reconstruction of only SSP without checking or overseeing the potential involvement of ISP is evident later by weakened adduction and reduced external rotation as well as ISP atrophy. This phenomenon goes in favor in incomplete RC reconstruction (22,23). Researches of Minagwe and later by Mochizuki et al. which was the first to describe insertions of SSP and ISP in their facets at the great and small tuberositas have great importance for the future projections in determining lesion and its reconstruction (9,14).

This is confirmed also by our research or direct correlation between the lesion within structures of the RC anatomic locus (with emphasis on tendons SSP and ISP) and functional evaluation of the surgically treated patients which is verified also by SPADI index.

Reliability of the SPADI index is also evaluated by Roach et al. By calculating internal consistent values with Cronbach alpha values which was in range from 86 to 95 (24) .

What is also important and influence the final success of the reconstruction is the selection of the surgical procedure.

Recent biomechanical and clinical trials on concept of “footprint reconstruction” are based on use of double row of suture anchorages which are recommended as superior compared to individual row in fixation of the repaired RC (13). Open tech-
niques are generally used to form a bone tunnels in order to provide transoseal fixation. Arthroscopic techniques for RC reparation are used as mode for fixation technique of suture anchors instead of transoseal tunnels. In order to achieve as better as possible restoration of RC insertion arthroscopic method involves double row of suture anchors which are placed in insertion which is equivalent of transoseal stitches with open or mini open technique.

6. CONCLUSION

Basic clinical imperative is to recognize and classify anatomic lesion of the rotator cuff.

At each specific form of lesion it is necessary to conduct adequate functional evaluation before and after the surgery.

According to find surgical anatomic substrate reconstruction of the rotator cuff should be conducted in accordance with confirmed morphology findings related to insertion of SSP and ISP “footprint reconstruction”.

By our research or direct correlation lesion within suture of the anatomic RC locus are evaluated (with emphasis on tendons SSP and ISP) with functional clinical evaluation of surgically treated patients as verified with SPADI index. Reliability of SPADI index is done by calculations of internal consistent values and they do not differ from the research done by other authors.

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Fracture Gap and Callus Area Delineation on Digital Radiogram Utilizing Modified Segmentation Algorithm

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SUMMARY
The regenerating bone during fracture healing is usually assessed by observing standard plain radiographs but radiographic definition of union is still not well established. Almost all clinical studies utilize radiographic expertise. The end-point of fracture healing has to be defined properly to make accurate clinical decision. The aim of the study was to support fracture healing evaluation by use of supplemental tool for proper segmentation of fracture callus region for further analysis. We have modified the one of the bacterial colony growth like segmentation algorithm for proper delimitation of fracture gap and callus area on digital or digitalized X-ray of long bone fracture cases. Our modification concerns in distinction of two attack components. First component is local and depends on signal intensity in “attacking” pixel and its direct surroundings. Second component depends on mean intensity of signal detected in whole “colony” and “attacking” pixel. Segmentation starts from one or more reference points. The “x” and “y” coordinates are user defined. They are represented by known intensity of a signal (Ia). In that moment mean intensity in colony is computed (Ik) as well. “Colonized” points attack their neighboring points ((xn, yn) where x(n-1, x+2) and y(n-1, y+1) i x(n)εN i y(n)εN).

The strength of attack is estimated using following algorithm:
1. Local attack component (Al):
   (1) \( \Delta I_l = |I_o - I_a|/\Delta I_{max} \) where: \( \Delta I_{max} \) – maximal delta value of intensity
   Ia – intensity value in attacking point
   Io – intensity value in attacked point
   \( \Delta I_l = 1 - \Delta I_{l} \) where: k – empirical factor of equation.
2. Colony attack component (Ak):
   (2) \( \Delta I_k = ||I_o - I_k|/\Delta I_{max} \) where:
   Ik – mean signal intensity in whole colony.
   Condition \( \Delta I_k \neq 0 \), for points \( \Delta I_k \neq 0 \), \( \Delta I_k = 1 \).
   Ak = 1 - \( \Delta I_k \) 3. Attack factor is calculated:
   (5) A = Al*Ak

There is stored information about total strength of attack (SA) and id number of attacking colony (iKo) in matrix describing points. If iKo of attacked point is equal to iKa (id of attacking colony) then \( SA = SA + A \). If iKo ≠ iKa then \( SA = SA - A \) and \( iK = iK + 1 \).

If \( SA \geq TA \) (TA – minimal successful strength of attack) then the point is marked as colonized and in next cycle it will attack its neighbors. The loop repetition is set. Exit points depend on choice of segmentation control method:
1. in case of user independent method
2. MATERIAL AND METHODS
We have modified the one of the bacterial colony growth like segmentation algorithm for proper delimitation of fracture gap and callus area on digital or digitalized X-ray of long bone fracture cases. Our modification concerns in distinction of two attack components. First component is local and depends on signal intensity in “attacking” pixel and its direct surroundings. Second component depends on mean intensity of signal detected in whole “colony” and “attacking” pixel. Segmentation starts from one or more reference points. The “x” and “y” coordinates are user defined. They are represented by known intensity of a signal (Ia). In that moment mean intensity in colony is computed (Ik) as well. “Colonized” points attack their neighboring points ((xn, yn) where x(n-1, x+2) and y(n-1, y+1) i x(n)εN i y(n)εN).

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If \( SA \geq TA \) (TA – minimal successful strength of attack) then the point is marked as colonized and in next cycle it will attack its neighbors. The loop repetition is set. Exit points depend on choice of segmentation control method:
1. in case of user independent method
– no possibility of attack, that means:
  a) number of no colonized points is 0 or
  b) number of neighbor’s points for which calculated $A > 0$ is 0 or
  c) interruption by user is also available.

2. in user dependent method – release of mouse button.

3. RESULTS

Radiograms of long bones (humerus, forearm, femur, tibia) were selected for the study. Series of images of 10 fracture cases were used in a study. The algorithm has been tested on different X-ray images (DICOM files) (up to 1000 intensity levels) and standard graphical formats (jpeg, gif, tiff) (255 gray scale levels). In first step we had to estimate $k$-factors for equations two and four, $\Delta I_{\text{max}}$ and $TA$.

We have found empirically that the best results are achieved for $k$-factor of equation 2 remains within the range from 0.01 to 0.05 and for equation 4 within the range from 0.01 to 0.03. Greater values of $k$-factors speed up the algorithm but may cause over spread errors, particularly in equation nr 2. $TA$ values usually lie within the range 0.5-1.0. Lower values of $TA$ also speed up computation. But in the range 0.7-1.0 it does not cause significant errors in segmentation. $TA$ values above 1.0 are acceptable but cause algorithm works slower and results are not much better. $\Delta I_{\text{max}}$ was set to 0.5 of difference between maximal and minimal pixel value in whole image in most of our experiments. This difference was calculated automatically. Greater values more likely produce errors. Another problem appeared as the number of reference points from which segmentation starts. General rule was set to place these points in distance about $2 \times d$, where “d” represents width of the fracture gap. The greater distance may appear in the case of well defined gap borders. We have found that results of segmentation using developed algorithm in user-dependent time of segmentation method cover correctly expected region of gap or callus in almost all so called “clear” cases. In uncertain cases, when whole gap or callus can not be drawn easily from its view on X-ray presented algorithm helps to delineate correctly shape of the gap and callus in almost all cases. That requires lower values of $k$-factors and greater $TA$ values. Presented algorithm has been developed primarily for two dimensional images. However, there is a possibility to utilize it as an evaluation method for 3D images.

4. DISCUSSION

A noninvasive method to assess the fracture healing may utilize digital radiography as well digitalized plain classic X-ray (1,4). During the process of bone healing, mineralization of the callus leads to higher bone density and bone mass of the cal- lus tissue. However, a little objective data exists to explain how the radiographic appearance correlate with the quantitative strength of the newly formed bone within fracture gap (5). Quantification of fracture healing utilizing X-ray image was employed in several studies as a unique approach (1,2,3). Relative analysis of optical density of digitized radiograms was employed as a key approach for image analysis and RODIA system development (1,2,3). Relative approach to measurement of optical density allows applying it on standard, plain radiographs despite of X-ray exposition standardization (film quality, process of development, etc.). Final result of each analysis shows comparison of different fragments of the same X-ray. The value received at the end of analysis is not appointed and requires to be compared with previous analyses. The method allows an assessment of trend and rate of the process of fracture healing. An assessment utilizing relative way requires setting internal calibration based on establishing reference ODV ROI. Viewing of the series of consecutive, timely developed images and their ODV assessment in analogue locations makes the healing assessment available. This already described approach (3) may improve daily orthopaedic trauma practice assessment by experienced specialist and determine “healing” quantity and predict the bone union completion. That may enhance radiological quantization of fracture healing (2,3). Current approach considers callus formation and its contribution in bone healing. Periosteal forming callus is located outside the fracture gap. Its size depends on healing stage and movement within fracture site. Stiff bone junction produce no or very little external callus, moderate movement leads to prominent periosteal callus for-

![Fig. 1 Colored area of fracture callus determined by segmentation algorithm](image-url)
formation and extensive movement prevent callus to appear. Having some difficulties in determining callus area while assessing more detailed analysis for whole healing area, supplemental algorithm was developed. Utilizing previously developed tools the exact determination of callus area was not correctly achieved due to uneven and blurred bone edges and smooth callus transition into surrounding soft tissue. “Smooth transition” represents low callus-soft tissue ODV gradient that may remain observed on “soft technique” X-ray or plaster density seen on the image when patient immobilized. Modified “bacterial colony growth algorithm” has been used to determine the callus and fracture line areas. An algorithm differentiates them from surrounding bone (mostly compact bone). Fracture gap and callus areas were delineated successfully in analysed cases.

5. CONCLUSIONS
The clinical usefulness of the algorithm in process of numerical evaluation of long bone fracture healing requires further evaluation. During analysis of first simple cases we noticed positive correlation between computed relative factors of signal intensity in segmented regions with clinical findings. only statistical analysis of patient’s cohort may give us final answer about real and added value of presented algorithm in this subject. This is the next aim and step of our work. The definition of fracture union is important for each patient treated, and for research. Simple, unarmed evaluation of radiographs may not define union with sufficient accuracy in internally fixed fractures. The degree of callus formation and the rise of fracture line optical density may seriously influence on final diagnosis of union. Improvements in evaluation of the radiographic image may lead to greater clarity of fracture healing on plain radiographs. Due to requirements of the precise quantification method to indicate fracture healing progress presented above algorithms can be recommended. Precise determination of fracture callus area utilizing modified segmentation algorithm may help to draw its shape, and make it easy accessible for further optical density analyses. Usefulness of presented methods has to be evaluated by statistical analysis on large number of cases due to satisfactory results of preliminary study.

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Action-grid: International Networking in Grid Computing and Biomedical Informatics

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SUMMARY
The main objective of the ACTION-Grid, Project funded by the European Commission under the 7th framework, is to establish a collaborative environment between the European Union, Latin America, the Western Balkan countries and North Africa in the Grid and Biomedical informatics areas. The main reason for such cooperation lays in networking human resources of different backgrounds, research areas and expertise on different levels that share the same goal, in this case the main goal to achieve, maintain and improve people’s health.

Key words: biomedical informatics, ACTION grid.

INTRODUCTION

ACTION-Grid is a project designed to establish a collaborative environment in grid and biomedical informatics (BMI) areas including the European Union, Latin America, the Western Balkan countries and North Africa region (1). The project includes seven partners from six countries (Argentina, Chile, Croatia, France, Greece and Spain). The aim of the Project is to share ideas on interoperability between universities, research centers, hospitals and other institutions involved in different aspects of health care and technologies, in various settings (countries and continents). Mobility of people and education is also part of the project.

Despite of lot of work in the grid area and a number of projects, the grid technology has not yet fully reached health care settings (2,3). Grid technology is mostly focused on research and development in health areas, trying to enhance biomedical research and delivery of health care, create an open collaborative virtual community and communicate the collective knowledge of the health grid community (3). As such, the health grid calls for cooperation of different experts, such as computer scientists, bioinformaticians, medical informaticians, physicians, public health experts and others.

On the other side it seems that the future of medicine and health care lies in the active role of patients in their health and illness (4) and in the concept of individualised approach and personalised medicine. It can be expected that genomic information will improve the diagnosis of disease, as well as the prevention and treatment of disease (5). This means that the preventive actions aimed at reducing individual’s risks for certain diseases will be largely dealt with at the molecular level. Also, individual treatment could be more effective if the genomic bases are known. Genomic level is measured on the molecular scale but in the last years new developments based on regenerative medicine and nanomedicine are scaling downs to the nano-level. This involves the use of nano-particle, defined as those whose size does not exceed 100 nanometres.

As a general rule, the particles’ size is measured by their diameter that ranges from 100 to 2500 nanometres for fine particles, and from 1 to 100 nanometres for ultrafine particles (http://semanticommunity.wik.is/Nanoinformatics/Background).

There are several different approaches and several sources of information relevant for solving health problems on the clinical or public health level. Each of them brings their own features, tools and information. Medical informatics deals with the information in a clinical setting, public health informatics with the information at the population level, bioinformatics at the genetic level, and nanoinformatics and the nano level. Translational medicine, i.e. transfer of information and knowledge from basic discoveries to the intervention level (e.g., clinical or public health interventions) requires linking of all those areas. Consequential informational abundance requires the usage of advanced information technologies, including grid technology. This concerns networking of distributed computational capacities, often geographically dispersed, which will together be able to fulfil requirements set by the abundance and complexity of the data. However, technology alone is not enough. One of the key concepts is to link human resources that share the same goal, in this case the main goal to achieve, maintain and improve people’s health.
2. BACKGROUND

A number of initiatives have emerged in response to the need for appropriate technology and tools for finding all the information relevant for medicine and health care in specific clinical cases or at the population level. Many of them have been launched over the last few years to build Grid infrastructures both in Europe and the USA (www.health-grid.eu). Several initiatives should be mentioned: the HEALTHGRID (6), BNIR or Biomedical Informatics Research Network (7), GenoGRID, the Experimental GRID for genomics (8), GridPPS, Grid Protein Pattern Scanning (9) and Medigrid, one of the projects of German D-Grid Initiative with the main goal to Develop a Grid middleware integration platform enabling eScience services for biomedical life science (10). There is also Shared Genomics, a project that is developing accessible High Power Computing infrastructure to support the analysis of large genetic data (11).

Particular challenges are faced by projects that focus on specific health problems, for example Obesity e-Lab whose aim is to develop an e-Infrastructure for inter-disciplinary collaborative research into obesity (12), or Oxford University’s eDiMoND grid computing project that distributes information on breast cancer treatment, early screening and diagnosis, and provides medical professionals with tools and information to treat the disease (13).

In the context of the European FP6-ICT program, the ACGT projects is running (www.eu-acgt.org). ACGT aims to present the ‘next-step’ in post-genomics medicine by bringing together clinicians, biologists and informaticians. It aims to fill-in identified technological gaps in post-genomic clinical trials (two forms of cancer are targeted: breast cancer and paediatric nephroblastoma). ACGT provides technological advances on: biomedical information and data standards for all levels of investigation; develops new ontologies for cross-referencing terms and their biological contexts; and implements a bio-medical GRID infrastructure offering seamless media services for sharing and analysing complex and heterogeneous clinico-genomic data (14).

With respect to the utilisation of nanotechnology to medicine, the LOCCANDIA EU FP6-ICT is also on its way (www.loccandia.eu). LOCCANDIA targets, integrates and implements a full proteomics analysis chain, from blood sample to the diagnosis information, combining bio-, nano-, and informatics-related technologies. It includes and utilizes an innovative patented lab-on-chip, engages modeling and analysis of mass-spectrometry data, and targets the early pancreatic cancer diagnosis (15,16).

As small countries could not be excluded from grid based initiatives, in 2005 Croatia started with development of grid within the Croatian National Grid Infrastructure (CRO NGI) project. CRO NGI is an integral distributed computing environment consisting primarily of computing and data resources, which are located in geographically distributed sites within the Republic of Croatia. CRO NGI is a common resource of the research and academic community and represents the fundamental infrastructure for scientific research, use of new technologies and integration of Croatia and Croatian scientists into the European Research (ERA) and European Higher Education (EHEA) Area (17). One of CRO NGI’s projects is Health-e-Child, the Enabling Grids for E-Sciences (EGEE) project, which uses grid ‘supercomputing’ technology to connect and inform paediatricians (18). The other project dealing with medicine and health is IVAB, Interactive Visual Analysis of Bio-signals (19).

3. PROJECT PARTNERS AND EXPECTED RESULTS

ACTION Grid Project coordinator comes from Spain (Universidad Politecnica de Madrid). Other partners are Instituto de Salud Carlos III (Spain), Foundation for Research and Technology – Hellas (Greece), Hospital Italiano de Buenos Aires (Argentina), University of Talca (Chile), HealthGrid (France), and University of Zagreb, Medical School (Croatia). Representatives of partner institutions constitute the Consortium of the Project.

The project plan consists of several deliverables:

- Analysis and Results of the Survey of Grid Initiatives,
- First Report on Training and Mobility: needs, mechanisms, policy,
- Final Report on Training and Mobility,
- Final White Paper,
- ACTION-Grid Website and
- Final Report on Dissemination Activities.

To obtain an insight into research in the nano-bio-med areas in the EU, Latin America, Western Balkan region and North Africa, a survey will be designed and carried out. It will focus on specific achievements and needs as well as possibilities for exchange of Grid infrastructure, methods and tools.

Further important results of the project are to come from continuous development and testing of Resourcesome – the tool for finding on-line resources of information on the nano-bio-med levels.

Intensive cooperation of project partners should be established. Several meetings have been and will be organized, e-communication, website with repository of dissemination papers, brochures, scientific documents, conferences and workshops. Relevant professionals and panellists will be invited to the Plenary Consortium Meetings. Finally, the project will produce a White Paper to inform the European Commission and suggest future developments in this area.

4. PUBLICATIONS
Catering to the need to share information of the project within the EU, Latin America, Western Balkan countries and North Africa, a number of publications and press releases have been launched in English, Spanish and other languages, including the Croatian language (http://www.action-grid.eu/index.php?url=pressroom).

Scientific publications presented at the conference describe the first results of the project dealing with Building an Index of Nanomedical Resources and Primer in Knowledge Management for Nanoinformatics in Medicine and published in the Conference Proceedings (20,21).

5. CONCLUSION
ACTION Grid is an international cooperation project on healthcare information systems based on grid capabilities, bioinformatics, medical informatics and nanoinformatics. The project brings together six countries, four regions and three continents and includes different languages and cultures and various scientific and industrial levels of development. However, this diversity does not seem to hamper the partners’ willingness to cooperate and share their knowledge, methods and tools in order to improve information systems relevant for medicine and healthcare.

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The Advantages and Limitations of International Classification of Diseases, Injuries and Causes of Death from Aspect of Existing Health Care System of Bosnia and Herzegovina

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Professional paper

SUMMARY
Introduction: The International classification of diseases (ICD) is the most important classification in medicine. It is used by all medical professionals. Concept: The basic concept of ICD is founded on the standardization of the nomenclature for the names of diseases and their basic systematization in the hierarchically structured category. Advantages and disadvantages: The health care provider institutions such as hospitals are subjects that should facilitate implementation of medical applications that follows the patient medical condition and facts connected with him. The definitive diagnosis that can be coded using ICD can be achieved after several visits of patient and rarely during the first visit. Conclusion: The ICD classification is one of the oldest and most important classifications in medicine. In the scope of ICD are all fields of medicine. It is used in statistical purpose and as a coding system in medical databases.

Key words: ICD 10, advantages, disadvantages, limitations.

1. INTRODUCTION
The International classification of diseases (ICD) is currently in use in Bosnia and Herzegovina. There are lot advantages that this classification offer but it is not always possible to find appropriate code for some disease especially when patient comes first time to the ambulance when few or insufficient data cannot provide adequate diagnosis. The most physicians in Primary Health Care use this classification (1,2,3,4). This code is obligatory in case when patient needs medical prescriptions and is contained on this form and is included in database of pharmacies (1).

2. HISTORICAL BACKGROUND
The first medical classification made John Graunt in 1700, and it contained 13 kinds of the diseases of the young population (2). He made the review of the death cause of children less than six years age in England.

The systematic classification of diseases dates back to the nineteenth century. Groundwork was done by early medical statisticians William Farr (1807-1883) and Jacques Bertillon (1851-1922).

The French doctor Francois Boissier de Sauvages from Monpell (1706-1767) wrote the work “Nosologia Methodica” in which he divides “diseases” into 10 groups, 295 species and 2,400 kinds (3). William Farr (November 30, 1807–April 14, 1883) was a nineteenth century British epidemiologist, regarded as one of the founders of medical statistics. Both nomenclature and statistical classification received constant study and consideration by Farr in his annual “Letters” to the Registrar General published in the Annual Reports of the Registrar General. The utility of a uniform classification of causes of death was so strongly recognized at the first International Statistical Congress, held in Brussels in 1853, that the Congress requested William Farr and Marc d’Espine, of Geneva, to prepare an internationally applicable, uniform classification of causes of death.

At the next Congress, in Paris in 1855, Farr and d’Espine submitted two separate lists which were based on very different principles. Farr’s classification was arranged under five groups: epidemic diseases, constitutional (general) diseases, local diseases arranged according to anatomical site, developmental diseases, and diseases that are the direct result of violence. The purpose of the classification in the medicine is recognized in their historical development. The International classification of the diseases was often modified in order to satisfy the needs of the clinicians (1).

The following great name in the field of the medical statistics is Jacques Bertillon (1851-1922). The Bertillon Classification of Causes of Death, as it was first called, received general approval and was adopted by several countries in Europe and North America. At the meeting of the International Statistical Institute at Christiania in 1899, Bertillon presented a
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report on the progress of the classification, including the recommendations of the American Public Health Association for decennial revisions (2,4).

The first version of ICD was adopted in 1893 as a classification of death causes by International statistic institute in Chicago (author Jacques Bertillon). The Assembly of American society for public health care in 1898 recommended the revisions of the classification every ten years (1). WHO took over the responsibility for the ICD at its creation in 1948 when the Sixth Revision, which included causes of morbidity, was published for the first time. The World Health Assembly adopted in 1967 the WHO Nomenclature Regulations that stipulate use of ICD in its most current revision for mortality and morbidity statistics by all Member States. ICD-10 was endorsed by the Forty-third World Health Assembly in May 1990.

3. THE BASIC CONCEPT OF ICD

The basic concept of ICD is founded on the standardization of the nomenclature for the names of diseases and their basic systematization in the hierarchically structured category. One of the bad characteristics of ICD is that it does not give any possibility of the recognition of the extreme outcome of the course of treatment, neither differentiates the causes of the patient condition on the admission (as are the age of a patient, kinds of therapy, superposed diseases, mix cases and similar). The ICD is the international standard diagnostic classification for all general epidemiological, many health management purposes and clinical use (2,3).

The ICD is the international standard diagnostic classification for all general epidemiological, many health management purposes and clinical use. These include the analysis of the general health situation of population groups and monitoring of the incidence and prevalence of diseases and other health problems in relation to other variables such as the characteristics and circumstances of the individuals affected, reimbursement, resource allocation, quality and guidelines.

The tenth revision of the ICD came into use in WHO Member States as from 1994. The tenth revision of ICD is contained in three books (21):

- The tabular list with the classification on three- and four character level, by the classification of morphology of the neoplasm, with special tabular list of the morbidity and definitions and regulation of nomenclature
- Instruction for use and
- Alphabetic index.

The most obvious innovation in the classification is that the structure of the codes has changed from numeric to alphanumeric. This allows for considerable expansion of the number of categories and sub-categories in ICD-10 and future revisions. There are approximately 12,700 codes in ICD-10, of which about 8,000 are valid as an underlying cause of death, a considerable increase from approximately 5,000 valid codes for underlying cause of death in ICD-9. The new chapters are created for the diseases of eye and diseases of ear and mastoid processes. The earlier additional classifications of the external causes and factors, which influenced on the health care condition and contact with health care service (E and V list, former additional classification of the Tenth revision), is now a part of the main classification. Enhancements in the code structure create the possibility for analysis of more subtle distinctions in outcomes.

Other changes include the re-naming and re-ordering of chapter titles in ICD-10 compared with ICD-9, and the labeling of blocks of categories. In the Tenth Revision, the use of codes with the first character “U” is reserved for the provisional assignment of new diseases of uncertain etiology, and for research purposes, such as studying the effect of alternative classifications on mortality or morbidity statistics. As an example of the former, in early 2003 a provisional category, U04, was created for the newly-identified severe acute respiratory syndrome (SARS).

4. THE HEALTH CARE SYSTEM OF B&H

In Bosnia and Herzegovina is in process health system reform and expert team has been working on reduction of “paper” documentations and computerization through family medicine program conducted by the Federal Ministry of Health. Also, in Bosnia and Herzegovina there are implementing several pilot project independently developed and mostly supported by International organizations and foreign Universities. Those projects are based on foreign health systems and as such not adjusted to Bosnia and Herzegovina’s needs and requirements. The similar programs are also initiated in Republic of Srpska. In Bosnia and Herzegovina, unfortunately, the health care system is divided according to territorial organization and there are basically no data exchanges among territorial units. The situation is slightly better inside these units but there are no clues that unique health informatics system will be created in next few years.

5. ADVANTAGES OF ICD CLASSIFICATION

This classification is integral part of the most information systems in our country. Basically, there are two ways of keeping medical records.

The old fashioned way to keep all data about the patient is use of paper medical records that are placed in family medicine office. The physician enters the information on paper and after that this paper family record is placed in archive and is not available for patient at any remote location. In basic set of data that are required for record ICD code and diagnosis are obligatory.

Another more modern way of keeping patient record is computer database. Now, it is possible to search patient record more rapidly but patient can...
only access this data while he is in physician’s office. Medical Records is an easy and comprehensive medical record keeping software for maintaining your family’s medical history. This way of medical record can even better utilize ICD classification because there is more relevant information that are necessary to code specific disorders.

The health care provider institutions such as hospitals are subjects that should facilitate implementation of medical applications that follows the patient medical condition and facts connected with him. The list of procedures with their prices can be found in all hospitals and is used by economist but are of little help for medical workers. Database should provide the whole picture of current situation. It is very important that we have tools for analysis of clinical data. Analysis of data is only way to improve the prevention of future errors and induce reduction of costs of hospitalization. Using the database it is possible to reveal all advantages and disadvantages of some method.

6. DISADVANTAGES OF ICD CLASSIFICATION

This classification is not suitable in cases where few or no information about patient is available. In such case only symptoms of disease can be coded that can be caused by several different medical condition that can be regularly coded if we have enough information to confirm diagnosis.

The Classification committee of WONCA (World Organization and Academic Association of the general Practitioners) has produced a clinical coding system known as ICPC (International Classification for Primary Care) (1). The release of an updated version ICPC 2 is now published. ICPC-2 classifies patient data and clinical activity in the domains of General/Family Practice and primary care, taking into account the frequency distribution of problems seen in these domains. It allows classification of the patient’s reason for encounter (RFE), the problems/diagnosis managed, interventions, and the ordering of these data in an episode of care structure.

Above mentioned tasks cannot be achieved using ICD 10 classification. The definitive diagnosis that can be coded using ICD can be achieved after several visits of patient and rarely during the first visit.

7. CONCLUSION

The nomenclature and classifications are essential part of scientific methodology in the health care. The existing state of the nomenclature in the healthcare activity enables the optimal application of the computer technology in the processing and the retrieval of the medical data or information.

The problems of the nomenclature of the health care services, the classifications, the identification and coder for the needs of the development and functioning of the informational systems in the health care are the weakest link in our conditions.

The ICD classification is one of the oldest and most important classifications in medicine. In the scope of ICD are all fields of medicine. It is used in statistical purpose and as a coding system in medical databases. This classification is used by most of physicians.

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Clinical Parameters of Dexa Test in Confirming Osteoporosis Within Population Risk Groups

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PROFESSIONAL PAPER

SUMMARY
Osteoporosis represents loss of bone mineral density (BMD) for more than 2.5 standard deviation of T score in relation with BMD in young people at age of 35 years (WHO definition). Almost every fourth women older than 60 years have osteoporosis mostly in asymptomatic form, and that is why this is called «silent calcium thief». There is a poor motivation in older population for preventive diagnosis and treatment and what is very efficient in the early stage of this disease. Aim of this project is to evaluate clinical parameters of densitometry test (DEXA test two energy X rays absorption) in osteoporosis diagnosis among risk groups of patients in the family medicine office and usability of questionnaire «Osteoporosis risk assessment test». Different groups of patients are determined according to the questionnaire by questionnaire „Osteoporosis assessment test“ and the results of the densitometry – DEXA test (T score value). According to the questionnaire „Osteoporosis risk assessment” patients are divided into three risk groups: I low risk group, II moderate risk group and III high risk group. T score represents the value of variation for measured BDM value from the bone mass density in standard units. According to the T score status of bone mass is divided into: Increased bone mass T > than + 1, Normal bone mass T ranging from – 1 to + 1, Osteopenia T from -1.0 to – 2.5 and osteoporosis T lower than -2.5 and more below normal. Severe osteoporosis – T value – 2.5 and more below normal with bone fracture. Due to more accurate calculation of clinical parameters patients with the risk factor 0-4 points are labeled as A or group of „healthy“ patients, and the patients with 5-6 points and 6-9 points as group B or clinically „sick“. Test of osteoporosis risk contains following data: age, gender, menopause, fractures, TT corticosteroid therapy, chronic diseases. Sample is consisted of 16 patients. Based on analyzed data we will calculate clinical features of the densitometry test and present data analysis within I, II and III group and evaluate value of the DEXA test in work of family doctor.

Key words: osteoporosis, risk groups, preventive diagnostic, clinical parameters, Family doctor

1. INTRODUCTION
Osteoporosis is systemic bone disease that is featured with low bone mass micro architecture of the bone tissue (bone ceilings), which leads to increased susceptibility to fracture, especially of the hook (femoral bone neck, vertebra and fore arm) (1). In the world every 20 seconds a woman have a femoral bone neck fractures, while 20% die during the first year after the break because of numerous complications (tromboembol, heart infarction) (1). Densitometry of the bone-system is inevitable in the diagnosis of osteoporosis while measuring bone density it estimated the risk of fractures (gold standard in diagnosis of osteoporosis). Osteoporosis is divided into generalized and localized according to localization and primary and secondary according etiology. Among people older than 75 years, there is a senile osteoporosis (2).

Patient with primary osteoporosis mainly does not have any symptoms, but they can have pain in the bones and muscles especially of the back. One of the main problems related to osteoporosis is the fracture risk. In the profession of family doctor because of this, is very important to evaluate the osteoporosis problem among geriatric patients which are more present and in order to achieve early detection and treatment. WHI study from 2002 compared data on frequency of fractures among women on treatment and those receiving placebo. It was clearly shown that the number of hip, vertebra and combined fractures decreased. It is important to start the treatment before structural deterioration of the bone begins (3). Early diagnosis of osteoporosis can have significant influence of risk factor for osteoporosis (nutrition, abuse, TT; lack of estrogen, sight, falls, and physical activity) (2). It is important to keep in mind this bone disease within family doctor practice in case of risk groups (post menopause women, elderly patients, tobacco smokers, long term use of corticosteroids > 7.5mg a day, diazepam, diuretics, lithium and other medications). It is important to have diagnostic evaluation before treatment onset. In our country most present and most reliable diagnostic method is densitometry, so DEXA in our case also represents a gold standard in diagnosis of this disease. With this article I wish to present the value of densitometry as method for diagnosing osteoporosis among risk groups and usefulness of the form „Osteoporosis assessment risk“.

2. MATERIAL AND METHODOLOGY
Chosen population is at age from 25 years as the youngest one, up to 74 years as the oldest. Average patient's age was 54.3 years. Total of 16 patients is evaluated. Patients were randomly selected. Chosen patients had the symptoms which suspect osteoporosis) pain in lower part of the back, pain in bones and muscles, kyphosis of the thoracic spine, fractures at age over 45 years and other), and the patients with diseases causing secondary osteoporosis (diseases of the parathyroid gland, intestinal disease, kidney diseases), or have the predisposing habits for this disease L (smoking, physical inactivity, fat rich nutrition, mineral and vitamins deficit in nutrition). Special focus was on the patient's n the post menstrual...
period. After selection of patients data was collected according to questionnaire „Osteoporosis risk assessment“. This research project is conducted at the family medicine practice at the Department for family medicine of the Primary health care center Mostar in period from 01 September 2004 until 01 March 2005. Following data were collected: patient’s age, gender, menopause period, use of hormone substitution treatment, fractures after age of 45 years, TT, corticosteroid treatment, chronic disease. Based on these data a scoring is performed for each question, and based on this points patients were divided into three risk groups.

I 0-4 points – low osteoporosis risk
II 5-6 moderate osteoporosis risk
III> 6 high osteoporosis risk

Due to more accurate calculations of the clinical parameters patients were divided into the group A – those who have low osteoporosis risk or group of „healthy“, and group B – those who have moderate or high osteoporosis risk or group of „sick“. Clinical parameters are the following: sensitivity, specificity, positive predictive value, negative predictive value, false positive results, false negative results, true positive results, and true negative results. Value of these results is calculated according to the adequate formulas listed later in the article. This project also anticipated the laboratory tests for the patients, but due to inaccessibility of the laboratory these testing are not done. After the analysis the data are processed with the Epi-info epidemiology software. The results are present also in form of tables.

3. RESULTS

By data analysis we determined that in total there were 16 patients tested, out of which there was 0 males or 0% and 16 female or 100%. According to age patients were divided into three groups:

- I group age up to 35 years 3 or 3 or 18.75%
- II group age 35-70 years 8 patients or 50%
- III group age over 70 years 5 or 31.25%

Results of DEXA test indicated that in total there was 6 or 37.5% positive results (osteoporosis), and negative (osteopenia or normal finding) 10 or 62.5%.

Calculated clinical parameters are as follows:

- False positive results were present in 2 or 12.5%
- False negative results were present in 1 or 6.25%
- True positive results were present in 4 or 25%
- True negative results were present in 9 or 56.25%

Diagnostic sensitivity of the test is calculated according to formula PPV=Tp/Tp+Fp

Positive predictive value (PPV) is calculated according to formula

PPV=TP/TP+FP

Positive predictive value (PPV) is calculated according to formula

PPV=TP/TP+FP

Negative predictive value (NPV) is calculated according to formula

NPV=Tn/Tn+Fn

Now we will present above listed results in form of tables.

<p>| Table 1. Gender distribution of patients |</p>
<table>
<thead>
<tr>
<th>Patient gender</th>
<th>No. of patients</th>
<th>Percent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0</td>
<td>0.0 %</td>
<td>16 patients</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>100%</td>
<td>16</td>
</tr>
</tbody>
</table>

<p>| Table 2. Age distribution of patients |</p>
<table>
<thead>
<tr>
<th>Age</th>
<th>No. of patients</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 35 years</td>
<td>3</td>
<td>18.75%</td>
</tr>
<tr>
<td>35-70 years</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>&gt; 70 years</td>
<td>5</td>
<td>31.25%</td>
</tr>
</tbody>
</table>

<p>| Table 3. Number of patient processed in the project according to the osteoporosis risk groups |</p>
<table>
<thead>
<tr>
<th>Patient groups</th>
<th>No. of patients</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk, 0-4 points „healthy“</td>
<td>11</td>
<td>68.75%</td>
</tr>
<tr>
<td>Increased osteoporosis risk 5-6 points „sick“</td>
<td>3</td>
<td>18.75%</td>
</tr>
<tr>
<td>High osteoporosis risk &gt; 6 points „sick“</td>
<td>2</td>
<td>12.5%</td>
</tr>
</tbody>
</table>

<p>| Table 4. Calculated project parameters |</p>
<table>
<thead>
<tr>
<th>Test parameters</th>
<th>No. of patients</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>True positive Tp</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>False positive Fp</td>
<td>2</td>
<td>12.5%</td>
</tr>
<tr>
<td>False negative Fn</td>
<td>1</td>
<td>6.25%</td>
</tr>
<tr>
<td>True negative Tn</td>
<td>9</td>
<td>56.25%</td>
</tr>
<tr>
<td>Sensitivity Se</td>
<td></td>
<td>80%</td>
</tr>
<tr>
<td>Specificity Sp</td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>66.66%</td>
<td></td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>90%</td>
<td></td>
</tr>
</tbody>
</table>

4. DISCUSSION

Review of the literature listed in the references and wider, and with review of the all available literature dealing with similar problems, we have the following data: within WHI study from 2002 compared are the data on fracture frequency among treated women and those receiving placebo. It is clearly shown that the number of hip, spine and combined fractures decreased. It is important to start the treatment before the onset of the structural bone decline. (3) Machines for measuring bone density (popular bone densitometry with X rays) transmit very low radiation compared to the environmental sources and does not represent a danger to patient. As a routine test it focused on imaging of the lumbar spine, radius neck, and whole body (1,3).

5. CONCLUSIONS

Importance of this research is that it shows the high sensitivity 80%, specificity 90% and speaks in favor of practicality of this test, quite acceptable
cost, and harmlessness to patient’s health and proven high accuracy of measurements. Large advantage of this diagnostic test compared to the RTG of the bones (applicable in case of patients with bone density decreased for 30% or more) and other test such as quantitative CT, transcranial biopsy of the bone. Parameters of this test are calculated on a basis of precise data obtained with the BMD-DEXA test and the data questionnaire „Osteoporosis risk assessment“. This questionnaire showed its importance and practicality in work of family doctor because it gives an adequate selection of the patients which needs BDM testing or constant control and osteoporosis treatment. Limitations of this study is in fact that during the six months period it is not possible to process larger number of patients and achieve higher test validity, because the patients are not sufficiently informed about this problem because 30% of them refuse testing after filling out the questionnaire. For the patients with lower economic status the test is expensive. General evaluation of the test is good, as well as importance which indicated large usability of these test in everyday work of family doctor within family medicine practice.

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Quality of Medical Record Management for Patients with Diabetes Mellitus: Do the general practitioners need continuous education?

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Recommendation of the Committee of Ministers of the Council of Europe impose to member states to build a patient safety system which is based on creating a culture of safety, patients security assessment in health institutions by use of indicators, better use of data and sources of information on the safety of the patient (2). Error of health professionals may be triple: not following established scientific knowledge and rules of professional techniques (Vitium Artis); Violations of the principles of humanity which are specific for medical profession, simple recklessness and negligence; guilty of health workers must contain not following some duty that he had to know and do (3).

Currently in Bosnia and Herzegovina there is a reform of the health system, including the reorganization of primary health care according to the Organization of family medicine in accordance with European accreditation standards (4), which was made for us by the Agency for quality and accreditation of health in Federation of Bosnia and Herzegovina. In order to be successful, team of general medicine needs to adopt new knowledge and skills in the field of family medicine to be closer to accreditation standards. Medical students as future general practitioners during their academic education receive enough information about managing patient with diabetes mellitus as well as the maintenance of its record (5,6). “Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia caused by insufficient insulin secretion, its adequate effect or both. Chronic hyperglycemia is joined with long-term harm, dysfunction or insufficiency of various organs–especially the eye, kidney, nerves, heart and blood vessels.”(7). Annual screening for the prevention of complications of diabetes include: control of blood pressure at each visit; inspections of feet during each visit; fundus ophthalmologist annually, lipid profile annually; kidney function annually; microalbuminuria each year; vibrations, a gentle touch, RAT annually, full review of feet once a year (8).

1. INTRODUCTION
It is a sad fact that young doctors and nurses, pushed upside down into practice, do not have basic knowledge of quality assurance and safety of medical services, nor have basic information about what are the medical and non-medical risks in health, such as medical errors and how to prevent them. On the contrary, they come out of the classrooms with two-rooted myths about the perfection and the one about the punishment, which is broadly supported and placed by media. Myth about perfection claims: if the people put enough effort, the error cannot happen, while the media adds: health professionals must be immaculate, because this is primarily case about human lives (1).

2. GOAL
To improve control of diabetes mellitus and improve quality of life for people
Quality of Medical Record Management for Patients with Diabetes Mellitus:

with diabetes by more quality management of the medical record in the general medicine practice.

3. METHODS

Audit is the manner for formal evaluation of the health care by setting standards, assessing the activities and implementing changes (9).

The additional education from family medicine for Bosnia and Herzegovina sets standards for management of medical records for patients with diabetes, which fully corresponds to the Agency accreditation standards for quality and accreditation of health in FB&H. In its task of making revision-audit of medical records for patients with diabetes is used a standardized questionnaire from Queens University Canada, which is used in additional education in family medicine.

Observed variables are: blood pressure, feet examination, and urine analysis, review of the fundus, blood cholesterol levels and body mass index (BMI). Used equipment is the standard one for the teams of general and family medicine. Data are analyzed and compared with Agency standards for quality and Accreditation of FB&H and shown in form of charts and tables.

4. RESULTS

Twenty general practitioners from the three federal cantons and 10 primary health care centers performed analysis or audit analysis of the success of their work by reviewing 20 medical records of people suffering from diabetes mellitus. Reviewed are 290 or 52.5% medical records of female patients and 110 or 47.5% medical records of male patients. Persons younger than 40 years were 44 or 11% in our sample; persons at age of 40-59 years were 138 or 34.5%, and persons at age older than 60 years 225 or 56.25%. The blood sugar level inscribed on the record was present in 383, or 95.7%, out of which blood sugar levels for the past year has 305 or 79.63% of patients.

The number of medical records with inscribed cholesterol level was 325 out of which 272 or 83.6% was done in the past year. Minimal standard of 25% were fulfilled by all teams. Blood pressure present at all in the medical record had 377 out of which 326 was done last year or 86.47% (Chart 1).

One team reached the minimum standard and 19 maximum (minimum standard was 25%, and maximum 55%)

Body Mass Index (BMI) is calculated and noted on medical records in case of 156 or 39% of patients out of which during last year 120 or 76.92%. Results vary from 5 to 85%.

Only 5 teams reached the minimum standard which was 35%, while the maximum standard was 90% (Chart 2).

Number of medical records with noted HbA1C value measured during past year is 83 or 20.75%. Only 5 teams reached the minimum standard of 25% (maximum standard was 90%).

Number of records with noted findings of the feet examination during the past year was 160 or 40%. Minimum standard was 25% and the maximum 90%. In total 14 doctors reached the minimal standard (Chart 3).

Number of records with performed and noted eye examinations during the past year is 247 or
61.75%. Minimum standard was 25% and the maximum 90%. Out of baseline 4 reached maximum standard and 16 minimum (Chart 4).

On a question how many doctors did the urine protein analysis during the past year and noted that in the record we found affirmative answer in 271 records or 67.75% of all reviewed. Within baseline 11 doctors reached the minimum standard of 25%, and we did not find the maximum standard in neither one medical record, and one team does not have anything noted (Chart 5).

5. DISCUSSION

Obtained results from the 120 reviewed medical records of the female patients, and 190 records of the male patients, general practitioners who attended the Program of additional education in family medicine during the academic year 2007/2008 were not satisfactory. Majority of records had data on blood pressure while the number of those which had results of feet examination (40%) and HgbA1C (20.75%) was much lower than the requested standards.

Mean value of variation for the requested standards is around 30%. Similar results had colleagues from Greece (10) whose results indicated that the patients with the congestive heart failure use much more medications and with less cooperation than required by standards. Team of family medicine doctors from the Department for family medicine in Tuzla also found that the secondary prevention of the cardiovascular system diseases is very low with high prevalence of easy changeable risk factors. (11) Colleagues of Family medicine in Tuzla in one of their articles (12) also found on a sample of 800 medical records that the BMI is noted in 17-28% of records during 4 years of PAT program but that the doctors still write very little in case of all other components besides blood sugar levels and blood pressure, so that malpractice continues. In Denmark within new IT system there are only 10 general practitioners which have register of the chronic noncontiguous diseases (13).

Study which speaks in favor of family medicine doctors is done in Tuzla (14) which state that form the total of 32 reviewed records 80% of them have satisfactory data and managements which fulfills the standards.

6. CONCLUSION

General practitioners must have additional education in order to be ready to work in the family medicine practices, and whose work would satisfy the accreditation standards, which is provided by Federal Agency for quality and accreditation in health.

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Radiation Oncology and Computer Technology

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Clinic for Oncology of Clinical Centre University of Sarajevo

Professional paper
SUMMARY
Widespread implementation and continuing improvements in computer technology led to the development of modern radiotherapy, called Three Dimensional Conformal Radiotherapy. Using CT scan or MRI scan it’s now possible to define target volume in three dimensions using delineation on multiple slices from computer tomography or other imaging study. The information from these scans feeds directly into the radiotherapy planning system. The computer programme then designs multiple radiation beam directions to crossfire on the targets. Individual beams are shaped or intensity modulated to create dose distributions that conform to ‘conform’ more closely to the shape of the tumour and avoid healthy tissue as far as possible. Patient positioning, immobilization, and treatment delivery become also computer controlled and to great deal automated, so that setup errors and patients motions are minimized. That enables to maximize dose to tumors, minimize dose to surrounding tissues, and in so doing, improve the likelihood of malignant diseases control and outcome, and patient’s better quality of life.

Key words: computer technology, conformal radiotherapy, three dimensionally planning

1. INTRODUCTION
The advance of computer and information technology has played a vital role in furthering every branch of modern medicine. Yet nowhere has its impact been felt so broadly as in the field of radiation oncology.

In the earliest days of radiotherapy, in less than 4 years after the discovery of x-rays by Roentgen, radioactivity by Becquerel, and radium by the Curies, x rays and radium were used for cancer treatment. Golden age of radiation oncology was the second half of 20th century. There have been two ways in the development of radiotherapy. One is physical development, in which efforts have been made to improve the dose concentration on the tumour while avoiding normal tissue and the other is biological efforts to increase the radiation sensitivity of tumours. The success of radiation oncology has come about, in large part, as a result of the evaluation of computer and imaging technology, and flow of information in the fastest and most productive way (1).

2. THREE DIMENSIONAL CONFORMAL RADIOTHERAPY
For many years it has been known that delivering a high dose to the tumour is critical for tumour control and that probability of complications increases with radiation dose and volume of organ irradiated. The basic concept of radiotherapy was elucidated quite early: to treat the tumour to a high dose while minimizing the dose to normal tissues. Contemporarily approach in radiotherapy is three dimensionally planned and conformally optimized delivery of radiation to irregularly and individually shaped volumes (Three Dimensional Conformal Radiotherapy- 3DCRT), and changing intensity in different part of a single radiation field through sophisticated plan optimization techniques and dynamic delivery of radiation that results in modulated flounce of photon beam profiles computer control (Intensity Modulated Radiotherapy- IMRT). Conformal radiotherapy describes radiotherapy treatment that creates a high-dose volume that is shaped to closely “confirm” to the desired target volumes while minimizing the dose to critical normal tissues. It is possible with widespread use of computer technology (2).

A number of important technical and computer innovations have increased the sophistication of planning, treatment delivery, and treatment verification and quality. They make possible not only to identify cancer early, but to determine of optimal dose of radiation and volume to be treated, according to anatomic location, histological type, stage, potential regional nodal involvement, other tumour characteristics, and normal structure in the region. Consequently, all that enables escalation of prescribed dose ant improve tumour control, while better protection of normal tissues and organs (3,4).

Basic components of such radiotherapy process are: patient positioning and immobilisation, imaging, anatomical model of patients planning, pick beams and technique, dose calculation, plan evaluation, preparation to treatment, and treatment delivery (5).

Patient setup and localization is one of the most crucial aspects of patient treatment. Instead of the old manual model it is possible to perform relatively automated patient positioning, if the new digital imaging capabilities setup with much improved accuracy are integrated with the computer–control system of the treatment accelerator.

Imaging: Goal of advanced therapies is attainable only if the exact dimension and localisation of tumour can be ascertained before treatment, and as well as nearby critical structures. The development of x-ray computer tomography (CT) in the 1970th and its application to radiotherapy planning were absolutely crucial milestones in the development of conformal therapy techniques, as it made avail-
able 3D description of the anatomy of each patient, which could be basis for planning. Target volumes—the volumes that must receive high radiation dose—are defined in three dimensions using computer drawn on multiple slices from CT or other imaging study (6). Contouring normal structure must be done consistently as well (Figure 1). Additionally CT enabled inhomogenity-corrected dose calculation, because CT provided the necessary electron density of the patient. These abilities quickly led to widespread use of CT-based radiotherapy planning. Other imagining data, including magnetic resonance imaging (MRI) and positron emission tomography (PET) can be very useful, as target volumes and normal structures can be identified on these additional imaging data basis. Fusing results from deferent technology create hybrid imaging. But typically, a CT scan set is taken to be a geometric basis for the treatment planning, because the CT data are high resolution, geometrically accurate, and quickly obtained (7,8).

Planning: After the anatomic model of the patient has been established, the next major step is to create a set of beams for radiotherapy treatment by use the computer planning system. This collection of beams, usually known as plan, include picking the energy and number of beams, the basic orientation of beams, and a type of beam shaping or intensity modulation, use of wedges in the field, create isocenter. Planning systems incorporate a 3D graphics reconstruction of the patient anatomy projected into divergent geometry used by the x-rays producing “beam s eye view” (BEV), and creation of digital reconstructed radiographs (DRR) used to set up and verify patient position (Figure 2).

Once the initial treatment plan is designed, the next step is to perfume a dose calculation, so the dose distribution expected from the plan can be evaluate. Treatment planning dose calculations have been performed on one or more two-dimensional slices (or contours) of the patients since the 1940s. Often, these calculations were performed by the hand, from table or chart look-ups, using single traced contours of the external shape of the patient on a single axial slice at the centre of the treatment fields. These distributions were in principle two dimensional and did not give a complete distribution of the dose to be delivered to the patient. Continuing increases in computer capabilities and improved treatment planning and dose calculation algorithm developments resulted in availability of so-called 3D dose calculations in the late 1980s. Many different types of calculation algorithms have been developed and new improvements are continually becom-
ing available (9). Unlike this so called forward planning, inverse 3-D planning starts with ideal dose distribution, finds the beam characteristics through trial and error or multiple interactions and than produces the best approximation of the ideal dose distribution (10).

After the dose distribution from the plan has been calculated, the next step is to evaluate the plan, and choose between plans. Predicted physical dose distribution is the main parameter to evaluate the quality of various plans proposed by the planner. Dose distribution is evaluated by looking at isodose curves on individual cuts through the plan, dose volume histograms –DVH and digital reconstructed radiographs – DRR (Figure 3).

Treatment machine- linear accelerator itself benefits of modern digital technology that allows expansion to accommodate new and future radiation oncology modalities and techniques. Multileaf collimator needed for fabrication of fully divergent beam blocks, electronic portal imaging device enabling real-time verification of sites being treated, automatic documentation, interface showing graphic parameters of treatment on screen, range of photon and electron energies, virtual wedge, all are integrated with information system.

The treatment delivery process used for modern conformal therapy has also changed from manual positioning the accelerator for each treatment field using the hand pendant controls. Each field was started on the treatment machine console in the control room. Most parameters used for patient treatment were set by hand and susceptible to various random errors. Since 1990s computer-controlled treatment is in use in which the treatment machine is tied to the treatment plan or information system database that contains all the treatment plan information (11). Automated and sequential treatment delivery enables full auto setup, verify, record and field sequencing. Operator performs the first field motion enable with a single keystroke all other fields require no operator interaction (12).

As computer systems have increased the sophistication of planning, treatment delivery, and treatment verification and quality assurance, are too much technical information to allow sole use of a paper treatment chart. There is need for more sophisticated treatment documentation has also grown and imposed the use of patients electronic treatment chart. Electronic oncology patient’s chart integrates, consolidates and manages information critical to the therapy process, at the database and application level (13).

2. CONCLUSION

All the innovation in the world is of value only when it provides better tools, results and progress in lives of people. In medicine that means more positive outcomes for patients and higher throughput for clinic. The advance of computer and information technology has played a vital role in furthering every branch of modern medicine. Yet nowhere has its impact been felt so broadly as in the field of radiation oncology. Computer technology have increased the sophistication of planning, treatment delivery, treatment verification and quality and enables a complex process 3D CRT, that begins with the creation of individualized, three dimensionally digital data sets of tumours and normal adjacent anatomy used to generate 3D computer images and to develop complex plans to deliver highly focused radiation while sparing normal adjacent tissue. Because higher doses of radiation can be delivered to cancer cells while significantly reducing the amount of radiation received by surrounding healthy tissues, the technique should increase the rate of tumour control, while decreasing side effects.

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Specific Implementation of Electronic Medical Record in Pediatrics Practice

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Review
SUMMARY
The Electronic Medical Record (EMR) is the future of pediatric patient record documentation. Limitations in software, hardware and networking technologies have made EMR difficult to affordably implement in small, budget-conscious, multiple location healthcare organizations. EMR, while an important factor in interoperability, are not a critical first step to sharing data between practicing pediatricians, pharmacies and hospitals. Many pediatricians currently have computerized practice management systems that can be used in conjunction with health information exchange (HIE), allowing for first steps in sharing shared patient information (lab results, public health reporting) which are necessary for timely, child-centered and portable care. Information in an EMR includes documents relating to the past, present and/or future physical and mental health and condition of a patient, medical test reports or multimedia images, and financial and demographic information. A major concern is adequate confidentiality of the individual records being managed electronically. There are two primary categories of the EMR: the “born digital” record and the scanned/imaged record. Paper Charts of Kid Patient Medical Records are the norm worldwide for recording child patient information. Barriers to adopting an EMR system include training, costs and complexity, as well as the lack of a national standard for interoperability among competing software options. Computerised information systems have not achieved the same degree of penetration in healthcare as that seen in other sectors such as finance, transport and the manufacturing and retail industries. Implementation of electronic medical record systems promises significant advances in pediatric patient care, because such systems enhance readability, availability, and data quality.
Key words: EMR, Children, Pediatrics, Implementation.

1. INTRODUCTION
Electronic Medical Record (EMR) systems lie at the center of any computerised health information system (1,2,3,4). Adoption of electronic medical records by pediatricians is increasing slowly (5,6). EMR is a patients’ medical record in an electronic format, accessible by computers on a network for the primary purpose of providing health care and health-related services (7). There are two primary categories of the EMR: the “born digital” record and the scanned/imaged record. The “born digital” record, which is information captured in a native electronic format originally is information that may be entered into a database, transcribed from an electronic tablet or notebook PC, or in some other manner captured from its inception electronically (8). The information is then transferred to a server or other host environment, where it is stored electronically (9,10). The second category are records originally produced in a paper or other hardcopy form (X-ray film, photographs, etc.) that have been scanned or imaged and converted to a digital form. These records are best described as “digital format records”, as their content is not able to be modified or altered (with the exception of the use of a third party software to make “overlay notations”) as electronic records are. The EMR can be accessed conveniently by appropriate health professionals-pediatricians to ensure ultimate maximum and optimal patient care (11). The purpose of EMR systems is to compile and centralize all pertinent information related to a child’s medical and non-medical care so as to ensure that optimal pediatric care is provided. Privacy issues are very unique in the pediatric population. The EMR should be able respond to the different privacy needs regarding the variability of adolescent medicine from state to state, restriction and protection of sexual and mental health information, and behavior issues. In addition the system should be able to record the different guardianships in cases of foster care, adoption, and emergency treatment.

2. PEDIATRIC SPECIFIC EMR
Quality Pediatric Medical Record vendors have begun to recognize the special needs of the pediatric practice (12). The best EMR companies have recognized that pediatrician’s needs are different. Some pediatric specific features consist Immunization/Health Maintenance Reminders and Tracking, Electronic Growth Charts, Client/Server or ASP based, Point-n-Click SOAP Note Templates, E&M Coding Assistance for Pediatrics, PDR-Based Prescription Writing, Lab Interface (Quest, LabCorp, Unilab, etc.), Decision Support (ADE, Coding), Document/Image Management, Drug Database with Drug Interaction Checking, Health Maintenance Reminders, Online Patient Portal, Pediatric Specific Education, MidMark ECG/EKG device interface, CHDP Forms (California), Welch Allyn Vitals Device Interface, Pediatric Dosage Calculator and many more Pediatric EMR features... From birth special attention is given to the growth of a child (13). All the top ranked EMR systems from EMR. Experts are able to record the child’s growth, chart and calculate growth patterns, and compare each child’s growth and body mass index. All this is done using the normal range of data based on ethnicity and sometimes geography. This is vital to a pediatric practice.

2.1. Objectives for Implementing EMRs
- Improve Quality Care
Avoid Adverse Drug Events
• Improve Quality Measures
• Enhance Resident Safety
• Improve Operational Efficiencies and Re-allocate Staff
• Increase Reimbursements

Implementation of electronic medical record systems promises significant advances in patient kids care, because such systems enhance readability, availability, and data quality (14,15). Implementing Pediatric EMR Software in practice has facilitates risk management, improves profits, improves work processes and patient-kid-centered office (16).

2.2. Component of EMR
• Capture kids patient data,
• EMR software integrates with other data sources,
• EMR assists in provider decision making,
• Document/Image Management,
• Patient Portal,
• Statistics and Reporting,
• E-prescription,
• Billing

2.3. Document/Image Management
This function provides offices with a way to manage the flow of paper coming into their office, kids patient intake forms, referring physician letters, faxes, lab reports, etc. and provides pediatricians with a way to manage images such as x-rays, MRI's, ultrasound and, in some programs, audio/video clips. CT Scan and X-ray results can be processed, reviewed and entered directly into the child-patient file. The results may be sent to other specialists by the Internet network for consultation (17).

2.4. Statistics and Reporting
This function allows providers to create reports from their database for statistical purposes. This feature becomes especially helpful in the event of drug recalls, health maintenance reminders and disease management. The description of pediatric terms is extremely difficult in EMR systems. The system designers needs to expand standard terminology to include concepts that adequately represent these terms by describing historical findings, psychosocial risk factors, family structural details, social history, physical examination findings, developmental problems, behavioral issue, congenital syndromes and diagnoses particular to pediatrics (18,19,20).

2.5. Data
The quality of data stored is also a problem of paper records (21). Data is a man-made artifact. Each individual has a method for recording relevant patient data within a framework (22). Marked discrepancies may occur between information reported during patient interview and that which is contained in the record. Not all patient facts reported may fit neatly into a structured record. Such “misinformation” may be contained in the EMR due to misunderstanding of definitions and terms used.

2.6. Standardization
Is a definite requirement for widespread use of electronic records. This would include Lab. results units and precise medical terms. On-line dictionaries would help. Standardization of support software to link one system to another would also be necessary (23,24,25,26).

2.7. Structure of pediatric EMR
Information in an EMR includes documents relating to the past, present and/or future physical and mental health and condition of a patient, medical test reports or multimedia images, and financial and demographic information (Picture 1). In addition, ordering of medical tests, treatments, medications, and clinical guidelines used for the kids patient’s care, are accessible within the EMR during the encounter (27). EMR data can be captured or transmitted, received or updated, stored or retrieved, securely and in real-time by users at the point of care or distant locations (28).

2.8. Pediatrics implementatation
Immunization has always been a critical activity in the care of children. For this reason, it has been important to the pediatrician that the EMR system provides the ability to record and display data that helps them to comply with the federal authorities. This data consists of the manufacturer’s name, lot numbers, expiration dates, and site of vaccine administration, route, and date. It also contains consent for administration or documentation of vaccine refusal (29) Another activity that requires special consideration is the prescription of medication based on age and weight or body surface area. Tools that allow physician to check current weight against the age, verify doses against accepted pediatric references, express the prescriptions in volume to be administered by caregivers and pharmacy specifications other than instructions for the parents are important functions to assist in selecting medication.

Figure 1. Flow Charts Aspects contributing to a typical EMR
and prevent errors. The ability of the EMR system to provide growth charts is a unique requirement for pediatricians. Clinicians make important decision regarding how their patients have been growing by plotting length or height, weight and head circumference against age. These graphic representations allow the pediatrician to analyze the growth velocity at specific age, by gender and against establish norm, enabling the physician to identify problems at the early stages (30). System designers should also take special consideration when establishing normal ranges for numeric (vital signs, body measurements, scores on standardized assessments, and laboratory results) data in view that these values change with child’s age.

3. CONCLUSIONS

The implementation of advanced information systems is enabling great social and organisational changes (Figure 2). Pediatricians who use electronic health records believe such systems improve the quality of care and are generally satisfied with the systems. Electronic medical record (EMR) systems, which are usually designed for adult care, must perform certain functions to be useful in pediatric care. This statement outlines these functions (eg, immunization tracking and pediatric dosing calculations) to assist vendors and standards organizations with software design for pediatric systems. The description of these functions should also provide pediatricians with a set of requirements or desirable features to use when evaluating EMR systems. Particular attention is paid to special aspects of pediatric clinical care and privacy issues unique to pediatrics. Many elements are functionally important in pediatrics, such as immunization management, growth tracking, medication dosing, and patient identification. The future of health care documentation is found in information technology through use of electronic medical records (EMR) (31,32,33,34,35).

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