Abstract
This study was carried out on 52 subject of Babylon dentistry student and children who were naturally infected with measles virus and laboratory confirmed as measles during 2009 by detection of specific anti-measles IgM. They were tested for IgG avidity to estimate their immune status and to distinguish between primary measles infection and reinfection due to secondary vaccine failure. The study reflected that all unvaccinated subjects (19.2%) showed a primary immune response whereas secondary immune responses were detected in (46.09%). Of 34 subjects sourly vaccinated (42.9%) of them reflected a primary immune response, whereas (57.1%) of them reflected secondary immune response, thereby indicating a secondary vaccine failure that was seen at very high proportion in subjects > 11 years old, so that revaccination of 11 years old children is recommended for reactivation of their immune status to restrict secondary reinfection.

Introduction
Measles is a highly communicable infections disease, it remains the leading cause of vaccine preventable childhood mortality in developing countries, and is still a major public health concern in the developed countries [14].

Measles virus (MV) is a member of the family paramyxoviridae, genus Morbillivirus. It is transmitting via the respiratory rout and has an incubation phase of 9 to 19 days [5].

Measles outbreaks are known to occur even in highly vaccinated population despite the availability of an effective live attenuated measles virus vaccine [19]. Mild or asymptomatic measles infection are probably very common among measles immune persons exposed to measles cases and may be the most common manifestation of measles.
during outbreaks in highly immune populations [9]. Measles control has a high priority in many countries, and it is important that questions surrounding possible vaccine failures eliminate measles may be evaluated and strengthened [20].

A study from the United States of 80 blood donors of whom 8 developed measles during an outbreak in a university college, reported that individual with low measles antibody titers ($\leq 120$ m IU) were susceptible to infection [2].

Observation from immunized populations suggest that undetectable antibodies may not necessarily imply that the individual is fully susceptible to disease [1],[13]. Measles virus-specific high-avidity antibodies are associated with pre-existing B-cell memory, whereas low avidity IgG is an indication of the primary immune response [18],[7];[21]. Thus avidity measurement can be used to assess the success of measles vaccination [3],[7] and offers a way of assessing the type of vaccine failure without knowledge of prior antibody status [16]. In this study, we used IgG avidity assay to analyze sera from confirmed measles patient in order to determine how many cases of reinfection (high- avidity antibodies) and how many were cases of primary infection (low- avidity antibodies) in adult subject and study of there immune response.

It is important that highly sensitive and specific laboratory test Enzyme Immune Assay (EIA) used to accurately determine the antibody level resulting from vaccination or naturally infection with measles virus. Several enzyme immune assay (EIA) kits for anti-measles virus antibodies are available commercially, among which the Dade Bering EIA kit was previously found to perform better in comparison with other commercial EIA kits [10]. Therefore this kit was used in evaluation of the immune response in this work.

The objectives of present study were:
1. To evaluate measles-specific humeral immune response IgM in teenager (Dentistry students), as well as children naturally infected with measles virus.
2. To differentiate between primary and secondary immune failure by detection the avidity of immunoglobulin G.

**Materials and Methods**

During March to June 2009 several cases of measles were detected in Babylongovernorate including teenager university student, and childrens. The first case came from Wasit governorate who live in student resident house, in Hilla city. Most students in contact with him became ill and seafaring from fever, cough and coryza most of them after 3 days later developed a generalized maculo-papuler rash and was subsequently confirmed by serological study to have measles. Information about students' illness, vaccination status and their age were reported. Blood samples by vein puncture at acute and convalescent period were collected to test for the presence of measles- specific antibodies.

**Serological analysis**

Serum were separated from collected blood samples, they were tested for the presence of measles specific IgM and IgG antibodies by using previously described indirect enzyme immunoassay that have been shown to be highly sensitive (99.6%) and highly specific (100%) [Enzygot, Dade Behring, Marburg, Germany] (Hamkar R. et al., 2006).

**Study group samples**

Nine sera sample were collected from laboratory confirmed measles patients aged $\leq 2$ years old.
whom were received single dose of measles virus (except two of them of unknown vaccination status) experienced primary infection, and were not reinfected by measles virus, therefore their sera were regarded as low avidity anti-measles IgG.

Another 7 sera sample were collected from subjects (3 male and 4 female) age 12 years old who had been vaccinated twice for measles at 9 months with measles vaccine and 15 months of age with MMR vaccine during vaccination program in Hilla city Babylon governorate (one of them of unknown vaccination status). The third group of sera sample were collected from 36 university student aging from 19 – 25 years whom were suffering from acute measles infection regarded as having high avidity IgG against measles virus.

At the time of sera sample collection, a question about personal data, vaccination status was completed. Cases were confirmed as measles when testing for anti-measles IgM gave positive IgM results when using Enzygost anti-measles IgM and IgG (EIA) kits (Dade Behring, Marburg, Germany).

Avidity measurement

All sera samples were subjected to anti-measles IgG avidity assay according to [2],[7];[8]. The avidity of IgG for measles virus was measured by a protein-denaturing enzyme immune assay where the antibodies were first allowed to bind to the virus antigen followed by elution with or without, six molar urea. Each sample was tested at dilution of 1:21 and each sample at 4 replicates. For each replicate a single serum dilution (1:21) of the kit serum diluents was applied to each of 4 wells on one row of ELISA plates. (Two wells of measles antigen positive - coated and 2 wells of measles antigen negative - coated).

After incubation for 1 hour, test plates were washed 4 times according to ELISA kit procedure. Then 2 wells (one antigen – positive and one antigen – negative were soaked for 5 minutes in wash buffer containing 6 mol / L. urea. Fresh buffer were applied and the soaking was carried out twice more.

The plates was then washed 4 times with wash buffer. Then the test was continued according to the kit restriction manual. The remaining specific antibody was then detected according to the EIA kit procedure. An avidity index (AI) was calculated from the optical density (OD) of the wells according to the following formula: 

\[ AI = \left( \frac{\Delta OD \text{ with urea}}{\Delta OD \text{ with wash buffer}} \right) \times 100 \]

Three control were used for testing EIA plates serum sample containing strong high- avidity, weak high avidity and low- avidity anti-measles IgG- antibody, in addition to kit positive and negative control were also applied.

Results

Serum samples included in this study was grouped by age and measles vaccination status and their distribution was shown in table (1).

All samples were tested and confirmed as measles case in laboratory, (anti-measles- IgM positive). Nine ≤ 2 year old children and seven (12) years old subjects samples were used as a control source of low and high avidity from all age groups, 10 (19.2%) had unknown vaccination status, 8 (15.4%) had not been vaccination, and 34(65.4%) had received one (21 subjects) or two (13subjects) doses of measles vaccine.

Overall, 24 (46.2%) measles cases confirmed by a positive IgM test exhibit high-avidity IgG representing secondary immune response to measles (that representing secondary
vaccine failure), while remaining other 28 subjects (53.8%) of them exhibiting a primary immune response (low avidity) indicating primary measles infection see table (2). The table reflected also anti-measles virus low and high-avidity IgG which was distributed as following: subjects less than 2 years old show 100% low avidity and this proportion decreased gradually with increasing age and reach 28.5% of those age 23 years.

High avidity anti-measles virus IgG in higher proportion at subjects age 23 years (71%) followed by 22 years (70%) then 21 years (60%). Whereas 2 cases (28.6%) was found in 12 years age group and non in ≤ 2 years age group.

The distribution of anti-measles virus high and low-avidity IgG among the study group by vaccination status was reflected in table (3) below. Non of the 8 unvaccinated patients (0%) reflect high-avidity anti-measles IgG so their infection was regarded as a primary measles infection. Of the remaining 35 patients which were sourly vaccinated 15 (42.9%) showed low avidity (i.e., a primary immune response) and 20 (57.1%) showed a secondary immune response, which indirectly reflecting a secondary vaccine failure.

There was no relationship between vaccination status and age (P > 0.05), but there was a clear relationship between anti-measles virus IgG avidity with age (P < 0.05). Also there was no relationship between vaccination and avidity (P > 0.05) but there was a direct relationship between number of vaccine dose and avidity. Table (3) also reflected that subjects who received two dose of measles virus (infected and vaccinated) showed high-avidity anti-measles virus IgG proportion (55%), where as subjects who received single dose vaccine showed lower proportion (45%).

**Discussion**

Although vaccination program with measles virus live attenuated virus vaccine in Iraq started since 1980s, by a routine immunization program, under which the vaccine is given in one dose scheduled at 9 months of age, with a recommendation for vaccination at 18 month age with MMR trivalent vaccine, yet measles cases were reported every year anywhere in Iraq and neighboring countries, however during March 2009 a large episodes of measles infection was seen and teenager subject were included most of them had been vaccinated, so this study was directed mainly toward teenager patients (dentistry student). Several research published that vaccine- induce protection with less duration less robust than naturally acquired immunity against measles virus [7], [15], also high occurrence of mild symptoms measles due to secondary vaccine failure [4], [7]; [9]; [11]; [17]; [18] has been found among measles patients vaccinated over decade age especially among those who were revaccinated [7][17]. Hence the evolution of measles control programmes in Iraq and neighboring countries require well understand of the reasons for primary and secondary vaccine failure. The presence of high proportion of primary vaccine failures in vaccinated patients with measles, give an indication of improper vaccine handling, for example, improper cold chain or misvaccination, in addition to suppressing factors influencing Iraqi population since more than 3 decades, besides persistent exposure to naturally circulating measles virus. All this gave reasons to follow up the immune status of Iraqi population, to improve measles control in Iraq. Therefore introduction of good diagnostic test for detection of measles such as IgM- capture EIA for detection
of measles IgM is not sufficient to differentiate between primary infection and re infection due to second vaccine failure [7],[17]. Detection of specific measles IgM detected only in primary measles infection or vaccination but also inducible by overcome end.

Few researcher used IgG avidity test as a useful procedure for identifying primary and secondary immune responses [7], yet few reports upon this test used during measles outbreaks [7],[17]. However in this study 46.2 % of 52 of measles cases confirmed by a positive IgM EIA test mounted a secondary immune response, giving an indication that presence of IgM can not be used as a reliable indicator of a primary immune response [7],[17]. The present study also reflected that all unvaccinated subjects showed a primary immune response supporting the information giving by the IgG avidity test. This finding inconsistent with other researchers, and I had concluded that:

1. measles virus can infect previously immune responded persons, producing classic symptoms of measles in some, and mild or no symptoms in others.
2. The protective immunity induced by vaccination may not be life long without being boosted by an exposure, mostly sub clinically, to a naturally circulating virus.
3. Due partly if not entirely, to the secondary vaccine failure, the numbers of measles cases among adults in Iraq increase in recent over the previous year.
4. Measles is still endemic in Iraq, and person has the potential for repeated exposure to wild type measles virus.

1- Large scale serological estimation of immune status of Iraqi population is required in all governorates to find the population requiring vaccination to be included in rotten vaccination program
2-Implementation of better vaccination programs is urgently required especially for those aging 15-20years as a boaster dose.
3-IgG immunoglobulin avidity test is a good parameter for detection of primary and secondary immune response failure.

Table1 Distribution of anti-measles IgM-positive cases by age and measles vaccination status

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Total subject</th>
<th>unknown</th>
<th>Known</th>
<th>vaccination status</th>
<th>No. of vaccine doses(Known vaccination status)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tested</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>0   1  2 No. No. No.</td>
</tr>
<tr>
<td>≤2</td>
<td>9</td>
<td>2</td>
<td>22.2</td>
<td>7</td>
<td>77.8</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
<td>1</td>
<td>14.3</td>
<td>6</td>
<td>85.7</td>
</tr>
<tr>
<td>19</td>
<td>6</td>
<td>2</td>
<td>33.3</td>
<td>4</td>
<td>66.7</td>
</tr>
<tr>
<td>20</td>
<td>8</td>
<td>1</td>
<td>12.5</td>
<td>7</td>
<td>87.5</td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>22</td>
<td>10</td>
<td>2</td>
<td>20</td>
<td>8</td>
<td>80</td>
</tr>
<tr>
<td>23</td>
<td>7</td>
<td>2</td>
<td>28.6</td>
<td>5</td>
<td>71.4</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>10</td>
<td>19.2</td>
<td>42</td>
<td>80.8</td>
</tr>
</tbody>
</table>

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Table 2 Distribution of low and high-avidity anti-measles virus IgG in the study group by age.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Total subject Tested</th>
<th>anti-measles virus IgG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>≤2</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
<td>50</td>
</tr>
<tr>
<td>19</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>20</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>22</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>23</td>
<td>7</td>
<td>28.5</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 3 Distribution of low and high-avidity anti-measles virus IgG in the study group by vaccination status.

<table>
<thead>
<tr>
<th>anti-measles virus IgG</th>
<th>Total subject Tested</th>
<th>vaccination status (No. of doses of vaccine)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>High-avidity</td>
<td>24</td>
<td>44.4</td>
</tr>
<tr>
<td>Low-avidity</td>
<td>28</td>
<td>55.6</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100.0</td>
</tr>
</tbody>
</table>

References
Exercise induced ST segment elevation in aVR more than 2 mm to differentiate between left main and three vessel disease in patients with Duke score ≤ -11

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College of Medicine, University of Babylon, Hilla, Iraq.

Abstract

Background: This study evaluated the ability of exercise induced ST segment elevation in aVR in patients with Duke score ≤ -11 to predict left main stem disease and three vessel disease and to investigate the ability of ST segment elevation in aVR more than 2 mm to differentiate between left main stem and three vessel disease.

Methods: 66 patients with Duke score ≤ -11 were divided into three groups. Group 1 included 16 patients with no ST elevation in aVR, group 2 included 21 patients with ST elevation less than 2 mm and group 3 included 29 patients with ST elevation more than 2 mm, coronary angiography was done and results were correlated with ST elevation in aVR.

Results: 70% of patients with ST segment elevation in aVR had either left main stem or 3 vessel disease. Exercise induced ST elevation in aVR in patients with Duke score ≤ -11 had sensitivity of 89% and specificity 74% in predicting left main disease, while exercise induced ST elevation in aVR more than 2 mm had sensitivity of 95% and specificity 32% in predicting left main disease.

Conclusion: Exercise induced ST segment elevation in aVR in patients with Duke score ≤ -11 is sensitive but not specific for both left main and three vessel disease while ST segment elevation in aVR of more than 2 mm is both sensitive and specific for left main but not for three vessel disease.

The objectives of this study were to evaluate the ability of exercise induced ST segment elevation in aVR, which is both sensitive and specific for left main disease, to differentiate between left main and three vessel disease.

The main stem and three vessel disease were investigated using ST segment elevation in aVR more than 2 mm.

The study included 66 patients with Duke score ≤ -11, divided into three groups. Group 1 included 16 patients with no ST elevation in aVR, group 2 included 21 patients with ST elevation less than 2 mm, and group 3 included 29 patients with ST elevation more than 2 mm. Coronary angiography was done and results were correlated with ST elevation in aVR.

The results showed that 70% of patients with ST segment elevation in aVR had either left main stem or 3 vessel disease. Exercise induced ST elevation in aVR in patients with Duke score ≤ -11 had sensitivity of 89% and specificity 74% in predicting left main disease, while exercise induced ST elevation in aVR more than 2 mm had sensitivity of 95% and specificity 32% in predicting left main disease.

The conclusion of the study was that exercise induced ST segment elevation in aVR in patients with Duke score ≤ -11 is sensitive but not specific for both left main and three vessel disease, while ST segment elevation in aVR of more than 2 mm is both sensitive and specific for left main but not for three vessel disease.
Introduction

The exercise treadmill is used in the evaluation of symptomatic patients to predict the presence and extent of coronary artery disease and the short and the long term prognosis [1,2]. Although a large number of non invasive stress testing modalities are currently available, the exercise ECG is still used as a standard for comparison with other clinical and testing risk markers, it is also the least costly of all provocative non invasive tests.

Although the exercise electrocardiogram has been extensively studied in numerous reports there are limited data regarding the significance of exercise induced ST segment changes in aVR to detect myocardial ischemia[3-6].

It has been postulated that ST elevation in aVR in patients with stable angina is highly predictive of left main or three vessel disease [7] without mentioning the degree of ST segment elevation.

The present study was undertaken to investigate the ability of exercise induced ST elevation in aVR for the detection of severe coronary artery disease including left main stem or three vessel disease and the ability of degree of ST segment elevation in aVR to predict left main coronary artery disease.

Patients and Method

The study was conducted in Merjan teaching hospital between January 2009 to June 2010 including 66 patients age 29-82 mean 57±8, 49 males and 17 females.

According to Bruce protocol exercise test was carried out, resting heart rate, blood pressure, and 12 lead ECG was recorded, a 12-lead electrocardiographic tracing was observed continuously, blood pressure was measured by arm-cuff sphygmomametor during the last 30 seconds of each work stage, test was terminated when patient got limiting chest pain, severe fatigue, dyspnea, or severe ventricular arrhythmias, the test also was terminated if patient got maximum ST depression 3mm or greater, systolic blood pressure more than 230 mm Hg or diastolic blood pressure more than 130 mm Hg or the patient reached the target heart rate.

An exercise test result was considered positive if there was horizontal or down sloping ST segment depression of at least 1mm at 60 ms after J point or an up sloping ST segment depression ≥ 1.5 mm at 80 ms after the J point [8].

Duke treadmill score was calculated for every patient as described by Mark and coauthors as duration of exercise in minutes – (5 X maximum ST deviation in millimeters)- (4 X treadmill anginal index). The treadmill anginal index was taken as 0 after no angina, 1 for non limiting angina and 2 for exercise limiting angina[9]. The score typically ranges from -25 to +15, these values correspond to low risk (with score of ≥+5), moderate risk (with a score ranging from -10 to +4) and high risk (with a score of ≤-11).

All medications that may interfere with the exercise test results was discontinued at least five half-lives before the exercise testing.

Patients with left or right bundle branch block, left or right ventricular hypertrophy, preexcitation, prior myocardial infarction, coronary
angioplasty or aortocoronary bypass surgery and valvular heart disease were excluded from the study.

ST segment in lead aVR was accepted as elevation if the elevation was ≥ 0.5 mm from isoelectric line at 60 ms after J point. Intraobserver and interobserver mean percent error (absolute difference between two observations divided by the mean and expressed in percent) was determined in 21 randomly selected study participants and were less than 4% and 5% respectively.

Out of 82 patients with high risk according to Duke score 66 patients underwent coronary angiography within 3 months of exercise test and were included in the study, they were divided into 3 groups, group 1 including patients with no ST elevation in aVR, group 2 including patients with ST elevation of less than 2 mm in aVR and group 3 including patients with ST elevation in aVR of more than 2 mm.

Coronary angiography was done by percutaneous (Judkins) technique. Significant coronary artery disease was diagnosed when there was diameter narrowing of ≥ 70% in the lumen of coronary artery except left main coronary artery where diameter narrowing ≥ 50% was considered significant (the patient was considered to have LM disease even if there was single, two or three vessel disease with LM diseased vessel). Catheterization laboratory investigators were unaware of the results of exercise test.

**Statistical analysis**

The variables were presented as means ± SD as proportions for categorical data. Analysis of variance (ANOVA) test was used to determine the significant level of difference in various variables of ST segment elevation. P value less than 0.05 was considered significant.

**Results**

There was 16 patients in group 1 (no ST segment elevation in aVR), 21 patients in group 2 (ST segment elevation in aVR less than 2 mm mean 1.5 ± 0.4 mm), and 29 patients in group 3 (ST segment in aVR more than 2 mm mean 2.4 ± 0.3 mm). The clinical characteristics of the study population are presented in table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 No. 16</th>
<th>Group 2 No. 21</th>
<th>Group 3 No. 29</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>57 ± 7</td>
<td>58 ± 7</td>
<td>57 ± 6</td>
<td>N.S</td>
</tr>
<tr>
<td>Male</td>
<td>12 (75%)</td>
<td>16 (76%)</td>
<td>20 (72%)</td>
<td>N.S</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>7 (44%)</td>
<td>10 (48%)</td>
<td>14 (48%)</td>
<td>N.S</td>
</tr>
<tr>
<td>Hypertension</td>
<td>9 (56%)</td>
<td>10 (48%)</td>
<td>15 (52%)</td>
<td>N.S</td>
</tr>
<tr>
<td>Smoker</td>
<td>7 (44%)</td>
<td>11 (52%)</td>
<td>16 (55%)</td>
<td>N.S</td>
</tr>
</tbody>
</table>

Demographic variables and major cardiovascular risk factors were similar between patients groups (p > 0.05). The exercise parameters in studied groups are shown in table 2.
Table 2 exercise parameters in patient's groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 No. 16</th>
<th>Group 2 No. 21</th>
<th>Group 3 No. 29</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise duration (in minutes)</td>
<td>6 ± 1.3</td>
<td>5 ± 1.1</td>
<td>5 ± 1.2</td>
<td>N.S</td>
</tr>
<tr>
<td>Maximum systolic blood pressure</td>
<td>170 ± 10</td>
<td>168 ± 11</td>
<td>165 ± 9</td>
<td>N.S</td>
</tr>
<tr>
<td>Incidence of angina</td>
<td>7 (43%)</td>
<td>12 (57%)</td>
<td>17 (59%)</td>
<td>N.S</td>
</tr>
<tr>
<td>Duke treadmill score</td>
<td>-15 ± -2</td>
<td>-15 ± -2</td>
<td>-17 ± -2</td>
<td>N.S</td>
</tr>
</tbody>
</table>

The exercise parameters were similar between patient's groups.

Table 3 Results of angiography in patients with and without ST elevation

<table>
<thead>
<tr>
<th>No ST segment elevation in aVR (Group 1) No. 16</th>
<th>ST segment elevation in aVR (Group 2 and Group 3) No. 50</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM CA</td>
<td>1 (6%)</td>
<td>18 (36%)</td>
</tr>
<tr>
<td>3 vessel disease</td>
<td>3 (19%)</td>
<td>17 (34%)</td>
</tr>
<tr>
<td>2 vessel disease</td>
<td>5 (31%)</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>1 vessel disease</td>
<td>7 (44%)</td>
<td>10 (20%)</td>
</tr>
</tbody>
</table>

This table shows that out of 50 patients with ST segment elevation in aVR 35 (70%) patients had either left main disease or three vessel disease while 25% of patients (4 out of 16 patients) with out ST segment elevation in aVR had either left main stem or three vessel disease.

Out of 50 patients with ST elevation in aVR there were 29 patients with ST elevation more than 2 mm and the angio graphic finding in patients with ST elevation more than 2 mm are presented in table 4.

This study showed that exercise induced ST elevation in aVR had sensitivity of 95%, specificity of 32%, positive predictive value 36%, and negative predictive value of 93% in detecting LM disease and had sensitivity of 85%, specificity of 28%, positive predictive value of 34% and negative predictive value of 81% in detecting three vessel disease.
Table 4 Angiographic finding of study population with respect to ST segment elevation in lead aVR more than 2 mm

<table>
<thead>
<tr>
<th></th>
<th>No ST segment elevation in aVR more than 2mm (Group 1 and group 2) No. 37</th>
<th>ST segment elevation in aVR more than 2mm (Group 3 No. 29)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM CA</td>
<td>2 (6%)</td>
<td>17 (59%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>3 vessel disease</td>
<td>16 (43%)</td>
<td>4 (13.7%)</td>
<td>0.0098</td>
</tr>
<tr>
<td>2 vessel disease</td>
<td>6 (16%)</td>
<td>4 (13.7%)</td>
<td>0.7852</td>
</tr>
<tr>
<td>1 vessel disease</td>
<td>13 (35%)</td>
<td>4 (13.7%)</td>
<td>0.0491</td>
</tr>
</tbody>
</table>

The finding of ST elevation in aVR more than 2mm had sensitivity of 89%, specificity of 74% positive predictive value 59% and negative predictive value of 95% for detecting LM disease and sensitivity of 20% specificity of 46%, positive predictive value 14% and negative predictive value 57% for detecting three vessel disease.

Discussion

Exercise induced ST depression although the most common and accepted criterion for detecting coronary artery disease is unable to discriminate the significantly narrowed coronary vessel [2].

Exercise induced ST segment elevation is less frequent than depression but it's presence has been attributed to ventricular wall motion abnormalities[11,15] ventricular aneurysm[10,12] and ischemia due to either coronary vaso spasm or severe proximal coronary stenosis [11,13]. Bruce et al [14] studying 350 ambulatory patients with coronary heart disease postulated ventricular dysfunction and poor prognosis in patients with exercise induced ST segment elevation.

Lead aVR has not only been under evaluated for the detection of coronary artery disease during exercise testing but surprisingly has been selectively ignored in pervious reports [3,5].

In Mason's modified 12 lead system, arm electrodes are placed in the infraclavicular fossae and leg electrodes mid way between the rib margin and iliac spine [15], different lead placement during standard ECG recording and exercise testing ECG recording might possibly raise some concern about the interpretation and comparison of evidence demonstrated in these two setting, however as the final pathophysiological mechanism involves a common pathway resulting in raised left ventricular end diastolic pressure either in demand ischemia (i.e exercise testing) or supply ischemia (i.e acute coronary syndrome) the ECG finding reflecting as ST segment elevation in aVR may also be similar in both sitting[16].

The ability to discriminate among various coronary artery patterns may influence early management decision, thus the ability to identify left main coronary artery disease is important [17].
Some studies reported that ST segment elevation in lead aVR could predict LM disease in patients with acute coronary syndrome [18,19].

Zhan Znong-Qum et al mentioned that ST segment elevation in aVR has been associated with left main or 3 vessel disease (with out mentioning the degree of ST elevation) and with adverse out come [20,21].

Yamaji showed that ST elevation in aVR more than 0.5 mv present in 88% of patients with acute LM obstruction with out mentioning three vessel disease or the degree of ST elevation [22].

Kosuge et al [23] found that ST elevation greater than 0.5 mm in lead aVR is strongest predictor of LMCA or 3 vessel disease in patients with acute coronary syndromes superior to presence of ST depression in other leads with sensitivity of 78%, specificity of 86%, positive predictive value 57%, negative predictive value 95%.

M. Tuna Katercibasi et al showed that exercise induced ST segment elevation in aVR is sensitive 92% but not specific (48.6%) electrocardiographic finding of significant LM coronary artery disease in patients with Duke treadmill score ≤-11 , with out taking in consideration the degree of ST segment elevation[24].

Some of the reports took other criteria to increase specificity for detecting LM disease in patients with ST elevation in aVR like ST elevation in aVR with less elevation in V1 as predictor of total or sub total left main stem obstruction in patients with acute coronary syndrome [22].

This study showed that increased specificity for detection of LM disease can be achieved when we take ST segment elevation of more than 2 mm in aVR in patients with Duke score less than -11. So finding of ST segment elevation in aVR should attract attention toward left main stem or three vessel disease ( high sensitivity with low specificity)and finding of ST segment elevation more than 2 mm gives high sensitivity with specificity for LM coronary disease rather than 3 vessel disease.

Nikus and Sclarosky stated that ST segment depression specifically in V4-V5 induces reciprocal ST segment elevationin lead aVR since aVR is electrically opposite to these leads [25] although this statement seems to be correct but is not the only explanation for ST segment elevation in aVR as mentioned above for ST elevation in aVR can occur with out ST segment depression in chest leads [26].

Yamaji et al [22] suggested that acute LM obstruction causes ischemia to the basal part of the septum through disturbance of the major septal branch flow which could account for lead aVR ST segment elevation.

Lead aVR is orientated toward the cavity behaving as pseudo-intra cavitary lead and consequently detects inter ventricular amplitudes of the left ventricle. Transmural anterior wall ischemia during maximum exercise testing may result in ST elevation in lead V1 and possibly aVR [27].

Another explanation for ST segment elevation in aVR in LM stenosis may be that ST segment elevation in lead aVR reflects endocardial ischemia because this lead faces the cavity of the left ventricle[28] further more ischemia due to LM stenosis may lead to increase in left ventricular end diastolic pressure. The result of this raised left ventricular end diastolic pressure is sub endocardial ischemia which may be reflected as ST depression in the precordial lead and ST segment elevation in aVR. [29]
So according to these as far as ischemia is more and degree of obstruction is more one expect that degree of ST elevation will be more in LM disease.

Engelen et al [30] reported that lead aVR ST segment elevation is observed in acute obstruction of the left anterior descending artery proximal to the major septal branch but not in acute LAD obstruction distal to the major branch. They concluded that lead aVR ST segment elevation associated with proximal LAD obstruction is caused by transmural ischemia of the basal part of the septum. This led to assume that acute LMCA obstruction also cause lead aVR ST segment elevation through disturbance of major septal branch blood flow that is interruption of LAD blood flow, since not all patients with three vessel disease get involvement of proximal LAD so the incidence of ST elevation in aVR in these patients is less although they can get it through causing sub endocardial ischemia even in absence of proximal diseased LAD.

Since L.M disease is more able to cause transmural ischemia of the basal part of septum and more able to cause endocardial ischemia thus it is more able to cause more degree of ST elevation in aVR.

Conclusion and Recommendation
1- Lead aVR needs not to be ignored
2- Exercise induced ST segment elevation in aVR Should attract attention to LM or 3 vessel disease and its elevation of more than 2 mm should attract attention to LM disease in patients with Duke score ≤-11

References
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Abstract

Objective: We conducted a study to evaluate the short-term functional outcomes of patients with an isolated tibial shaft fracture treated with locked intramedullary nailing, using a prospective clinical and radiographic assessment, for union time, time of starting full weight bearing, rate of infection, knee and ankle joint movement, knee joint pain, and malalignment.

Patients and Methods: We had included 56 patients with isolated tibia fractures from our patients prospectively followed up in period between Feb, 2006 and December 2008 (34 months). 56 patients agreed to present to our timetable of follow up, 4 patient lost after 3 months of follow up. We had a median follow-up of 10 months, with a range from 6 to 18 months. All patients were initially acutely treated with locked intramedullary nailing of their tibia within 48 hours of getting injured. All enrolled patients were evaluated with Functional assessment, and were evaluated radiographically and by physical examination.

Results: Of the total number (56 patients), 15 (26.7%) patients had at least moderate knee pain. 6 patients out of 52 (11%) got knee joint stiffness. whereas 2 patients (4%) had ankle joint stiffness, both groups treated by a physiotherapy course. in 90% of the patients, mean time of union was 15 weeks ranged from 12-24 weeks. After getting union those patients started full weight bearing. Totally 4 patients got superficial wound infection (7%). (12%) got malalignment, all were in proximal and distal 1/3.

Conclusions: We see that locked intramedullary nailing is a suitable procedure for unstable fractures of tibial shaft. In contrast to open reduction and internal fixation, intramedullary nailing can be performed initially on the first or second day of admission. The advantages of IM nailing include better alignment, earlier range of motion of knee and ankle, better mobility of patient, less frequent follow up visits, and earlier return to work.
90% من المرضى تمكنوا من المشي دون ألم في الساق بعد حصول الانحلام في الكسر بعد زمني هو 15 أسبوعًا. ־(12-24) أسبوع، وهذا (7%)  حصل لهم خمج سطحي في جروح العملية علقت جميعا بالمضادات المضادة للحويضة (12%) من المرضى حصل لهم الانحلام معيوب في محل الكر، من متاخمة نتائج علاج مضاعفات وivarona بنتائج الدراسات السابقة، نرى أن طريقة معالجة كسور عظم قصية في الساق بواسطة التشتت الداخلي باستعمال المقابل للمدخن ناخذ العظم. تعتبر الطريقة المثالية لحمر الحصول على الانحلام الكر، يمكن المريض من استعادة قدرته على المشي بأقرب وقت متوفر عليه مع بسرعة رجوعه للعمل وممارسة حياته اليومية بدون مساعدة.

Introduction

Intramedullary nailing has become the treatment of choice for displaced diaphyseal fractures of the tibia in adults.[1–9]. A commonly cited complication of this injury treated by this method is anterior knee pain.[3,5,6,10–22]. This has been associated with the approach for nail insertion, and the influence of entry point has also been extensively investigated [9,14,15,17,20]. There have been multiple reports to support the superiority of intramedullary nailing to other methods of treatment with respect to return to weight bearing and work.[7,23]. Over the past years, intramedullary (IM) nailing has become an established technique for the surgical management of tibial shaft fractures. Apart from unreamed IM devices, reamed interlocked systems are becoming increasingly popular. Gradual reaming of the tibial medullary cavity allows larger-diameter devices to be inserted [25]. This should enhance the stability of the fixation, and reduce micro movements at the fracture site. Also, contemporary IM implants offer a variety of interlocking and/or compression options, which will affect the geometry and the stability of the overall system [26]. Choosing the correct implant length, diameter, and interlocking mode is particularly important in the management of unstable fractures of the tibial shaft.

Further, it has been shown that even a very small amount of residual angulation in the united fracture alters load through the knee and ankle joints.[24] The evidence in the literature on the effects of tibial angular malunion in lower extremity outcomes is conflicting; however, this alteration in force could cause a predisposition to osteoarthritis.

In this study we would like to estimate the effectiveness of using the closed locked I.M. nailing system as a primary procedure in treatment of isolated fracture of tibial shaft, as well as the complication of this surgical procedure.

Patients and Methods

In our study, we selected all patients who were treated for an isolated tibial shaft fracture with an intramedullary nailing, at orthopedics department in Rahba hospital/Abu Dhabi, between Febr.2006 and December 2008 ( 34 months ). The anatomic locations of fracture were included are the middle three fifths and only those with closed fractures and treated with an intramedullary nail, and all patients with other injuries were excluded including proximal and distal fifth, Immature skeletons ( less than 15 years ) and compound fractures.

All patients had been discharged from follow-up once their fractures had united, and started painless unprotected full weight bearing.

Of the 56 patients enrolled in the study, there were 13 women (23%) and 43 men (77%). The overall average age at time of injury was 34.4 years.

A total of 56 patients agreed to present our timetable of follow up, 4 patient...
lost after 3 months. Each of the 52 patients underwent a physical examination which included both knees and ankles, were they are evaluated at 2 weeks, 6 weeks, 3 months, 6 months, 9 months following surgery according to our schedule, 10 patients presented after 12 months and 6 patients presented after 18 months after surgery as per their will. Average follow-up was 10 months (range 6–18 months).

During each postoperative assessment, patients were directly asked if they had knee pain, and knee range of motion was evaluated. Additionally, patients were asked to kneel down during the clinic visit to assess for pain or difficulty kneeling.

Finally, 52 of 56 patients agreed to have full-length radiographs of their affected lower leg, including the knee and ankle. These were used to establish nail presence, presence of locking screws, prominence of nail at the knee, and heterotopic ossification and alignment.

Healing is defined as the time when the patient is walking without pain on the operated leg with full weight bearing and on radiological examination bridging bone healing of at least three of the four cortices seen in the a.p. and lateral views is visible. Delayed union was defined as bone healing which occurred without additional surgery with a healing time, which exceeded double of the normal healing time of three months. Non-union was defined as deficient bone healing, which must be treated with additional surgical measures such as cancellous bone grafting or revision osteosynthesis. Mal-union was defined as bone healing with an axial deviation in any direction exceeding 5° in any plane. Mal-union was analyzed at the time of union, on the a.p. and lateral x-rays, the axis deviation between the proximal and distal fragment was measured at the level of the previous fracture.

Patients were placed supine on a radiolucent operating table. A thigh pneumanatic tourniquet was used, and the extremity was draped free. Using a C-arm X-Ray Image intensifier, the knee poisoned in 90 degree flexion, and did not use skeletal or calcaneal traction to aid in reduction. A (3 cm) longitudinal incision was made from the inferior pole of the patella just medial to the lateral edge of the patellar tendon, and extended distally. The retinacular layer was identified and incised just at the lateral edge of the tendon. The infrapatellar fat pad was identified and its insertion into the proximal tibia was sharply incised transversely from lateral to medial, allowing its retraction superiorly for exposure of the proximal tibial ridge.

Postoperative management included restricted weight bearing for 6 weeks, followed by progression to weight bearing as tolerated. Supervised physical therapy was initiated for thigh muscle strengthening and knee range of motion exercise.

Dynamization done in 9 patients by removing the distal static screw after starting full weight bearing.

We routinely use low molecular heparin in a prophylactic dose preoperatively and continue postoperatively until patient start active movements in bed.

Results

In our study we had treated a 56 patients presented with closed isolated fracture of tibial shaft, with locked intramedullary nailing using closed technique in all of them, 52 patients agreed to present our timetable of follow up until they get their fractures united and started pain free full weight bearing, while 4 patients we lost any contact with them after three months.
there were 13 women (23%) and 43 men (77%). The overall average age at time of injury was 34.4 years, the average age of the female patients was 38 years and of male patients was 32.3 years. (32) patients (57%) due to RTA, (20) (36%) due to work related injuries, (4) (7%) sport injuries.

The range of follow-up was 6-18 months, with a median of 10 months. Of these injuries, 40 were comminuted (71%), 7 were spiral (13%), 3 transverse (5.3%), 6 are short oblique (10.7%). Anatomically, of the 56 fractures, 38 (68%) were middle 1/3 and 10 (18%) were distal 1/3. 8 patients (14%) with proximal tibial fractures.

The proximal and distal fractures were away from the proximal and distal fifth of the bone and approximately more than 5 cm from the articular surface. There were 4 patients who required urgent fasciotomies (7%) all treated by delayed primary closure with out need for skin graft.

15 patient out of 56 (27%) having associated fracture fibula in the proximal or middle third that did not need for fixation.

Estimated blood loss during and after surgery was 400–600 cc during the first 24 hours, where we routinely used a vacuumed drain. In 12 patients a blood transfusion was necessary.

Of the total number (56 patients), 41 patients (73.2%) denied knee pain with any activity whereas 15 (26.7%) patients had at least moderate knee pain postoperatively. Knee range of motion was equivalent to the unaffected side in 46 patients (82%) but 6 patients out of 52 (11%) got knee joint flexion restricted to about 85 degrees and needed a course of physiotherapy. whereas 2 patients (4%) had a about 10-15 degrees restricted range of motion of the ankle who need also a physiotherapy course.

Union time was 15 weeks in 12 patients out of 52 (23%), from 16 – 20 weeks in 25 patients. (48%). From 21 – 24 weeks in 10 patients (19%), total cases got union within 24 weeks are 47 patients (90%). Delayed union (26 – 29) weeks in 5 patients (10%). Mean time of union was 13.2 weeks ranged from 15 – 24 weeks. Totally 4 patients got superficial wound infection (7%).

3 patients got superficial wound infection in the distal screw entry sites and 1 patient got superficial wound infection in the proximal nail entry sites and all responded well to antibiotics.
Complications of I.M. nailing

During our radiographic review of (52 patients) revealed no case of tibial nonunions. There was one fibular nonunion, which was asymptomatic. In 10 patients (19%) Dynamization done by removing the static distal screw after 12 weeks(3 transverse fractures and 7 short oblique).

In 6 patients out of 52 (12%), there were malalignment(with 10-15 degrees of angulation anterolaterally), 4 cases (8%) were in proximal 1/3 and 2 cases(2%) in the distal 1/3 (4 comminuted and 2 are short oblique).

In 33 patients (63.5%) the result was excellent, were the fractures united within 24 weeks, with no knee joint pain or stiffness, and no infection. In 4 patients (8%) the result of treatment was(Good), as the united within 24 weeks, but there was a superficial infection, and considered (fair) in 9 patients (17%) as they developed one or more of the following knee joint pain or mild knee and/or ankle joints stiffness as well as a delayed union. In 6 patients (11.5%) considered poor due to significant malalignment.

**Discussion**

Intramedullary nailing is the treatment of choice for displaced diaphyseal fractures of the tibia in adults(1–9). Patients with this injury are generally young. The average age of patients treated with this method at our hospital between February 2006 and December 2008 was 34.4 years. While in the study of (Yoram et.al 2009) [27] was 45 years, that difference because most of our patients are young expatriates traveling to UAE for work. For a patients of that age, information related to at least the short-term.
outcome is important as well as a long term follow up if possible. This study aimed to report the short-term outcomes of patients treated with intramedullary tibial nail using as time table schedule of clinical and radiological examination.

In our study total cases got union within 24 weeks are 47 patients (90%). In the study of (Alho A et al)[28] and (Court-Brown et al) [4,11] even a union rate exceeding 95% can be expected.

Mean time of union in our patients was 13.2 weeks ranged from 15-24 weeks, which is less than reported in other studies like (Court-Brown et al) [11] who reported 16.9 weeks. Karladni [5] reported 16.4 weeks, Toivanen [10] reported 12 weeks and 19 weeks by Bone [3]. We do not have a case of non union, as Court-Brown et al got a rate of 0% of non union [4,11]. Shuler et al (2007) [29] mentioned a non union rate of 3%. Intramedullary nailing can be performed initially on the day of admission. The intramedullary approach produces superior results, as described by Robinson [30] and Nork [31], who reported a 100% union rate. El Ibrahimi [32] confirmed that good results with no major complications were obtained with reamed nailing. Fan [33] reconfirmed that there were no signs of nonunion or malunion. Toivanen [10] reported a rate of 0% of nonunion, 1.8% in the study of Bone [3], Karladni [5] reported 3.8% of nonunion.

In our study we have 5 patients (10%) of delayed union, but finally all of them get united at within 29 weeks. In three important studies, delayed union was reported 20% by Karladni [5], 0% by Toivanen [10].

We have 6 patients (12%) resulted with significant malalignment 4 cases (8%) were in proximal 1/3 and 2 cases (4%) in the distal 1/3, (Hansen et al 2007) [34] reported in his study a total of 19.4% of malalignment (13.6% for proximal fractures, 4.3% for shaft fractures, and 1.5% for distal fractures).

We have a 4 patients (7%) got a superficial infection, while it was approximately 1% in the study of Shuler (2007)[29], and 43.8% of patients were considered to have developed infection as had been mentioned by (Puloski 2004) [35], and 1.9% by Court-Brown CM (2004)[36].

In our study out of 52 patients, (11%) got knee joint flexion restricted to about 85 degrees and needed a course of physiotherapy. Whereas 2 patients (4%) had a about 10-15 degrees restricted range of motion of the ankle who need also a physiotherapy course.

Keating JF [38] shown a loss of knee range of motion in the early postoperative period and a 10% loss of ankle range of motion.

Habernek H [37] shown a rare difference in knee range of motion and in contrast he did find a loss of ankle range of motion in (42.4%) ranging from 5 to more than 20 degrees.

In our patients 90% started full weight bearing at a mean time of 13.2 weeks. Martinus Braten(2005) [39] shown that un protected weight bearing was achieved at 12 weeks.

In our patients estimated blood loss during and after surgery was 400-600 cc during the first 24 hours. James E (2008)[40] shown an estimated blood loss of 100-300cc intra operatively.

However, in our 6-18 months of follow-up, we found a comparable result to previous short term follow-up studies.

Out of our 56 patients, 15 (26.7%) patients had at least moderate knee pain postoperatively. Habernek reported a knee pain incidence of 31% [12], whereas Court-Brown...
reported an incidence of 56.2% [11]. Court-Brown also reported that knee pain was worse in younger patients and frequently required nail removal.

One advantage of early fixation is the ability for early range of motion of both the knee and ankle. (Schmidt et al., 2003)[41]. Overall, intramedullary nailing is an effective treatment for fractures of the tibial shaft.

Conclusion
After tibial nailing of isolated tibial fractures, majority of patients’ function is comparable to population norms, where they can start full weight bearing without assistance, other advantages of intramedullary fracture fixation, that it is a familiar technique for fixing tibial shaft fractures; it allows osteosynthesis under biological aspects; there is no need to open the fracture site; soft tissue dissection is not necessary; and the blood supply is spared.

It enables symmetric, dynamic and load-sharing fracture stabilization without the need to restrict joint motion, with very few complications. We see that locked intramedullary nailing is a suitable procedure for unstable fractures of tibial shaft.

In contrast to open reduction and internal fixation, intramedullary nailing can be performed initially on the first or second day of admission. The advantages of IM nailing include better alignment, earlier range of motion of knee and ankle, better mobility of patient, less frequent follow up visits, and earlier return to work.
### Table (2) Causes of fractures

<table>
<thead>
<tr>
<th>Mechanism of injury</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTA</td>
<td>32</td>
<td>57%</td>
</tr>
<tr>
<td>Work related injury</td>
<td>20</td>
<td>36%</td>
</tr>
<tr>
<td>Sport injuries</td>
<td>4</td>
<td>7%</td>
</tr>
</tbody>
</table>

### Table (3) Results of our study

<table>
<thead>
<tr>
<th>Results of treatment</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>33</td>
<td>63.5%</td>
</tr>
<tr>
<td>Good</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Fair</td>
<td>9</td>
<td>17%</td>
</tr>
<tr>
<td>Poor</td>
<td>6</td>
<td>11.5%</td>
</tr>
</tbody>
</table>

### Table (4) Fracture configuration

<table>
<thead>
<tr>
<th>Pattern of fracture</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comminuted</td>
<td>40</td>
<td>71%</td>
</tr>
<tr>
<td>Spiral</td>
<td>7</td>
<td>13%</td>
</tr>
<tr>
<td>Short oblique</td>
<td>6</td>
<td>10.7%</td>
</tr>
<tr>
<td>Transverse</td>
<td>3</td>
<td>5.3%</td>
</tr>
</tbody>
</table>
Figure (1) Midshaft tibial fracture of left leg using only distal static screw.

Figure (2) Comminuted midshaft fracture with better fly.
Figure (3) One case with superficial infection at the proximal wound and the distal screws entry wounds.

Figure (4) Healing in distal 1/3 fracture after Dynamization by removal of static screw.
Figure(5) One case of spiral fracture in distal 1/3 of left leg using of 2 planes distal screws set.

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Metabolic syndrome among Type 2 Diabetic Patients in Babel Governenate

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Abstract
Metabolic syndrome (MS) is becoming a serious global problem. This study was carried out on patients with type 2 diabetes mellitus attending Merjan teaching hospital, diabetic clinic in Babylon city, for the period from December 2009 to March 2010, to investigate the occurrence of metabolic syndrome among diabetic patients. The relevant data were collected, anthropometric measurement and laboratory estimation of triglyceride and high density lipoprotein-cholesterol (HDL-C). The study was conformed on 200 diabetic patients (90 males, 110 females) the mean age group was 59.2 ± 9.2 for males and 56.5 ± 9.02 years old for females. Metabolic syndrome was diagnosed according to the criteria of National Cholesterol Education Programme (NCEP) in 133 patients (59 males and 74 females). The prevalence of metabolic syndrome among diabetic patients was 66.5%. MS was distributed in 65% urban and 35% rural area. In MS patients, the mean waist circumference in males was 114 ± 12.9 cm females. Mean triglyceride level in MS patients was 2.74 mmol/l ± 0.5 in males and 2.4 mmol/l ± 0.14 in females. Body mass index was 31.19 in MS patients. Most patients with MS have three components mainly Diabetes and hypertension and one of these disorders (obesity as measured by BMI and waist circumference, hypertriglyceridermia and decrease in HDL-C).

Introduction
Metabolic syndrome (MS) is a highly prevalent clinical entity, and become one of major public health challenges. MS is world wide disease due to increase of mortality from its complication and because of long duration of disease [1]. As defined by the recent Adult Treatment Panel (ATP) III required three of the
following abnormalities for diagnosis the metabolic syndrome , waist circumference >88 cm in women and >102 cm in male. Fasting serum triglycerides >1.69mmol/l, HDL cholesterol<1.03 in men and <1.29mmol/l in women, blood pressure ≥ 130/85 mm Hg, or fasting serum glucose ≥ 6.1mmol/l[2]. Insulin resistance with resultant hyperinsulunemia which causes type 2 diabetes mellitus appears to be a major determinant of MS[3]. The pathogenesis of the metabolic syndrome is still unclear, although some environmental factors, coupled with unknown genetic factors, clearly interact to produce the syndrome[4]. However, metabolic syndrome associated with a marked increasing in the risk of cardiovascular disease (CVD)[5]. Multiple factors appear to predispose to metabolic susceptibility such as genetic defects in insulin signaling pathways, various disorders of adipose tissue, physical inactivity, mitochondrial dysfunction, polygenic variability in individuals and ethnic groups, advancing age, endocrine dysfunction, and certain drugs[6,7]. The prevalence of metabolic syndrome worldwide is between 20-40% among males and females,[8]. Rapid demographic, nutritional, and economic changes are as occurring in South Asians. The life expectancy and the percentage of elderly population have increased.

Most importantly, globalization of diets and consumption of nontraditional fast foods have occurred at a rapid place in urban areas[9]. rapid increase in western fast food outlets, sale of aerated sweet drinks, and increased consumption of fried snacks in work place is being seen commonly.[9].Intake of dairy products, sugar, and hydrogenated vegetable oil (vanaspatin) containing a high amount of trans fatty acids [TFA] is widespread in people belonging to low and middle socioeconomic strata[10] In addition, modern are less physically active, and a sedentary lifestyle is increasing, migration from villages to cities is increasing. These intracountry migrants become urbanized and mechanized, resulting in nutritional imbalance, physical inactivity[11]. Recent studies have reported that physical activity and physical fitness are associated with lower prevalence and incidence of metabolic syndrome and individual CVD risk factors (e.g., high blood pressure, insulin resistance, abdominal adiposity, and dyslipoproteinemia[12]. The other components of the metabolic syndrome, such as dyslipidemia, may have an equal or greater bearing on the syndrome and its association with coronary heart disease(CHD), and all cause mortality, Subjects with insulin resistance often display a characteristic form of dyslipidemia, with near-normal low-density lipoprotein cholesterol (LDL-C), low high-density lipoprotein-cholesterol (HDL-C), and elevated triglycerides, which are important disorders for diagnostics criteria to determine MS and related disorder[13]. Metabolic syndrome is responsible for increasing morbidity and mortality in all age groups and it is a very important health problem due to the expected long-term diseases and expenditure[14]. As MS is considered global health problem it is required for more studies and control method in treatment regimes control diabetes ,good guilty of food ,physical activity [15].The change in environmental condition and dietary habits among different population ,which differ from one country to the other necessitate the determination of biochemical and anthropometric parameters which evoke MS among Iraqi population.
Material and Methods
The study design was a cross-sectional study conducted between December 2009–March 2010 and, this study was carried out at Merjan teaching Hospital in the university of Babylon/college of medicine in Babylon Governorate on patients of diabetes mellitus type 2. The study including questionnaire and biochemical investigation, in questionnaire age, sex, address (rural and urban), duration of diabetes mellitus, types of antidiabetic treatment, history of chronic illness, hypertension history and treatment type of hypertension and family history of diabetes.

Measurements
Blood pressure
It was measured using mercury sphygmomanometer (used for all patients) while the patients sitting for five mints.

Body mass index; measured according to the formula of weight in (kilogram) divided by the square of height in (meter) : classifying underweight (BMI <18), normal (BMI 18-24.5), overweight (BMI 25-29.9) and obese (BMI >30).

Waist circumference (WC): It was used to determined abdominal obesity. The waist was measured while the patients standing up, at the level of umbilicus as the smallest girth between the costal margins and the iliac crests.

Biochemical estimation
After a minimum of 10 hours of fasting, five milliliters of venous blood was drawn from the antecubital vein of each participant. Separation was done using a centrifuge at 3000 rpm for about 15 min. The high-density lipoprotein cholesterol (HDL-C) fraction was measured after precipitation of LDL-C and VLDL-C with dextran sulfate-magnesium techniques and fasting Triglyceride estimation was measured by the enzymatic method [16]. Accuracy was monitored using commercial-quality control sera. Measures representing the components of metabolic syndrome were obtained, including fasting blood glucose, waist circumference, triglyceride, HDL-C, and blood pressure. As detailed in the Adult treatment Panel (ATP III) report, participants having three or more of the following criteria were defined as having metabolic syndrome: Abdominal obesity (waist circumference >102 cm in men and >88 cm in women), hypertriglyceridemia (>1.69 mmol/L, low HDL-C <1.04 mmol/L in men and <1.29 mmol/L in women), systolic blood pressure (>130 mmHg, diastolic blood pressure >85 mmHg). The data were summarized using descriptive statistics (mean, standard deviations, and percentages); an independent t-test was used to compare the physical characteristics and biochemical variables of males and females. A p-value of 0.05 or less was considered statistically significant.

Results
This study included 200 patients (90 males and 110 females) of a mean age of 59.14±9.26 for males and 56.9±9.02 for females.
There are 130 patients from urban area and 70 patients from rural area.

According to analysis of data obtained from this study, there are 133 patients with obesity, 59 male, 74 female, represented by high BMI about 31.19 in male and 32 in female, and mean of waist circumference 114.5±1.15 in male and 107.8±12.9 in females.

The results revealed that Patients with hyper triglyceredimia are 79.24 males and 55 females, with a mean of 2.74 mmol/l±0.38 in males and 2.4 mmol/l±0.5 in females.
Patients with low level of HDL-C are 64.27 males and 37 females with a mean 0.83mmol/l±0.08 in males and 0.9mmol/l±0.14 in females. These characters are represented in following table.

**Table 1** certain characteristics for persons with and without MS

<table>
<thead>
<tr>
<th>Character</th>
<th>Mean±Sd in Male</th>
<th>Mean±Sd in Female</th>
<th>Mean±Sd Without MS</th>
<th>Statistical significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waist circumference(cm)</td>
<td>114.5±1.15</td>
<td>107.8±12.9</td>
<td>96±4Male</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>BMI(Kg/m²)</td>
<td>31.19±1.15</td>
<td>31.19±1.15</td>
<td>26.25±1.9</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>Triglyceride level(mmol)</td>
<td>2.74±0.38</td>
<td>2.4±0.5</td>
<td>1.29±0.24</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>HDL-C(mmol/L)</td>
<td>0.83±0.08</td>
<td>0.9±0.14</td>
<td>1.4±0.4</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>145/85</td>
<td>150/90</td>
<td>135/80</td>
<td>Not significant</td>
</tr>
<tr>
<td>Systolic/diastolic</td>
<td>±20/15</td>
<td>±20/15</td>
<td>±15/15</td>
<td></td>
</tr>
</tbody>
</table>

As patients have diabetes mellitus type 2 for duration of DM from 1 year to 15 year and most of patients on oral hypoglycemic drug with diet control and on periodic follow up for DM in diabetic consultant clinic. most of patients in this study have hypertension hypertensive patients were 170 and they are on antihypertensive measures. about 165 of patients are physically inactive so physical inactive percent is 81%, and physical activity are positive in 19% of MS. MS distribution represented in following table.

**Table 2** distribution of MS among type 2 diabetic patients

<table>
<thead>
<tr>
<th>No. of Abnormality</th>
<th>Types of Metabolic abnormality</th>
<th>Male</th>
<th>Female</th>
<th>Total No.and(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hypertensionanddiabeticandabdominal obesity</td>
<td>59</td>
<td>74</td>
<td>133(66.5%)</td>
</tr>
<tr>
<td>3</td>
<td>HypertensionanddiabeticandHigh Tg.</td>
<td>24</td>
<td>55</td>
<td>79(39.5%)</td>
</tr>
<tr>
<td>3</td>
<td>HypertensionanddiabeticandHighHDL</td>
<td>27</td>
<td>37</td>
<td>64(32%)</td>
</tr>
<tr>
<td>4</td>
<td>Hypertensionanddiabeticandabdomesity and High Tg.</td>
<td>43</td>
<td>47</td>
<td>90(45%)</td>
</tr>
<tr>
<td>2</td>
<td>Hypertensionanddiabeticandabdomesity and High Tg.</td>
<td>16</td>
<td>31</td>
<td>47(23.5%)</td>
</tr>
<tr>
<td>3</td>
<td>Diabetes and obesity and high Tg.</td>
<td>1</td>
<td>2</td>
<td>3(1.5%)</td>
</tr>
<tr>
<td>3</td>
<td>Diabetes and obesity and low HDL</td>
<td>1</td>
<td>1</td>
<td>2(1%)</td>
</tr>
</tbody>
</table>

Age distribution of patients with MS are represented in following figure.
Figure 1: Age distribution for MS patients

Rural and Urban distribution for MS patients are represented in following figure.

Figure 2: Rural and Urban distribution for MS patients

The main abnormal characters including DM, hypertension, obesity, high triglyceride level, low HDL-C among MS patients are represented in the following figure.
Discussion
This current study is to examine the presence and components of metabolic syndrome in type 2 diabetic patients in Babel Governorate as they attending the special diabetic consultant clinic in Merjan Teaching Hospital for periodic check up. According to ATP III criteria, the prevalence of metabolic syndrome among our patients was found to be 66.5% in this study, we depend on definition ATPII, IDF, WHO for diagnosis of MS[17]. (Although there are difference in population in eastern and western society we depend on these definitions because there are no adjustment for this standards parameters in our society).
In our study Mean age group for patients have MS was 59.14±9.26 for male and 56.9±9.02 for female respectively these are indicated that prevalence of MS increases with age, this result was in good agreement with studies on MS in Sudan and Basra[18-19].
MS become prevalent medical problem and the prevalence of MS increase and become global medical problem, and mainly in urban societies, this study reveals that percentage of MS are 65% in urban area and this result, agree with studies in near by areas Turkia and Iran[20-21]. Increments of prevalence of MS in urban related to adoption of western life style in our society, low physical activity, sedentary behaviors and unhealthy habits in healthier lifestyle and food.
The MS in this study in female more than male, the prevalence of MS and abnormal characters are due to obesity are 44% in male and 64% in female, and increase of triglyceride are 32% in male, 68% in female, and low level of HDL-c are 42% in male, 56% in female, the prevalence of MS among females more than males agree with other studies in western population and eastern area as in Iran and Pakistan [22-24]. high prevalence of MS in female can be related to increase obesity in female and lower level of physical activity and high calories food, and all these factors contributing to insulin resistance and MS. The mechanism by which excessive body fat causes insulin resistance and impairs glucose metabolism is not clearly defined, but fat stores are an important cause of increased free fatty acid and triglyceride in the skeletal muscle, which impairs insulin secretion. Central obesity is also associated with a decreased production
of adinopectin, an antidiabetic collagen-like molecule [25]. Our report shows a mean HDL-C of 0.83±0.08 and 0.9±0.14mmol/L , and triglyceride of 2.74± 0.38 mmol/L 2.4± 0.5 mmol/L in men and women respectively, the patients with hypertriglycerdemia are39.5%and about 32% for low level of HDL-C which are the main contributors for MS components according to ATPll definition ,and these tow metabolic abnormality have positive correlation with increase risk for cardiac diseases[26].

**Conclusion**  
According to the results obtained from this study which indicated that MS become prevalence among diabetic patients, the patients in addition to diabetes mellitus type 2, by investigation were proved to have MS they have obesity , hypertension , dyslipidemia which are mainly contributed to increase rate of coronary artery diseases and increase mortality rate The main strategy for control MS is control of Diabetes mellitus by continuous follow up, weigh reduction and adaptation on good quality of food and increase in physical activity.

**References**
15-Ford ES, Giles WH. A comparison of the prevalence of the metabolic
24-Rizwan K ,Cate B .Appropriate diet and life style intervention can successful tret. of MS in female 2008;57:1502-1508 .
Abstract
The aim of this study to held a comparasim between FNAC and histopathology of patient with nodular goiter.

Methods: A prospective study of seventy eight patients included through the period between may 2009- October 2009 .All cases presented with multinodular and diffuse goiter, Ultra sound and thyroid function test were done for all them. The aspirated contents of the needle are expelled on to glass slides . two slides were immediately fixed in 95% ethyl alcohol for about 30 minutes and the slides well stained with Haematoxylin and Eosin (H&E).

Results: The types of thyroid nodule cases which is diagnosed by FNAC are predominant of nodular colloid goiter 52 (66.6%) cases, followed by hyperplastic thyroid nodules 6(7.6%) cases, the thyroid cyst and papillary carcinoma having 4(5.1%) cases, , and finally the follicular tumor and hashiomato's thyroiditis 3(5.1%).

The histopathology results are reveal the nodular colloid goiter is the most common disease 61(78%) cases, hyperplastic thyroid nodule is the second common one, followed by Hashiomato's thyroiditis and follicular adenoma 4(5.1%)cases. the papillary carcinoma represent the last one 2(2.5%) cases.

There are three false positive cases and one false negative case. The sensitivity (80%), specificity (96%) and accuracy (97%).

Conclusion: FNA cytology of thyroid goiter are sensitive, specific, accurate and should be done before surgery to decide type of surgery patients needs.
cost-effective diagnostic procedure in the assessment of thyroid nodules [3,4]. It is the primary diagnostic procedure in diagnosis of thyroid malignancy [5]. Numerous studies have shown it is high sensitivity and specificity in diagnosing malignancy of the thyroid especially papillary carcinoma [2,6]

In general FNAC are reported as clearly malignant, clearly benign, suspicious or non diagnostic. A non diagnostic results should never be interpreted as benign [7].

Papillary thyroid carcinoma is the easiest to diagnose microscopically with evidence of papillary fronds, monolayered sheets of cells with dense cytoplasm and distinct intracellular borders and pale nuclei, indistinct nucleoli[8]. Anaplastic carcinoma is also easy to identify due to its high degree of cellularity atypia, multinucleated malignant cells, malignant spindle cells with mesenchymal appearance and necrotic cell fragments [9].

Follicular adenoma and carcinomas have similar cytological appearance with diagnosis of malignancy requiring demonstration of capsular or vascular invasion, cellular smear with equal sized cell clusters derived from follicles and often have rosette-like or acinar appearance, scanty colloid[10,11]. The criteria for diagnosis of Hashimoto thyroiditis are Askanazy cells, moderate numbers of lymphocytes mainly of small mature type and scattered plasma cells[7,12]. In thyroid cyst during aspiration there is brown fluid, numerous foamy cells, many with ingested debris and spare epithelium showing degenerative features[13].

In hyperplastic nodule the cells are enlarged cells with more abundant vacuolated cytoplasm, variation in nuclear size and little colloid[14].

Most patients suffering some discomfort in the area for few hours the bleeding, infection and cyst formation but these complications are rare. Abundant colloid is the most characteristic finding in nodular goiter and fragility of the follicular cells, foamy cells [15].

The patient should be aspirated in the supine position placing a pillow under the neck tends to expose the gland more, bring it away anteriorly from the sternomastoids this is particularly useful when a small, diffuse goiter [16], we use 23 gauge needles and 2-4 aspirations may be performed. in diffuse goiters both sides are sampled and in large nodules material from several areas should be aspirated, the needle is moved to and fro for several millimeters in the same needle track, this must performed rapidly because of the vascularity of the thyroid, the aspiration is stopped if any material appears in the barrel of the needle or in the syringe. [17]

**Patients and Method**

A prospective study of seventy eight patients included through the period between May 2009- October 2009. The case notes were retrieved and information about the age and sex. All cases presented with multinodular and diffuse goiter, Ultra sound and thyroid function test were done for all them.

Each patients had one or two aspirate obtained using a 10 ml plastic syringe fitted with a 23-25 gauge disposable needle 1 1/2 inch long. The procedure took a fraction of minutes. The aspirated contents of the needle are expelled on to glass slides. two slides were immediately fixed in 95% ethyl alcohol for about 30 minutes and the slides well stained with Hamatoxylin and Eosin (HandE) and examined with light microscope.
the microscopic interpretation include:-
Benign: this means the nodule is not cancerous.
Malignant: this means nodule is cancerous.
Suspicious: this means diagnosis was not conclusive, but there was possible cancer.
Inconclusive: if the sampling was not sufficient, a diagnosis might be difficult in this case, an additional biopsy might be recommended.

Results
The FNAC results divided to: benign, malignant, suspicious and unsatisfactory according to study of slides
A seventy eight cases in this study, 72 (92%) cases can be diagnosed by the FNAC while 6 (8%) cases need to another FNAC assessment table (1). the types of thyroid nodule cases which is diagnosed by FNAC are illustrated in (table2), which is shows predominant of nodular colloid goiter 52 (66.6%) cases, followed by hyperplastic thyroid nodules 6(7.6%) cases, the thyroid cyst and papillary carcinoma having 4(5.1%) cases, and finally the follicular tumor and Hashiomato's thyroiditis 3(5.1%). There is three suspicious cases by FNAC, the histopathology reveal two benign nodular colloid goiter and one case follicular adenoma. there is three undiagnosed cases by FNAC and the histopathology findings are all of them benign cases. the histopathology results are recorded in (table3) which

\[
\text{True +ve} = \text{Sensitivity} = \frac{\text{True +ve}}{(\text{False-ve} + \text{True + ve})} \times 100
\]

Specificity: a measure of the likelihood that a patient with a lesion determined to be benign by histopathology will not have an malignant features by FNAC results and express as well in percent.

\[
\text{Specificity} = \frac{\text{True -ve}}{(\text{False +ve} + \text{True - ve})} \times 100
\]

Statistical Analysis
The result were presented by the use of SPSS and analyzed by chi square with probability less than 0.05 to be significant.
The following items were measured after comparing the results of reports of histiopathological with the findings of FNAC technique:-
Sensitivity: a measure of the likelihood that a patient with tumor will have abnormal FNAC results express as percent

\[
\text{Sensitivity} = \frac{\text{True +ve}}{\text{True +ve} + \text{False -ve}} \times 100
\]

Specificity: a measure of the likelihood that a patient with tumor will have normal FNAC results express as percent

\[
\text{Specificity} = \frac{\text{True -ve}}{\text{True -ve} + \text{False +ve}} \times 100
\]
True -ve 
Specificity= ------------------------- x100 
(False +ve)+ (True –ve) 

Positive predictive value: The probability that a thyroid disease with abnormal thyroid FNAC results will prove to be malignant thyroid on histopathology 

True +ve 
Predictive Value of +ve results= ----------------------------------X100 
(True +ve)+ (False+ve) 

Negative predictive value: The probability that thyroid disease without an abnormal cytological results will prove to be benign by histopathology 

True -ve 
Predictive value of –ve results = ------------------------------ 
(True -ve)+(False-ve) 

True negative : FNAC negative for thyroid malignant cells, histopathology reveal no malignancy False positive: FNAC positive for thyroid malignant cells, histopathology reveals no malignancy 
True positive: FNAC positive for thyroid malignant cells , histopathology reveal malignancy False negative: FNAC negative for thyroid malignant cells, histopathology reveals malignancy 

(True+ve)+(True-ve) 
Accuracy = -------------------------X 100 
Total 

The sensitivity rate was 80%, the specificity rate was 96%, predictive value of +ve results 

Table 1 Cases of FNA diagnosis

<table>
<thead>
<tr>
<th>F.N.A. Result</th>
<th>NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis by F.N.A.</td>
<td>72</td>
</tr>
<tr>
<td>Undiagnosed by F.N.A.</td>
<td>6</td>
</tr>
<tr>
<td>Total cases</td>
<td>78</td>
</tr>
</tbody>
</table>
### Table 2 F.N.A.C. Results

<table>
<thead>
<tr>
<th>F.N.A.C.</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodular colloid Goiter</td>
<td>52 (66.6%)</td>
</tr>
<tr>
<td>Thyroid cyst</td>
<td>4 (5.1%)</td>
</tr>
<tr>
<td>Hyperplastic thyroid Nodules</td>
<td>6 (7.6%)</td>
</tr>
<tr>
<td>Papillary ca.</td>
<td>4 (7.6%)</td>
</tr>
<tr>
<td>Follicular tumor</td>
<td>3 (5.1%)</td>
</tr>
<tr>
<td>Hashiomatics thyroiditis</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td>Suspicious tumor</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td>Non diagnostic</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td>Total cases</td>
<td>78 (100%)</td>
</tr>
</tbody>
</table>

### Table 3 Histopathological findings

<table>
<thead>
<tr>
<th>Histopathology Findings</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodular colloid Goiter</td>
<td>62 (78%)</td>
</tr>
<tr>
<td>Hashiomatics thyroiditis</td>
<td>4 (5.1%)</td>
</tr>
<tr>
<td>Follicular adenoma</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td>Papillary carcinoma</td>
<td>2 (7.6%)</td>
</tr>
<tr>
<td>Hyperplastic nodules</td>
<td>7 (8.9%)</td>
</tr>
<tr>
<td>Total cases</td>
<td>78 (100%)</td>
</tr>
</tbody>
</table>

### Table 4 the difference between the FNAC and histopathology

<table>
<thead>
<tr>
<th>Thyroid Disease</th>
<th>F.N.A.C. No.</th>
<th>Histopathology No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodular colloid Goiter</td>
<td>52 (66.6%)</td>
<td>61 (78.2%)</td>
</tr>
<tr>
<td>Hashiomatics thyroiditis</td>
<td>3 (3.8%)</td>
<td>4 (5.1%)</td>
</tr>
<tr>
<td>Thyroid cyst</td>
<td>6 (7.6%)</td>
<td>7 (8.9%)</td>
</tr>
<tr>
<td>Follicular adenoma</td>
<td>4 (5.1%)</td>
<td>—</td>
</tr>
<tr>
<td>Hyperplastic nodules</td>
<td>3 (3.8%)</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>78 (100%)</td>
<td>78 (100%)</td>
</tr>
</tbody>
</table>
Discussion
Thyroid diseases are not uncommon and the patients are referred for FNAC as well as tissue specimen diagnosis for various thyroid swellings.
FNAC is a sensitive and highly specific method of evaluating thyroid nodules for malignancy.
FNAC of thyroid nodule is reported to have a sensitivity ranges from 65%-98% and a specificity of 72%-100%.
In our series the analysis of the data revealed the sensitivity 80% which is less than Harun.A. Nggada, Alhaj B. Musa et al.[19] And Danorov, redler A and DeAntoni et al.[15] 88.9% and 91.6% respectively.
In our study the specificity is 96% which is similar to results of Harun.A. Nggada, Alhaj B. Musa et al.[19] And Danorov, redler A and DeAntoni et al.[15] 96.1% and 94.7% respectively.
The FNR is defined as the percentage of patients with benign cytology in whom malignant lesion are later on confirmed on thyroidectomy.
Our FNR is 1.5% which is accepted figure compare to compell etal[18] (2.4%), and Yang J, Schnadig V, Logrino R, Wasserman PG [9] (1.7%) we had only one false negative case which was Diagnosis by FNAC as nodular goiter and histopathology revealed a result follicular carcinoma. that was due to in proper sampling of FNAC.
The FPR indicates that a patient with malignant FNAC result was found on histopathological examination to have benign lesion.
In present study the FPR is 2.6% this result is accepted in compare to Caruso and Mezzaferri et al[17] 6% while Campbell and Pillsbury et al[18] reported 1.2%
The false positive three cases two of them were papillary carcinoma and the last one was follicular tumor by FNA while the histopathology showed one of them are hyper plastic nodule and the other was nodular colloid goiter and this can be explained by hyper cellularityand atypia of cells. While the last case was hasiomatos thyroiditis and this can be explained by hypercellularity.
The accuracy of our study was 97%, this very good result compared Caruso and Mazzaferri et al.[17] result which was 95% and Harun.A. Nggada, Alhaj B. Musa et al[19] (94.2%), the interpretation error can be reduced if aspirate was obtain from different portion of the nodule.
The result of our study shows that FNAC is more specific than sensitive in detecting malignancy and there fore it use as a reliable diagnostic test.

Conclusion and Recommendation
• FNA cytology of thyroid nodules are sensitive, specific, accurate and the initial investigation of thyroid disease and should be done before surgery to decide type of surgery patients needs.
• We encourage our physician and surgeon to embrace this procedure during patients handling, the use of ultrasound guided FNA produce is help to decrease the interpretation error.
• Its advisable to compare the final H/P result with initial FNA result the same histopetologist.
• Larger sample is required to for accurate result of FNA in assessment of rare thyroid disorder.

References
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aspiration cytology of thyroid nodule: how accurate is it and cytopathology, Vol. 12, No. 6. 2001 Dec. 399-405
4. Sclabas GM; Staerkel GA; Shapiro SE; Fornage BD ; Sherman SI; Vassilopoulou-Sellin R; Lee JE; Evans DB, Fine- needle aspiration of the thyroid and correlation with histopathology in a contemporary series of 240 patients. Am.J Surg 2003;186(6) 709-710.
Abstract

Sixty nine asthmatic patients (thirty five males and thirty four females) used corticosteroid therapies as oral tablets and inhaler forms, thirty eight patients used oral tablets and thirty one patients used inhaler form. Thirty five apparently healthy individuals with out any disease were taken as a control group.

Blood samples were drawn from patient and control groups after overnight fasting. The serum obtained from the blood was used for spectrophotometric estimation of the level of total protein, albumin, chloride, total calcium, phosphorus, total magnesium and zinc concentrations and serum alkaline phosphatase activity. Sodium and potassium levels were estimated by flame photometer. Ionized calcium and ionized magnesium levels were calculated by using two mathematical formulae.

The results showed that oral corticosteroid caused significant increase in mean serum sodium level (P < 0.001), and significant decrease in mean serum potassium (P < 0.001), total magnesium (P < 0.001), ionized calcium (P < 0.001), phosphorus (P < 0.001) and alkaline phosphatase activity levels (P < 0.001) when compared with those of the control group and those who used inhaled corticosteroid. The significant decrease in the mean serum chloride is (P < 0.01) when compared with the control group and (P < 0.05) when compared with those who used inhaled corticosteroid.

Also the results elucidated that oral corticosteroid had no significant influence on mean serum total protein (P > 0.05) and albumin (P > 0.05) levels when compared with those of the control group and those who used inhaled corticosteroid. The obtained results explained that inhaled corticosteroid had no significant effect on all the measured parameters when compared with those of the control group (P > 0.05).

It was concluded that oral corticosteroids possess more undesirable effects on the measured parameters than inhaled form as appeared by the changes in the measured parameters. Thus, the measurement of serum electrolytes and the correction of mineral status is quite important during corticosteroid therapy.

Serum Electrolytes and Minerals Status in Asthmatic Patients on Corticosteroids

Tarik H. Al-Khayat    Moaed E. Al-Gazally    Maitham Ahmed Abdul Aemma

Biochemistry Dept., College of Medicine, University of Babylon, Hilla, Iraq.
Asthma is a chronic inflammatory disease of the airways that is associated with increased responsiveness of the airways to environmental stimuli and variable airflow obstruction. It is a result of the interaction between genes and environment, and several genetic and environmental factors [1].

The prevalence of asthma increased steadily over the latter part of the last century in countries with a Western lifestyle and is also increasing in developing countries. In childhood, more common in boys, but following puberty females are more frequently affected. The socio-economic impact of asthma is enormous, particularly when poor control leads to days lost from school or work, hospital admissions and, for some patients, a premature death [2].

The prevalence of asthma has increased dramatically in recent years, with the largest increases and the highest prevalence in youth 18 years old and younger [3]. Large increases in the prevalence of asthma and allergic diseases have been reported in industrialized countries during the last twenty to thirty years [4]. There is strong evidence for differences in the prevalence of allergic diseases between urban and rural areas in Europe and in non-industrialized countries, with higher prevalence of allergic diseases reported in urban areas [5].
commonly grouped as major elements [11]. The major minerals, those that the body needs in amounts exceeding 100 milligrams per day, include calcium, sodium, phosphorous, magnesium, potassium and chloride. The essential trace minerals, those that one needs in minute amounts, include copper, iron fluoride, iodide, selenium and zinc. The (electrolytes) term is used to refer to the minerals sodium, potassium and chloride [12]. The alkaline phosphatases (ALPs) are a group of isoenzymes that hydrolyse organic phosphates at high pH. They are present in most tissues but in particularly high concentrations in the osteoblasts of bone and the cells of the hepatobiliary tract, intestinal wall, renal tubules and placenta [13].

Materials and Methods

Materials

Subjects: include the control and patient groups

A. Group 1: Thirty five (23 males and 12 females) apparently healthy subjects were chosen as healthy people. They were non smokers; don't have any history of chronic diseases. Their age range is from (23) to (48) years with the mean age and standard deviation (34.428 ± 9.555).

B. Group 2: Thirty one asthmatic patients (17 males and 14 females) were included in this study. Their age range is from (22) to (53) years with the mean age and standard deviation (34.096 ± 10.274) years. They were non smokers and on inhaled corticosteroid therapy [beclomethasone dipropionate (BDP)] (Beclosone)R with duration of treatment for (1) year. They received short courses of systemic corticosteroids in the past.

C. Group 3: Thirty eight asthmatic patients (18 males and 20 females) were participated in this study. Their age range is from (26) to (51) with the mean age and standard deviation (33.921 ± 11.075). They were non smokers and on oral corticosteroid therapy [prednisolone tablets (prisolone)R] with a duration of treatment for (1) year. The patients in group 2 and 3 were chronic stable asthmatics; they were not recently discharged from the hospital.

Patients selection and collection of specimens

Only asthmatic patients who were treated with corticosteroid drugs were included in this study. Post menopausal asthmatic women were excluded from the study. Patients with diarrhea, vomiting, a history of hepatic, cardiac, renal, bone, diabetes mellitus, thyroid gland disorders, hypertension, epilepsy or other diseases that may interfere with the study along with patients who take other drugs in addition to corticosteroids were also excluded from the study, except those on salbutamol inhaler (ventol).R

The study was carried from the first of November 2009 to the end of May 2010. The samples of patients were obtained from, Asthma and Allergy Center in Hilla city. The study was performed at the laboratory of Biochemistry Department in College of Medicine, University of Babylon. A questionnaire was taken for each patient and control subjects.

Blood sampling

Venous blood samples were drawn from healthy control individuals and asthmatic patients after fasting by using disposable syringes in the sitting position. Five milliters of blood were obtained from each subject without using tourniquet, and was pushed slowly into plain disposable tubes with out anticoagulant. The blood was allowed to clot for 10-15 minutes and serum was obtained by centrifugation.
at 2500 rpm for approximately 10-15 minutes. Then serum samples were placed into new clean disposable plain tubes.

**Methods**

Serum alkaline phosphatase activity determined by BioMerieux SA, France kit. Serum total protein concentration determined by Biolabo SA, France kit. Serum albumin concentration determined by Biolabo SA, France kit. Serum total calcium concentration determined by Linear Chemicals, S.L., Spain kit. Serum phosphorous concentration determined by Human, Germany kit. Serum total magnesium concentration determined by Linear Chemicals, S.L., Spain kit.

Serum zinc concentration determined by LTA s.r.l., Italy kit. Serum chloride concentration determined by Biolabo SA, France kit. All the above mentioned parameters were measured by using spectrophotometer. The serum concentrations of sodium and potassium were measured by flame photometer.

Corrected total calcium was calculated according to the formula: [14].

Corrected calcium concentration mmol/L = measured calcium mmol/L + 0.02 × (40 - albumin g/L)

The concentration of ionized calcium in serum was calculated according to the formula: [15].

Ionized calcium (mmol/L) = $60 \times \frac{\text{measured calcium (mmol/L)}}{K' + 60} $ 

\[ K' = 0.19 \times \text{total protein (g/L) + albumin (g/L)} \]

The concentration of magnesium ion in serum was calculated from measurement of concentrations of total serum protein and total serum magnesium according to the equation: [16].

\[ [100.4 \times \frac{GZ}{100G - P}]^2 + (33.77 + 2.42fP - fMg) [100.4 \times \frac{GZ}{100G - P}] - 33.77fMg = 0 \]

\[ P = \text{total protein in gram per 100 ml of serum.} \]
\[ G = \text{specific activity of serum} = 0.00292 \times P + 1.007 \]
\[ f = \text{liters of serum that contain 1 kilo of water} = 1000 / G (4225.6 – 3225.6 G). \]
\[ Mg = \text{total magnesium in milli-equivalent per liter of serum.} \]
\[ Z = \text{ionized magnesium in milli-equivalent per liter of serum.} \]

**Results and Discussion**

Serum total protein and albumin were measured in the sera of group 1, group 2 and group 3; the results are shown in table 1.
Table 1 Serum total protein and albumin concentrations in the group1, group2 and group3.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Groups</th>
<th>Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein (g/dL)</td>
<td>Group1</td>
<td>7.553 ± 0.485</td>
<td>6.325 – 7.993</td>
</tr>
<tr>
<td></td>
<td>Group2</td>
<td>7.470 ± 0.480</td>
<td>6.082 – 8.00</td>
</tr>
<tr>
<td></td>
<td>Group3</td>
<td>7.610 ± 0.376</td>
<td>6.853 – 8.100</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>Group1</td>
<td>4.180 ± 0.263</td>
<td>3.502 – 4.431</td>
</tr>
<tr>
<td></td>
<td>Group2</td>
<td>4.134 ± 0.278</td>
<td>3.351 – 4.486</td>
</tr>
<tr>
<td></td>
<td>Group3</td>
<td>4.191 ± 0.237</td>
<td>3.393 – 4.488</td>
</tr>
</tbody>
</table>

Table 1 shows that there is no significant difference in the mean serum total protein (P > 0.05) and albumin (P > 0.05) levels in the studied groups, thus total protein and albumin effects on the measured parameters are excluded.

Compared with systemic steroids, the dose of ICSs is low, and systemic absorption of most preparations via the gastrointestinal tract undergoes extensive first-pass metabolism, hence, their systemic side effects are fewer [17], this may explain the reason in this study in which it was observed no significant effect of inhaled BDP on the measured parameters when compared with that of the controls.

Serum sodium, potassium and chloride were measured in the sera of group1, group2 and group3; the results are shown in table 2.

Table 2 Serum sodium, potassium and chloride concentrations in the group1, group2 and group3.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Groups</th>
<th>Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (mmol/L)</td>
<td>Group1</td>
<td>141.771 ± 2.808</td>
<td>136 – 145</td>
</tr>
<tr>
<td></td>
<td>Group2</td>
<td>140.806 ± 2.587</td>
<td>137 – 146</td>
</tr>
<tr>
<td></td>
<td>Group3</td>
<td>146.894 ± 0.863 *** ***</td>
<td>146 – 149</td>
</tr>
<tr>
<td>Potassium (mmol/L)</td>
<td>Group1</td>
<td>4.117 ± 0.439</td>
<td>3.5 – 4.9</td>
</tr>
<tr>
<td></td>
<td>Group2</td>
<td>3.961 ± 0.432</td>
<td>3.4 – 4.8</td>
</tr>
<tr>
<td></td>
<td>Group3</td>
<td>3.305 ± 0.089 *** ***</td>
<td>3.1 – 3.4</td>
</tr>
<tr>
<td>Chloride (mmol/L)</td>
<td>Group1</td>
<td>102.135 ± 3.136</td>
<td>98.122–107.685</td>
</tr>
<tr>
<td></td>
<td>Group2</td>
<td>101.611 ± 3.221</td>
<td>97.876–107.135</td>
</tr>
<tr>
<td></td>
<td>Group3</td>
<td>99.955 ± 1.645 **</td>
<td>97.658–103.641</td>
</tr>
</tbody>
</table>

Notes: The stars below elucidate the significant difference at p values:
*** Mean that group3 significantly different from group1 at (p < 0.001).
*** Mean that group3 significantly different from group2 at (p < 0.001).
** Mean that group3 significantly different from group1 at (p < 0.01).
* Mean that group3 significantly different from group2 at (p < 0.05).

Table 2 shows that the mean serum level of sodium is not significantly different between group1 and group2, but shows a significant increase in the mean serum level of sodium in the group3 than the other groups; this is due to oral corticosteroid therapy. Corticosteroid drug may possesses glucocorticoid effects (action on organic metabolism), mineralocorticoid effects (action on inorganic metabolism) or both with different potencies. Mineralocorticoid effects: increase retention of sodium by the renal tubule, and increase potassium excretion in the urine. Silva J., et al. showed that synthetic glucocorticoid (prednisolone) has little mineralocorticoid effects [18].

Also table 2 shows that the mean serum level of potassium is not significantly different between group1 and group2, but shows a significant decrease in the mean serum level of potassium in the group3 than the other groups, this can be attributed to oral corticosteroid therapy.

The use of inhaled beta-2 agonists as salbutamol in patients with chronic asthma may have no effect on serum potassium level [19]. Patients on prolonged therapy with, corticosteroids tend to become hypokalemic due to the mineralocorticoid effect on the distal renal tubules [13].

Finally table 2 shows that the mean serum level of chloride is not significantly different between group1 and group2, but shows a significant decrease in the mean serum level of chloride in the group3 than the other groups. There may be some acid - base disturbance in the patients who received oral corticosteroid therapy.

Corticosteroid treatment may cause raised venous serum bicarbonate and decreased serum chloride [20]. Chloride is the major anion that counterbalances the major cation, sodium [21]. A change in plasma sodium concentration must be matched by a change in anion concentration. The major anions of the ECF are chloride and bicarbonate [22]. In the kidney, chloride reabsorption changes in a reciprocal fashion to bicarbonate reabsorption. When plasma chloride concentration changes independently of plasma sodium concentration, it is thus usually due to an acid-base disorder [23]. In the presence of hypokalemia, the kidneys conserve potassium and thus increase hydrogen ion excretion (recall that these ions compete for renal excretion). The serum chloride is relatively lower than sodium, as an elevation in the serum bicarbonate level causes the chloride level to drop. Norma M. said that as one anion increases, another tends to decrease to maintain electroneutrality [24].

Serum phosphorous, total magnesium, and zinc concentrations and alkaline phosphatase activity were measured also corrected total calcium, ionized calcium, ionized magnesium were calculated in group1, group 2 and in group3. The results are showed in table 3.
Table 3. Serum corrected total calcium, ionized calcium, phosphorous, total magnesium, ionized magnesium, and zinc concentrations and alkaline phosphatase activity for group 1, group 2 and group 3.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Groups</th>
<th>Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected total calcium (mmol/L)</td>
<td>Group 1</td>
<td>2.264 ± 0.113</td>
<td>2.105 – 2.491</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>2.225 ± 0.170</td>
<td>1.799 – 2.471</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>1.864 ± 0.154</td>
<td>1.475 – 2.120</td>
</tr>
<tr>
<td>Ionized calcium (mmol/L)</td>
<td>Group 1</td>
<td>1.129 ± 0.050</td>
<td>1.036 – 1.216</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>1.117 ± 0.069</td>
<td>0.927 – 1.241</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>0.919 ± 0.926</td>
<td>0.697 – 1.111</td>
</tr>
<tr>
<td>Phosphorous (mmol/L)</td>
<td>Group 1</td>
<td>1.439 ± 0.090</td>
<td>1.252 – 1.615</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>1.428 ± 0.138</td>
<td>1.165 – 1.611</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>1.100 ± 0.077</td>
<td>0.897 – 1.266</td>
</tr>
<tr>
<td>Total magnesium (mmol/L)</td>
<td>Group 1</td>
<td>0.752 ± 0.081</td>
<td>0.660 – 1.013</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>0.719 ± 0.064</td>
<td>0.598 – 0.861</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>0.565 ± 0.058</td>
<td>0.442 – 0.684</td>
</tr>
<tr>
<td>Ionized magnesium (mmol/L)</td>
<td>Group 1</td>
<td>0.473 ± 0.048</td>
<td>0.408 – 0.624</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>0.454 ± 0.039</td>
<td>0.369 – 0.533</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>0.353 ± 0.032</td>
<td>0.288 – 0.420</td>
</tr>
<tr>
<td>Zinc (mol/L)</td>
<td>Group 1</td>
<td>11.037±1.213</td>
<td>8.736 – 14.200</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>11.395 ± 1.646</td>
<td>9.101 – 16.830</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>8.704 ± 1.007</td>
<td>6.228 – 10.175</td>
</tr>
<tr>
<td>Alkaline phosphatase activity (U/L)</td>
<td>Group 1</td>
<td>71.070 ± 15.335</td>
<td>38.950 – 103.680</td>
</tr>
<tr>
<td></td>
<td>Group 3</td>
<td>50.213 ± 13.107</td>
<td>25.989 – 78.491</td>
</tr>
</tbody>
</table>

Note: The stars in table 3 give the same indications as in table 1.

Table 3 shows that the mean serum level of calcium is not significantly different between group 1 and group 2, but shows a significant decrease in the mean serum level of calcium in the group 3 than the other groups, this effect can be attributed to oral corticosteroid therapy.

Direct effects of corticosteroids include the suppression of intestinal calcium absorption, decreased renal tubular calcium reabsorption with increased urinary calcium excretion [25]. Hypercalciuria is due to increased bone resorption and decreased renal tubular reabsorption of calcium, which occurs despite elevated serum levels of PTH [26].
Packe G. et al. found no significant difference in serum calcium between asthmatics on inhaled BDP and those who had never taken inhaled or systemic corticosteroids [27].

Also table 3 shows that there is no significant difference in the mean serum level of phosphorous between group1 and group2, but shows a significant decline in the mean serum level of phosphorous in the group3 than other groups, thus the cause can be attributed to oral corticosteroid therapy.

Corticosteroids increase urinary phosphorous excretion [19]. The hyperphosphaturia observed in patients taking glucocorticoids is due in part to secondary hyperparathyroidism. The other causative factor is a glucocorticoid-induced change in \( Na^+ - H^+ \) exchange activity, which causes a decrease in sodium-gradient-dependent phosphate uptake in the proximal tubule [26].

Hypophosphatemia can cause respiratory muscle fatigue, and reduction of tissue oxygen extraction in patients with acute asthma [19]. Bootsma et al. [28] observed that serum phosphate was not significantly changed by BDP.

Additionally table 3 shows that there is no significant difference in the mean serum level of magnesium between group1 and group2, but shows a significant decline in the mean serum level of magnesium in the group3 than other groups, thus the cause can be attributed to oral corticosteroid therapy.

There was no association of hypomagnesemia with inhaled beta-agonists and inhaled steroids [29], thus low mean serum magnesium level in the group3 compared to other groups may be the result of oral corticosteroid treatment. Khosrow A., and Hamid R. said that receiving glucocorticoid drugs for long times especially its use by the patients in acute states may cause depletion of magnesium in human through urinary excretion [30].

Low serum concentrations of magnesium have been associated with diminished respiratory power that improves with administration of magnesium [31]. Magnesium appears to be important in bone cell activity. It is shown to be mitogenic for osteoblasts and its depletion causes cellular growth inhibition, in vitro [32]. Fatouh et al. found that serum magnesium was significantly lower in asthmatics receiving short courses of oral corticosteroid compared to controls and to those not receiving steroid [33]. Our results are consistent with those obtained by Khalid S. in that no relation was found between the regular uses of ICSs and serum magnesium [34].

Further table 3 shows that there is no significant difference in the mean serum level of zinc between group1 and group2, but shows a significant decrease in the mean serum level of zinc in the group3 than the other groups, this effect may be due to oral corticosteroid. Steroidal anti-inflammatory drugs have been found to increase urinary loss of zinc [35].

Zinc is needed for osteoblastic activity, and ALP activity [36]. Our results are in agreement with the findings of Flynn et al. in that all the patients receiving oral corticosteroid therapy had lower circulating zinc level [37].

ALP is produced by osteoblasts during bone formation, and in the absence of liver dysfunction the total serum levels reflects mineralization rates [38]. Glucocorticoids decrease the number and function of osteoblasts [39]. Glucocorticoids have a biphasic effect on bone. Physiologic concentrations and brief exposure enhance the function of differentiated osteoblasts, whereas prolonged periods
inhibit synthetic processes [26]. Ionized magnesium is one of the ALP activators, and ionized zinc is a constituent metal ion [40]. In this study the significant decline in the mean serum ALP level in the group 3 may be due to the inhibitory effect of oral corticosteroid on osteoblasts which are source of the enzyme, also may be due to its effect on the levels of zinc and magnesium which are important for the activity of the enzyme. Jin S. and Wei F. [41] found substantially reduced ALP levels in asthmatic patients who had received glucocorticoid therapy. Bootsma et al. [28] observed that serum ALP was not significantly changed by BDP.

Finally it was concluded that oral corticosteroids have more undesirable effects on electrolytes, minerals and bone than ICSs; therefore, it is better to use ICSs whenever possible.

References
Abstract
This is a prospective study that was carried out on 50 patients at the central teaching hospital for children in Baghdad, 20 males and 30 females. Their age ranged from 1-60 days with body weight ranged from 1.8-3.5 Kg., eight patients were premature. The study revealed atresia in 15 (30%) cases, stenosis in 12 (24%) cases, malrotation in 10 (20%) cases, and annular pancreas in 7 (14%) cases. Prenatal ultrasound diagnosed 3 patients. Bilious vomiting was the commonest presenting symptom (42 patients (84%)), associated congenital anomalies were found in 18 (36%) patients. Down syndrome was found in 10 (20%) patients, maternal polyhydramnios was observed in 20 (40%) patients and in one patient there was a family history of previous anomalies. Low birth weight and prematurity significantly affect the outcome, associated anomalies account for most of the morbidity and mortality and early diagnosis result in better outcome.

Objectives (aim of study)
To study cases with congenital anomalies of duodenum and verify the causes, clinical presentation, diagnosis and outcome in infants admitted to the central teaching hospital for children in Baghdad.

Introduction
Duodenal anomalies can be intrinsic (atresia, stenosis, web) or extrinsic (annular pancreas, malrotation and Ladd’s band). It can occur distal or proximal to the ampulla of Vater. Most commonly distal to the ampulla and there for bilious vomiting is present [1]. Associated polyhydramnios is recorded in up to one half of the cases, with premature delivery in one third [2, 3]. Growth retardation is also common, which may imply that the fetus have been deprived of nutritional

Al-Shamkhi A. al-Shamkhi A. al-Shamkhi A. al-Shamkhi A. al-Shamkhi A. 2010 - 3 -2010. ﻭﺍﻟﺮاﺑﻊ ﺍﻟﺜﺎﻟﺚ ﺍﻟﻌﺪﺩ ﺍﻟﻤﺠﻠﺪ ﺍﻟﻄﺒﯿﺔ ﺑﺎﺑﻞ ﻣﺠﻠﺔ ﺷروط ﺛﻢ ﺑﺎﻧﺎء ﻣﻌﺮﻓـﺔ ﺛﻢ ﺑﺎﻧﺎء ﻣﻌﺮﻓـﺔ ﺛﻢ ﺑﺎﻧﺎء ﻣﻌﺮﻓـﺔ ﺛﻢ ﺑﺎﻧﺎء ﻣﻌﺮﻓـﺔ ﺛﻢ ﺑﺎﻧﺎء ﻣﻌﺮﻓـﺔ ﺛﻢ ﺑﺎﻧﺎء ﻣﻌﺮﻓـﺔ 

Congenital Anomalies of the Duodenum
Mohammed Ubaid Hamza              Waad M.Salih*
Dept. of anatomy, College of Medicine/ University Babylon, Hilla, Iraq.  
*Pediatric Central Teaching Hospital, Baghdad-Iraq.
contribution of the swallowed amniotic fluid. Almost 50% of duodenal atresia are associated with some other anomaly (e.g.: cardiac, genitourinary, anorectal, or occasionally, esophageal atresia) [3].

Calder published the first report of duodenal obstruction in 1733 when he described two children with “preternatural confirmation of gut”. Both infants died, as did subsequently reported infants with this defect. Scattered report of duodenal obstruction appeared in the European literature over ensuing years. In 1916 the first survival was reported, yet survival in the early 20th century remained rare. Morbidity and mortality significantly improved only over the last 50 years. Progress in pediatric anesthesia and neonatology; combined with improved intra-operative methods and surgical materials; accounts for today’s more than 90% survival rate of infants who present with this anomaly [4]. Approximately 24 to 28% of newborn with duodenal atresia or stenosis have Down syndrome. Conversely, approximately 2.5% of patients with Down syndrome have duodenal atresia or stenosis (5). Rotational anomalies occur as a result of an arrest of a normal rotation of the embryonic gut. They are often associated with other gastrointestinal abnormalities, particularly those in which the intestine are located outside the coelomic cavity (e.g.: congenital diaphragmatic hernia or abdominal wall defect. As many as 17% of children with duodenal atresia and 33% of children with jejunoileal atresia may have an associated malrotation [6,7]. Three major theories have been proposed to explain the annular pancreas. adherence of the ventral bud to the duodenal wall prior to rotation resulting in its persistence and encirclement of the duodenum (Lecco’s theory) [8]. Persistence and enlargement of the ventral bud (Baldwin’s theory) [9]. Hypertrophy and fusion of the ventral and dorsal bud before rotation of the gut resulting in complete encirclement of duodenum [10].

By prenatal ultrasound most cases of duodenal atresia are detected between 7th and 8th month of intrauterine life, but a normal ultrasound of the fetus with polyhydramnios at that time does not absolutely exclude duodenal obstruction [11].

On a plain abdominal radiograph, duodenal atresia causes a classic double bubble sign [12] (Fig.:1). Contrast meal is required when there is incomplete obstruction to exclude malrotation and volvulus (Fig.:2, 3, and 4).

Specific studies may be required to evaluate the infant for associated congenital anomalies. in some cases, testing should occur prior to surgery. An Echocardiogram should be performed in infant with duodenal atresia. A preoperative cardiac assessment is most important in patient with Down syndrome. Infant with duodenal and jejunoileal atresia should have an antero-posterior and lateral chest radiograph to detect vertebral anomalies. Renal ultrasonography should be performed in infant with duodenal atresia. infant with duodenal atresia and down syndrome may need a rectal biopsy to exclude Hirschsprung’s disease [13].

**Patients and Methods**

A prospective study was done on a sample of 50 cases of newborn infants with congenital anomalies of duodenum from August 2007 to December 2008 at the central teaching hospital for children. Infant age was range from 1- 60 days, their body weight ranged between 1.8 and 3.5 Kg.
Detailed data collected include: age at presentation, gender, presenting features, associated congenital anomalies, family history, clinical examination, investigations (data form).

Results
A series of fifty patients were studied prospectively at the central teaching hospital for children in Baghdad in the period from August 2007 to December 2008. The series include 30 females (60%) and 20 males (40%). (F:M ratio = 1.5:1). The number of preterm babies was 8 patients (16%), while that of full term was 42 patients (84%) as shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>gender, maturity, and polyhydramnios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>30</td>
</tr>
<tr>
<td>male</td>
<td>20</td>
</tr>
<tr>
<td>Maturity</td>
<td></td>
</tr>
<tr>
<td>Full term</td>
<td>42</td>
</tr>
<tr>
<td>Preterm</td>
<td>8</td>
</tr>
<tr>
<td>polyhydramnios</td>
<td>20</td>
</tr>
</tbody>
</table>

Maternal polyhydramnios was observed in 20 (40%) patients.
The causes of duodenal obstruction were: 15 (30%) cases were due to atresia, 12 (24%) cases due to intrinsic web, 10 (20%) cases due to malrotation, 7 (14%) cases due to annular pancreas, 4 (8%) cases due to congenital bands and 2 (4%) cases were due to other anomalies which are multiple atresia in the small bowel with areas of mesenteric defect as shown in Table 2.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>causes of congenital duodenal obstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>cause</td>
<td>number</td>
</tr>
<tr>
<td>Atresia</td>
<td>15</td>
</tr>
<tr>
<td>Intrinsic web or diaphragm</td>
<td>12</td>
</tr>
<tr>
<td>Malrotation</td>
<td>10</td>
</tr>
<tr>
<td>Annular pancreas</td>
<td>7</td>
</tr>
<tr>
<td>Congenital band</td>
<td>4</td>
</tr>
<tr>
<td>Other anomalies</td>
<td>2</td>
</tr>
</tbody>
</table>

The age at presentation in different pathological types were as follows; all the 15 (100%) cases of duodenal atresia presented in the 1st week of neonatal life, nine cases (75%) of intrinsic duodenal web presented in the 1st week, two cases in the second week, and one case in the third week. For the malrotation of midgut; 4 cases presented in the 1st week, 3 cases in the 2nd week, 2 cases in the 3rd week, and one case in the 4th week. For the annular pancreas; 4 cases of annular pancreas presented in the first week, 1 case in the 2nd week, 1 case in the 3rd week and 1 case in the 4th week. Other congenital anomalies were 2 cases of multiple atresia presented in the 1st week, and congenital bands; 1 case in the 2nd week, 2 cases in the 3rd week, and 1 case in the 4th week as shown in the Table 3.
Table 3 presenting age in different pathological types.

<table>
<thead>
<tr>
<th></th>
<th>1st week</th>
<th>2nd week</th>
<th>3rd week</th>
<th>4th week</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atresia</td>
<td>15 (100%)</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Intrinsic web</td>
<td>9 (75%)</td>
<td>2 (16.6%)</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Malrotation</td>
<td>4 (40%)</td>
<td>3 (30%)</td>
<td>2 (20%)</td>
<td>1 (10%)</td>
<td>10</td>
</tr>
<tr>
<td>Annular pancreas</td>
<td>4 (57%)</td>
<td>1 (14%)</td>
<td>1 (14%)</td>
<td>1 (14%)</td>
<td>7</td>
</tr>
<tr>
<td>Other anomalies</td>
<td>2 (33.3%)</td>
<td>1 (16.6%)</td>
<td>2 (33.3%)</td>
<td>1 (16.6%)</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>34 (68%)</td>
<td>7 (14%)</td>
<td>6 (12%)</td>
<td>3 (6%)</td>
<td>50</td>
</tr>
</tbody>
</table>

Associated anomalies were presented in 18 cases (36%) of total cases, distributed as follow; isolated Down syndrome in 20%, this was diagnosed clinically and chromosomal study was not done due to the emergency situation of the cases. Other anomalies were present as follow; GIT anomalies 3 cases (6%), genitourinary 2 (4%), cardiac anomalies 2 (4%), multiple anomalies one case (2%).

Duodenal atresia have the highest percent of associated anomalies (16%), followed by malrotation (6%), annular pancreas (6%) and the least associated anomalies were in the duodenal web (2%) as shown in table 4.

Table 4 associated anomalies

<table>
<thead>
<tr>
<th></th>
<th>Atresia</th>
<th>web</th>
<th>malrotation</th>
<th>Annular pancreas</th>
<th>Other anomalies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down syndrome</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>---</td>
<td>10 (20%)</td>
</tr>
<tr>
<td>GIT anomaly</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3 (6%)</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>1</td>
<td>---</td>
<td>1</td>
<td>---</td>
<td>---</td>
<td>2 (4%)</td>
</tr>
<tr>
<td>Cardiac</td>
<td>1</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>---</td>
<td>2 (4%)</td>
</tr>
<tr>
<td>Multiple</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>8 (16%)</td>
<td>2</td>
<td>3 (6%)</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
<td>18 (36%)</td>
</tr>
</tbody>
</table>

The presenting symptoms and signs were; bile stained vomiting in the majority of cases (42) (84%) cases, dehydration 15 (30%) cases, distension 8 (16%) cases, jaundice in 7 cases (14%) and non bile stained vomiting in cases of pre-ampullary obstruction 2 (4%) cases. table 5

Table 5 presenting symptoms and signs

<table>
<thead>
<tr>
<th></th>
<th>Atresia</th>
<th>web</th>
<th>malrotation</th>
<th>Annular pancreas</th>
<th>Other anomalies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bile stained vomiting</td>
<td>14</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>1</td>
<td>42 (84%)</td>
</tr>
<tr>
<td>Dehydration</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>15 (30%)</td>
</tr>
<tr>
<td>Abdominal distention</td>
<td>1</td>
<td>---</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>8 (16%)</td>
</tr>
<tr>
<td>Jaundice</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>---</td>
<td>7 (14%)</td>
</tr>
<tr>
<td>Non biliary vomiting</td>
<td>1</td>
<td>1</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>2 (4%)</td>
</tr>
</tbody>
</table>
The imaging investigation used in the study were; erect plain abdominal x-ray in all patients, upper GIT barium study in 25 (50%), prenatal ultrasound in 3 patients and postnatal ultrasound examination in 15 (30%). The double bubble sign on plain abdominal x-ray was seen in all cases, barium study showed blind ended second part of duodenum in all cases of duodenal atresia, and narrowing in the duodenal web, birds beak appearance (complete obstruction) and coiled spring appearance (partial obstruction) in 6 cases of malrotation.

Prenatal ultrasound detects distended stomach and 1st part of duodenum with polyhydramnios in 3 cases and on exploration; 2 were atresia and one case of annular pancreas. Postnatal ultrasound examination done in 8 cases of duodenal atresia, 3 cases of malrotation, 2 cases of annular pancreas, and 2 cases of duodenal web, as shown in table 6.

### Table 6 Imaging investigations for diagnosis

<table>
<thead>
<tr>
<th>investigations</th>
<th>Atresia</th>
<th>web</th>
<th>malrotation</th>
<th>Annular pancreas</th>
<th>Other anomalies</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain x-ray</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>7</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Barium study</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Prenatal US</td>
<td>2</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>---</td>
<td>3</td>
</tr>
<tr>
<td>Postnatal US</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>---</td>
<td>15</td>
</tr>
</tbody>
</table>

### Discussion

Congenital duodenal obstruction is relatively common abnormality in the newborn period and may be complete or partial, intrinsic or extrinsic. Intrinsic atresia or stenosis are relatively common; a population-based study documented that duodenal atresia and stenosis have an incidence of about 1 in 7000 live birth and account for 49% of all small intestinal atresia.

Extrinsic duodenal obstruction may be due to annular pancreas, malrotation and Ladd’s band or as part of multiple congenital anomalies [14]. In our collection of 50 cases of congenital duodenal obstruction, females were relatively more common than males with a female to male ratio of 1.5:1 this is comparable with that mentioned in the literature [15]. Most of the cases were full term infants (84%) and preterm infants formed 16% of the collection. The percentage of the preterm infant is usually higher, where it might reach to 40% [15], the percentage in our study might be less than that mentioned as we do not have the mortality rate of preterm babies and the percentage of referred infants to our department.

The presentation of cases of duodenal obstruction is usually in the early neonatal life. In our study the time of presentation had relation to the type of pathology, the presentation was earlier in cases proved to be complete obstruction (duodenal atresia) and later in time in cases of incomplete obstruction (web, annular pancreas and malrotation).

All of our 15 cases of duodenal atresia were presented in the first week of life, while cases with annular pancreas and malrotation were distributed over the first four weeks. This is explained by the fact that intrinsic duodenal atresias (when the obstruction is complete) are developmental abnormalities that occur during early development of the foregut, and there is a little difficulty in clinical recognition, but when the obstruction is incomplete, like...
congenital intrinsic stenosis which caused by luminal membranes with a crescentic defect or central fenestration of variable size can provide a conduit of sufficient size to postpone symptoms until later in life and the diagnosis may pose considerable difficulty [16].

The relation between the point of obstruction and ampulla of Vatter is important; the site of obstruction is usually either below, at or above the ampulla of Vatter. This mean the bilious vomiting is related to the post-ampullary obstruction, while non bilious vomiting occurs in preampullary obstruction [4]. Bilious vomiting was the main reason for presentation in our series. This formed 84% of our cases. Most series document a predominance of postampullary obstruction, approaching 80% as in study of Fonkelsrud [17].

Dehydration was the second in order regarding the presentation. In this collection, 30% of our cases presented with profound sign of dehydration. This might be a high percentage which can reflect the medical awareness of the medical personnel and parents health education. The degree of the resultant dehydration depends on the duration and severity of vomiting.

Abdominal distension is usually mild and limited to upper abdomen as duodenal obstruction is regarded as high intestinal obstruction. Delayed diagnosis may result in dehydration, hyponatremia, hypochloremia. These facts are mentioned in literatures [18, 19].

Non bilious vomiting is accounting for about 4% of our cases. A European report described preampullary predominance [20].

Jaundice at presentation was rare in our collection 14%. Jaundice if present is rarely due to obstructive causes and is more likely due to dehydration and prematurity.

Congenital duodenal obstruction is commonly associated with other serious congenital anomalies, which account for most of the morbidity and mortality in these patients. Various reports put the incidence of the associated anomalies in our series 36%. Trisomy 21 (Down’s syndrome) is the most common associated anomaly observed and was present in 20% of our cases. This was diagnosed clinically without ordering chromosomal studies at time of presentation due to the emergency situation of the cases.

In our study, the incidence of down’s syndrome in cases of duodenal atresia was 40% which is similar to those reported in other studies by Alastair [1], Adeyemi [21], and AL-salem [22]. The diagnosis of duodenal atresia is often suggested by prenatal ultrasound. A maternal history of polyhydramnios is common in congenital duodenal obstruction, approaching 75% in one series [19]. A history of maternal polyhydramnios was reported in 20 (40%) of our cases. It is caused by a failure of absorption of amniotic fluid in the distal intestine. Therefore any case of polyhydramnios should be examined carefully to rule out the presence of fetal anomaly.

The dilated stomach and proximal duodenum seen on antenatal ultrasonography are detected between 7th and 8th month of the intrauterine life. These results support the role of fetal swallowing and absorption by fetal GIT in the regulation of amniotic fluid volume [4].

Fetal anomaly had a strong association with prematurity [23]. Both prematurity and maternal polyhydramnios were recorded in other studies; Dalla [2] and Grosfeld [3].

In this study, duodenal atresia and stenosis were the most common causes of duodenal obstruction, while
Malrotation of midgut was the 2\textsuperscript{nd} cause which is often caused by a peritoneal band that run from abnormally positioned caecum to the right side of the abdomen crossing the descending part of the duodenum.

The classic presentation of a complete postampullary obstruction includes bilious vomiting within 24 hours of birth in an otherwise stable infant with a non distended abdomen. Plain radiographs of the abdomen typically show the classic double - bubble sign (Fig. 1).

Two distinct gas collections or air fluid levels in the upper abdomen resulting from the markedly dilated stomach and proximal duodenal bulb [16]. If the infant’s stomach has been decompressed by vomiting or previous Nasogastric aspiration, 40-60 ml of air may be injected carefully through the Nasogastric tube and the double – bubble reproduced. Air makes an excellent contrast agent, obviating an upper GI tract contrast study in routine cases [16].

An upright abdominal radiograph using instilled air as a contrast is sufficient to confirm the diagnosis of duodenal obstruction.

Although plain x-ray was done to all patients, it was diagnostic in only 22 (44\%) patients.

Prenatal ultrasound examination diagnosed 3 cases (6\%). This can influence parent positively in coping with the anomaly and to seek surgical correction relatively earlier than others, which can improve; to some degree; the outcome [24].

**Conclusion**

Congenital duodenal anomalies are common conditions facing the pediatric surgeon in his life.

1- The most common cause of congenital duodenal anomaly was atresia and stenosis.

2- Prematurity and birth weight has a great importance in determining the outcome of the patient. Low birth weight and extreme prematurity need special care which should be available if good outcome is demanded.

3- Early diagnosis: this can be accomplished if the sonarist had good clinical awareness and experience in identifying the intrauterine fetal anomalies. Also early diagnosis can permit time for screening and possible early correction of some anomalies and thus helping the patient and parent in getting early surgical advice and avoiding the development of complication.

4- Associated anomalies: it is the first factor influencing the fate of the patient. Absence of other anomalies is considered a good prognostic factor regarding outcome.

5- The most important warning sign to the physician is the bile stained vomiting and it should be considered pathological and surgical until proved otherwise.

**Recommendations**

1- Careful intrauterine assessment of the fetus by ultrasound examination especially if the mother had polyhydramnios or there are previous congenital anomalies.

2- Any case of bilious vomiting should be considered pathological and surgical until proved otherwise.

3- Any patient with congenital duodenal anomalies should be investigated thoroughly for any associated anomalies as some of them influence the prognosis profoundly.

4- Health education of the community as well as the medical personnel about the early symptoms and signs of neonatal intestinal obstruction.

5- Education of the community about the importance of antenatal care in detecting fetal anomalies.
References


Evaluation of Intralesional Methotrexate in Comparison with Electrocutary in Treatment of Common Warts

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College of Medicine, University of Babylon, Hilla, Iraq.

Abstract
In this clinical trail, a 42 patients (12 males and 30 females) of 12-32 years old were randomly selected. They were clinically diagnosed as common warts on at least two symmetrical limbs (upper or lower) were selected and counted to form two groups of right sided and left sided warts. Each side of patient treated with methotrexate (MTX) intralesionally or electrocutary of his/her warts. Both treatment types were randomly allocated to either right side or left side warts. The mean No. of warts was 4.52 on upper limbs and 3.9 on lower limbs. A 6.78% of these warts wich was treated with intralesional MTX were cleared compared with 22.6% for electrotherapy. We found that MTX to have clearance rate less than electrocutary. In conclusion: intralesional MTX is less effective than electrocutary in treating common warts on hands and feet.

Introduction
Warts are benign growths usually caused by a viral infection of the skin or mucous membrane. Chemotherapeutic agents are possible wart treatments[1]. Methotrexate (MTX), a classical antifolate, is one of the most widely used and studied anticancer agents [2,3]. Unlike other anticancer agents, MTX can be safely administered over a wide range of doses, ranging from 20 mg/m² per week in maintenance chemotherapy for acute lymphoblastic leukemia and treatment of nononcologic diseases including rheumatoid arthritis or psoriasis [3, 4]. Methotrexate and its polyglutamates block de novo nucleotide synthesis primarily by depleting cells of reduced tetrahydrofolate cofactors through inhibition of dihydrofolate reductase (DHFR) [5]. MTX polyglutamates and dihydrofolates that accumulate as a result of DHFR inhibition. It also inhibit thymidylate synthase and other enzymes involved in the purine biosynthetic pathway[6]. Methotrexate has been shown to be safe for long-term use in most children[7, 8]. Toxic effects to proliferating tissues are usually observed in the bone marrow and to a lesser extent in the skin and GI
mucosa. This effect can be reversed by administration of leucovorin [9]. Intrallesional injection of methotrexate is effective for giant keratoacanthoma, which is a rapidly growing growth on the skin[10]. This study was designed to evaluate the intrallesional MTX in comparison with electrocutanty on common warts of hands and feet.

**Materials and Methods**

A forty eight patients, clinically diagnosed as common warts on at least two symmetric limbs (upper or lower limbs) were selected with the ages between 12- 32 years. Pregnant women, patients with cardiac pacemakers or patients who had taken any form of treatment were excluded from the study. Most patients (42 of 45) continued participation. The warts located on right/ left limbs of each patient were examined and counted to form two groups of right sided and left sided warts. Each patient received both treatment on his/ her warts. The two treatment types were randomly allocated to either right sided or left sided warts. A graphical warts map was prepared for each patient and location of warts along with data regarding wart size and type of treatment were recorded. Other data were collected through a structured questionnaire after an interview and medical examination by a dermatologist.

Treatment and assessment:

(Trixilem 5mg/2ml. lemery S.A DE C.V martries de Rio Bianco No. 54 Maxico D.F 16030) was diluted up to different concentrations 2mg/ml, 1mg/ml and 0.5mg/ml. After adding 2% lidocaine, the drug was injected into the lesion using an insulin syringe. Injection was continued until each wart blanched.

In both treatments patients were visited every 15 days. The injections were repeated for a maximum three times when required and the follow up continued for six month for evidence of recurrence, side effects or any other complaints. A wart was considered cleared if it completely resolved; otherwise it was considered as a failure of treatment. Test of proportion was used to test the significance of differences in wart cure between treatments. [11]

**Results**

Females constituted 71.43 percent of participants and 28.57 percent were males. Mean age of participants was 22.2 years. Mean number of warts on upper limbs was 4.52 and on lower limbs was 3.9. Distribution of warts on upper and lower limbs was statistically similar between study groups.

In 4.76 percent of the cases, all warts on the limb side treated by MTX were cleared compared with 71.43 percent for electrocutary (table 1), the difference was statistically significant (P<0.01). MTX was found to be less effective when the comparison was made between the total numbers of warts cleared by each treatment (table 2).

There were no adverse complications belonged to MTX, although many literatures mentioned many side effects to systemic MTX.

**Discussion**

In this study intrallesional MTX was shown to be of low efficacy in clearing wart vs. electrocutanty. Three different concentration of MTX was tested but the same results obtained. This result is agree with Hayes and O’Keefe (1986) that 0.5 mg/ml concentration is effective as 1 mg/ml [12].

In 4.76 percent of patients all the warts treated with MTX were cleared, and in 71.43 percent of patients all the warts treated with electrocutanty were cleared. The treatment with MTX is repeated
when required, but it was not effective in 95.24 percent. While the clearance percent for bleomycin was related to the number of treatments received, and independent of the interval between treatments [13].

No published study was found to compare the efficacy of MTX with electrocutary on the same patients or the same study group, in contrast to bleomycin which had been found by Adalatkhah, et. al. (2007) to has 1.23 times more clearance efficacy than cryotherapy [14].

Pain is the main problem in both electrocutary and intralesional MTX; analgesia is helpful in both groups. Pain management seems to be easier for MTX and the pain period is shorter compared with the pain and discomfort that may continue for several hours after electrocutary. The cost of MTX therapy is less than electrocutary, and MTX therapy also requires less equipment than electrocutary. There were no cases of significant adverse complications belonged to MTX, although many literatures mentioned many side effects to systemic MTX [10].

**Conclusion**

Although intralesional MTX is of least cost, easy to control and not required equipments, but it is less effective than electrocutary in treatment of common warts on hands and feet.

**References**


**Table 1** Effect of intralesional MTX and electrocutary on total number of warts in each limb

<table>
<thead>
<tr>
<th>Treatment trial group</th>
<th>All warts cured</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO</td>
<td>Yes</td>
</tr>
<tr>
<td>MTX</td>
<td>40</td>
<td>2</td>
</tr>
<tr>
<td>Percent</td>
<td>95.24</td>
<td>4.76</td>
</tr>
<tr>
<td>Electrocutary</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Percent</td>
<td>28.57</td>
<td>71.43</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>32</td>
</tr>
<tr>
<td>Percent</td>
<td>61.9</td>
<td>38.1</td>
</tr>
</tbody>
</table>

Test of proportion P < 0.01

**Table 2** Overall effect of intralesional MTX and electrocutary on treating warts

<table>
<thead>
<tr>
<th>Treatment trial group</th>
<th>Number of Warts cured</th>
<th>%</th>
<th>Number of warts not cured</th>
<th>%</th>
<th>Total number of warts treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTX</td>
<td>12</td>
<td>6.78</td>
<td>165</td>
<td>93.22</td>
<td>177</td>
</tr>
<tr>
<td>Electrocutary</td>
<td>40</td>
<td>22.6</td>
<td>137</td>
<td>77.4</td>
<td>177</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>14.69</td>
<td>302</td>
<td>85.31</td>
<td>354</td>
</tr>
</tbody>
</table>

Test of proportion P < 0.01
Clinical and Pigmentary Variation of Pityriasis Versicolor in Al-Muthana Government's Patients

Arwaa Abed Abdul-Hussein
College of Medicine, Al-Muthana University, Iraq.

Abstract

Background: Pityriasis versicolor, one of the most common disorders of pigmentation. It is a cutaneous superficial fungal infection characterized by pigmentary changes due to colonization of stratum corneum by dimorphic lipophilic yeast; Malassezia furfur. In general, pityriasis versicolor is thought to cause hypopigmented lesions in individuals with dark skin and hyperpigmented lesions in those with white skin.

Objective: It is a descriptive study to know the pigmentary variation of tinea versicolor in Al-Muthana Government.

Patients and Methods: This study was based on a sample size of 100 patients of pityriasis versicolor who attended the department of Dermatology and Venereology at Al-Samawa general hospital in the periods from January 2009 to March 2010. Diagnosis of tinea versicolor was established by 10% KOH examination of scraping from skin lesion and wood's lamp examination for the golden yellow fluorescence of skin lesions.

Result: From 100 patients with pityriasis versicolor, There were 64 males and 36 females. The age of patients ranged from 5-65 years with a mean age of 24.25 ± 3.22 years. Majority of cases (41%) occurred in the age group of 21-30 years. Sixty sex (66%) of cases had hyperpigmented macular lesions followed by hypopigmented type (23 %), combination of both; hyperpigmentation and hypopigmentation (6 %) and erythematous type (5 %) of lesions. The predominant site of the disease was trunk especially the upper trunk involves in 79 cases, followed by neck in 45 cases, upper limb in 34 cases face in 28 cases and lower limb in 11 cases.

Conclusion: all types of pigmentary variations in pityriasis versicolor are present in Al-Muthana's patients with a predominance of hyperpigmented ones.

Introduction

Pityriasis versicolor, one of the most common disorders of pigmentation, is known by various names, such as pityriasis versicolor, dermatomycosis perforatia, tinea flava, liver...
spots or achromia parasitica[1,2]. It is a cutaneous superficial fungal infection characterized by pigmentation changes due to colonization of stratum corneum by dimorphic lipophilic yeast, Malassezia furfur [2,3] It was first recognized as a fungal disease in 1846 by Eichstedt. In 1853, Robin described the fungus in the scales of tinea versicolor. He considered it to be dermatophyte and named it Microsporum furfur [4]. Recently, eleven pathogenic species of Malassezia have been recognized [5,6]. The most common are Malassezia Furfur, Malassezia Pachydermatis, Malassezia symposalis, malassezia globosa, Malassezia restricta, Malassezia obtuse and Malassezia slooffiae [6,7]. Recently published two studies incriminate two different organisms M. symposalis and M. globosa as the predominant organisms in pityriasis versicolor [8,9].

The color of the skin lesions varies from white to brown. The pathogenesis of these pigmentary variations has not been clearly established. Hypopigmentation has been explained by damage to melanocytes and inhibition of tyrosinase enzyme by dicarboxylic acids produced by Malassezia furfur; by reduction in number, size, and aggregation of melanosomes in melanocytes and surrounding keratinocytes; and by blocking of the ultraviolet light by lipid-like material accumulation in the stratum corneum [2,3]. Hyperpigmentation has been explained by abnormally large melanosomes, a thick stratum corneum and a hyperemic inflammatory response [2,3]. In general, tinea versicolor is thought to cause hypopigmented lesions in individuals with dark skin and hyperpigmented lesions in those with white skin [3].

**Patients and Methods**

The study compromised 100 patients of pityriasis versicolor, who attended the department of Dermatology and Venereology at Al-Samawa general hospital in the periods from January 2009 to March 2010. It was descriptive study. Diagnosis of tinea versicolor was established by 10% KOH examination of scraping from skin lesion (to look for the presence of hyphae and clusters of spores 'Spaghetti and meatball' appearance) and wood's lamp examination for the golden yellow fluorescence of skin lesions. Skin type of our patients was type III-V. The age and sex of the patients, the pigmentary changes, itching, duration, recurrence and site of lesion; all were studied. One patient might have more than one site of involvement. The statistical analysis used in this study was the frequency and percentage.

**Result**

A total of 100 cases of pityriasis versicolor were included in this study. There were 64 males and 36 females. The age of patients ranged from 5-65 years with a mean age of 24.15 ± 2.12 years. Four cases occurred in children. Majority of cases (41%) occurred in the age group of 21-30 years, followed by age group of 31-40 years in 26% of cases and age group of 11-20 years in 20% of cases [table 1]. Duration of the disease ranged from one month to 1.5 years with an average of 3.29 ± 2.3 months.

Majority of cases had hyperpigmented macular lesions (66%), followed by hypopigmented type (23%), combination of both; hyperpigmentation and hypopigmentation (6%) and erythematosus type (5%) of lesions. All types male cases more than females except in erythematos type in which females (4%) of cases while males (1%) of
cases [table 2]. Fifty two patients had type IV skin type, 37 patients had type III and 11 patients had type V skin type [table 3]. The predominant site of the disease was trunk especially the upper trunk involves in 79 cases, followed by neck in 45 cases, upper limb in 34 cases face in 28 cases and lower limb in 11 cases [table 4].

Recurrence of lesions was seen in 31% of cases. Pruritus was associated symptom in 49 cases [table 5]. It was present mainly during sweating, but a few cases also complained of itching at all time. It occurred more frequently in erythematous type variety (4 out of 5 cases), followed by hyperpigmented variety and less frequently in hypopigmented cases [table 5].

Twenty one percent of our cases had associated diseases include diabetes mellitus in 11 patients, hypertension in 5 cases, urticaria in cases, polycystic ovary in 2 cases and one case had renal stone. There were 2 cases of pregnant females and one cases had disease treated with corticosteroid.

**Table 1** Number of cases and sex distribution according to age group.

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No. of cases</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>11-20</td>
<td>20</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>21-30</td>
<td>41</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>31-40</td>
<td>26</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>41-50</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>51-60</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>&gt;60</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>64</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

**Table 2** Distribution of various pigmentary types.

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of cases</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperpigmented</td>
<td>66</td>
<td>43</td>
<td>23</td>
</tr>
<tr>
<td>Hypopigmented</td>
<td>23</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Both</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Erythematous</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>64</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>
Table 3  Distribution of pityriasis versicolor types according to Fitzpatric’s skin type.

<table>
<thead>
<tr>
<th>Skin type</th>
<th>Hyperpig. type</th>
<th>Hypopig. type</th>
<th>Both types</th>
<th>Erythematous type</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type III</td>
<td>24</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>37</td>
</tr>
<tr>
<td>Type IV</td>
<td>35</td>
<td>12</td>
<td>3</td>
<td>2</td>
<td>52</td>
</tr>
<tr>
<td>Type V</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>23</td>
<td>6</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4  Sites of involvement in pityriasis versicolor.

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of cases</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>28</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Neck</td>
<td>45</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>Trunk</td>
<td>79</td>
<td>52</td>
<td>27</td>
</tr>
<tr>
<td>Upper limb</td>
<td>34</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>Lower limb</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 5  Clinical profile of pityriasis versicolor with respect to its pigmentary types.

<table>
<thead>
<tr>
<th>Type</th>
<th>Itching</th>
<th>First episode</th>
<th>Recurrence Episode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperpigmented</td>
<td>36</td>
<td>48</td>
<td>18</td>
</tr>
<tr>
<td>Hypopigmented</td>
<td>8</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Both</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Erythematous</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>69</td>
<td>31</td>
</tr>
</tbody>
</table>

Discussion

Pityriasis versicolor occurs worldwide and most prevalent in tropical areas where high temperature and humidity are present; it reported to be as high as 50% in western Samoa and as low as 1.1% in the colder temperature [10]. In United States the prevalence of this condition is 2-8% of population [11]. It is caused by a dimorphic lipophilic fungus. The yeast phase of this organism has two morphologically distinct forms, an ovoid for *Pityrosporum ovale* and a spherical form *Pityrosporum orbiculare*. *P. ovale* resides more in the scalp and *P. orbiculare* occur more often on the trunk [12]. Pityriasis versicolor occurs when the yeast converts to its mycelial form due to certain predisposing factors [13,14]. These factors can be classified as exogenous or endogenous. The exogenous factors include heat and moisture (more prevalent in tropics), occlusion and altered PH range. On the other hand, endogenous factors incriminated are seborrheic dermatitis, Cushing’s syndrome, immunosuppressive treatment, malnutrition, hyperhidrosis and rarely hereditary factors [15,16].
Pityriasis versicolor occurs most commonly in adolescent and young adult, in whom sebum production is higher than in other age groups and seems to correlate with increased colonization by *pityrosporum* with increasing age (5-15% in 0-10 years children compared with 56-90% for 11-20 years old individuals) [17]. In Our study, four cases occurred in children while majority of cases (41 cases) occurred in the age group of 12-30 years followed by 31-40 years (26 cases) and 11-20 years (20 cases). In early cases, the lesions may seem to be perifollicular in origin, then it become multiple macules or patches with skip regions of normal skin in between. The macules and patches as implied by the name versicolor may be hyperpigmented, hypopigmented, leucoderma, erythematous or dark brown as noted in our series [17,18]. The color may vary according to patient’s normal pigmentation, exposure of the area to sunlight and to the severity of the disease. In the beginning, it is stated that the lesions are often red to light brown, the majority then become hyperpigmented [19]. Most of our cases had hyperpigmented lesions (66%). Most commonly, the sites of predilection of pityriasis versicolor macules or patches are the trunk in the sternal region and sides of the chest; the abdomen; back; pubis; neck and intertriginous [2,3]. Less frequently the face was involved by lesions of tinea versicolor as noted by others [20]. The trunk was the most frequent site involved in our study. Previously tinea versicolor thought to be a postpubertal disease. Evidence has shown that tinea versicolor is not uncommon in children and the lesions of the face were much more common, nearly 32% of children with tinea versicolor had face lesion of tinea versicolor[17]. In our study, four cases occurred in the children; three of them, had face involvement.

One study reported that there was a 2:1 ratio of women to men Patients. The age range was from 10-65 years, most patients were between 20-45 years of age [21]. Other series reported that sexes are about equally affected in adult and is usually established by early twenties [14,15]. Majority of our cases occurred in the age group of 21-30 years with male predominance.

In conclusion; from our study, we would say that all types of pigmentary variations in pityriasis versicolor are present in Samawa city patients with a predominance of hyperpigmented ones. Moreover, both types of pigmentary anomalies can occur simultaneously in any individual case.

References
Abstract
The attractiveness of laparoscopic cholecystectomy has led to a new understanding of biliary anatomy especially of the Calot's triangle area in order to perform a successful surgery. This study aims to describe the common and variant anatomy related to the cystic artery during laparoscopic cholecystectomy so that to minimize anatomical complications and to recommend an anatomically safe procedure. The analysis involved fifty patients who underwent laparoscopic cholecystectomy by (American technique) at different Iraqi centers during a 6-month period.
Females constituted 84% of the patients. Routine preoperative ultrasound examination revealed gallstones in 86% of the patients. 18% of the cases demonstrated anomalous vascular anatomy.
Vascular anomalies included caterpillar configuration of the right hepatic artery, a previously unreported right hepatic artery in the gallbladder bed, and cystic arteries that were early divided, low inserted, and originating from proper hepatic artery. Hartmann's pouch, cystic lymph node, and the superficial branch of the cystic artery were recognized as important anatomical landmarks during the procedure.

The Incidence of Cystic Artery Variation during Laparoscopic Surgery
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College of Medicine, University of Babylon,Hilla, Iraq.
Introduction
Embryogenesis of the gallbladder and biliary tract
Normal development

During the course of the fourth week of gestation, the embryonic foregut at its junction with mid-gut gives rise to the hepatic diverticulum. From the distal end of the diverticulum develops the parenchyma of the liver; the extra hepatic biliary tract and the gallbladder develop from the proximal portion.

The biliary tract is the site of great variation and even gross anomalies: some are fatal in postnatal life while others, although physiologically functional, may result in operative catastrophes if they are unrecognized during surgical procedures later in life [1]. The gallbladder, the hepatic ducts, and upper portion of common bile ducts are supplied by the cystic artery. Other vessels derived from the hepatic artery pass to the gallbladder from the bed in the liver.

Cystic veins are numerous and minute; those from the hepatic surface pass through the gallbladder bed to enter the quadrate lobe of liver. Veins under peritoneal surface may reach the neck of gallbladder and enter the quadrate lobe to be directly or by way of a plexus around bile duct. These veins entering the liver open into the hepatic veins not the portal vein. Veins from the lower part of common bile duct drain into the portal vein by the start of the fifth week, all the parts of the system are indicated. During this stage, the future duct system ,like the duodenum itself ,is a solid cord of cell, toward the end of the fifth week, growth of the left side of the duodenum initiates a shift of the attachment of the liver and the two pancreatic diverticula's to their final position on the dorsal surface of the duodenum. During the sixth week, the lumina of the ducts become established, starting with the common bile duct and progressively extending to the remainder of the system. The gallbladder remains solid until the twelfth week. During the process of recanalization, two or three lumina may appear and eventually coalesce. This pattern of solid stage followed by recanalization parallels the changes in the duodenum, but strangely, no solid stage appears in the pancreatic ducts.

More than one duodenal opening of the common bile duct is not unusual at this stage .The lower one usually vanishes, but a case in which a bifurcated common bile duct persisted was describe by [1].

The proximal portion of the hepatic diverticulum, the future common bile duct becomes absorbed into the expanding duodenum so that the bile and pancreatic ducts enter the wall together. In most individuals ,the dividing septum between the two passages retracts to leave a common ampulla of variable length [1].

The biliary tract is the site of great variation and even gross anomalies: some are fatal in postnatal life. while others, although physiologically functional. Cystic artery supply both gallbladder and cystic duct commonly arise from the right hepatic artery in angle between the common hepatic duct and the cystic duct. Variation in the origin and course of the cystic artery are common. The common bile duct is a very vascular structure,
especially around the retroduodenal segment. There is rich ensheathing epicholedochal arterial plexus derived primarily from the retroduodenal or posterior superior pancreaticoduodenal artery [2]. There may be considerable variation in the origin of this ductal blood supply. There is also a rich intramural plexus, the duct should not be denuded or traumatized for more than 2 cm in the supraduodenal portion, or an vascular stricture may result. Strictures that result from stripping the adventitia probably occur when the blood supply is minimal. [2]

Materials and Method

Patients
The study involved fifty patients who underwent laparoscopic cholecystectomy from October 2007 to March 2008 at Kadhamia Teaching Hospital-Baghdad (50 cases). All the patients had a history of symptomatic choledolithiasis. Investigations including, liver function tests, blood grouping, and ultrasound of the abdomen emphasizing on the gallbladder, liver, and extra-hepatic biliary tract were performed. Previous history of any surgical operation especially in upper part of abdomen was taken into consideration.

Age and gender distribution of the patients included in this study are summarized in Table 1.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age in years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20-29</td>
</tr>
<tr>
<td>Male</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 (22%)</td>
</tr>
<tr>
<td>Total</td>
<td>12 (24%)</td>
</tr>
</tbody>
</table>

Female: Male ration = (42/8) = 5.25:1
Mean age = 39.3 years

Materials
The laparoscopic equipments used were produced by Richard Wolf (Germany).

Method
The patients were operated in the supine position with 10°-20° head up (reverse Trendelenberg position) and with a left tilt once the pneumoperitoneum has been established.

The surgeon stands on the left side of the patient and the first assistant is on the right side of the patient. The person operating the camera stands to the left of the surgeon (American technique).

Results
Patients' age and gender distribution
Patients' age ranged from 20-69 years, with a higher frequency during the third and fourth decade for females. Most of the male patients were in their fifth decade onwards. Females constituted 84% of the patients with a female: male ratio of 5.25:1.

Anatomical variations
Nine (18%) of the cases operated in this study demonstrated anomalous vascular anatomy. The anomalies observed can be categorized into five main types: Caterpillar configuration, Early divided cystic artery, Low inserted cystic artery, Right hepatic
artery in the bed of Gallbladder, and Cystic artery originated from proper hepatic artery (Table-3.1).
The usual configuration is an anterior cystic duct close to the laparoscopic view and appearing larger than the cystic artery which lies postero-superior. The cystic artery arising from the right hepatic artery and appearing smaller and farther away. This normal pattern was present in about (82%) of the patients (Fig.3-1).
In the caterpillar configuration, the right hepatic artery comes close to the gallbladder and cystic duct, this arterial loop renders the right hepatic artery tortuous and results in a short cystic artery (Fig.3-2). In the early divided cystic artery, the anterior and posterior branches of the cystic artery, which commonly divide upon reaching the neck of the gallbladder, divide before reaching Calot's triangle (Fig.3-3A). In this case, two arteries traverse the triangle. On further traction of the gallbladder and dissection of the peritoneum, the two arteries appeared to stem from a single cystic artery in a Y-shaped configuration (Fig.3-3B).

Table-3.1 Incidence of Vascular anomalies types and distribution

<table>
<thead>
<tr>
<th>Vascular anomalies</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caterpillar configuration</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Early divided cystic artery</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Low inserted cystic artery</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Right hepatic artery in the bed of Gallbladder</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Cystic artery originated from proper hepatic artery</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>18%</td>
</tr>
</tbody>
</table>

In a low-inserted cystic artery (Fig.3-4), the artery originated from vessels other than the right hepatic artery (e.g. gastroduodenal, superior mesenteric, etc. The low inserted cystic artery, in order to reach its final destination passed anterior or inferior to cystic duct but not posterior to it. The operation field in laparoscopic cholecystectomy and its technique hinders further dissection to confirm the origin of the variant vessel.

When the cystic artery originated from proper hepatic artery (Fig.3-5, its relation to the cystic duct was the common posterior relation. In both, low-inserted cystic artery and when the cystic artery originated from the proper hepatic artery, the cystic artery runs a long course before reaching the gallbladder.

In two patients there was an overlap in the anatomical variations. In one case there was a Phrygian cap anomaly associated with a low inserted cystic artery. In the second case there was a Phrygian cap anomaly associated with a caterpillar configuration of the right hepatic artery.

A rare anatomical variation encountered in this study was a right hepatic artery found in the bed of gallbladder (Fig.3-6). Commonly, the right hepatic artery courses behind the bile duct and joins the right pedicle high up in Calot's

**Discussion**

**Important anatomical landmarks of the operative field**

**Infundibulum (Hartmann's pouch)**
The most important anatomical landmark to start dissection of the cystic duct was the infundibulum of...
gallbladder. The junction of the neck of the gallbladder with the cystic duct should always be identified and visualized prior to further dissection. The dissection of Calot's triangle can be done safely starting at Hartmann's pouch and moving towards the cystic duct (Figure 4-1).

**Cystic lymph node**

In Calot's triangle the cystic node (Node of Lund) usually overlaps the cystic artery. To be on the safe side, it was found that staying lateral to the node during dissection of the cystic duct and artery reduces the incidence of injury to boundaries and contents of Calot's triangle. In other words, the cystic node was used as an end-point in the dissection of Calot's triangle (Figure 4-2).

**Superficial branch of the cystic artery:**
The superficial branch of the cystic artery on the surface of the gallbladder was a good landmark to lead to the site of the parent cystic artery when pathology obscures clear anatomy of the cystic artery (Figure 4-3).

**Gender distribution**

Patients' age ranged from 20-69 years, with a higher frequency during the third and fourth decade for females. Most of the male patients were in their fifth decade onwards. Females constituted 84% of the patients with a female: male ratio of 5.25:1.

Recent postoperative study [3] of one hundred and fifty consecutive patients with calculi of biliray system created on as elective cholecystectomy in 1999 / October to 1st October 2000. There were 112 females (74.7%) and 38 males (25.3%) with age range of 20 – 80 years and a mean age of 46 years, with a peak incidence in the fifth decade of life, as shown in table 4-1.

<table>
<thead>
<tr>
<th>Table 4-1 Age and Sex distribution [3]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Female: Male ration = (112/38) = 3:1
Mean age = 46 years

**Vascular anomalies**

An important consideration during dissection of Calot's triangle is the frequent anomalies of cystic artery and cystic duct. Nine (18%) of the cases operated in this study demonstrated anomalous vascular anatomy.

In other study [3] found that the total number of extrahepatic biliary anomalies were 81 out of 150 cases (incidence 54%), and these was divided into vascular (40%), ductal (12%), and GB anomalies (2%), Table 4-2.

<table>
<thead>
<tr>
<th>Table 4-2: Incidence of total extrahepatic biliary anomalies. [3]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anomalies</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Vascular anomalies</td>
</tr>
<tr>
<td>Ductal anomalies</td>
</tr>
<tr>
<td>GB anomalies</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Vascular anomalies (40%) are much commoner than ductal anomalies (12%).

The main arterial supply to the gallbladder is the cystic artery and presented an unusually high degree of variability not only in origin but also in its course to the gallbladder. Since it is always sought for ligation during cholecystectomy irrespective of its origin, the most practical method of locating the cystic artery would be the relationship of its course to the biliary-duct system and the Calot’s triangle. Commonly the cystic artery passes superior and medial to the cystic duct within the Calot’s triangle as in this study (96%), while it is found outside in 6 cases only (4%), inferior to cystic duct especially when there is high insertion of this duct. So it is important to be aware of the situation when no artery is seen in Calot’s triangle, because various abnormalities in position may exist and overlooking them result in sever hemorrhage.

Table 4-3: Incidence of vascular anomalies in 150 cholecystectomies and its several subtypes[3]

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>No.</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory cystic artery</td>
<td>27</td>
<td>(18)</td>
</tr>
<tr>
<td>Anterior cystic artery of anterior RHA</td>
<td>24</td>
<td>(16)</td>
</tr>
<tr>
<td>Caterpillar hump right hepatic artery</td>
<td>9</td>
<td>(6)</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>(40)</td>
</tr>
</tbody>
</table>

1- Accessory cystic artery (18%),
This high incidence also reported in many studies (no statistical significant difference between our study and other studies: P > 0.05), as shown in (Table 6). Therefore after carefully ligating or clipping one artery, the surgeon must search carefully for the possibility of another supply which may have any source of origin, and if not identified this may be torn and bleeding may obscure the operative field and hurried blind clamping may produce a disaster.

2- Anterior transposition of the cystic artery, or (the right hepatic artery) anterior to the (CHD) or (CBD), was found in (16%), again there is no statistical significant difference between our study and other studies: P > 0.05 as shown in Table 4-4.

Table 4-4 Comparison between this study and other studies about vascular anomalies. [3]

<table>
<thead>
<tr>
<th>Studies</th>
<th>Anterior cystic or anterior RHA(%)</th>
<th>Accessory cystic artery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adkins RB (2000)</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Shwartz (1999)</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Touli (1993)</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Stremple J.F (1986)</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Benson and Page (1976)</td>
<td>20.7</td>
<td>26.4</td>
</tr>
<tr>
<td>Nicholas (1951)</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>Moosman (1951)</td>
<td>19.6</td>
<td>25.2</td>
</tr>
<tr>
<td>Daseler et al (1947)</td>
<td>-</td>
<td>14</td>
</tr>
</tbody>
</table>

(P > 0.05)
It is clinically important to note especially when doing an exploration of (CBD), and when the anterior cystic artery being ligated there is always a possible risk of direct injury to either (CBD) or (CHD), depending on where the anterior cystic artery runs, how closely it is related to the ductal structure and how far proximally the ligation is placed.

3- Caterpillar hump right hepatic artery, which is much less common (6%). This artery can pass anterior or posterior to the (CBD) or (CHD). If the right hepatic artery replaces the cystic artery within the Calot’s triangle, and it is tortuous and projects forwards to the right of the (CHD), something like the hump of caterpillar back during progression, with convexity downward or upward and from the summit of the U-shape loop a short cystic artery arises and passes to the neck of the gallbladder, and it is definitely not a traction artifact, it is potentially a more treacherous and dangerous anomaly for the following reasons:

a. It may be mistaken for the cystic artery (especially if vigorous traction is applied) and an attempt may then be made to ligate it, and this can fatal in the presence of impaired liver functions.

b. Since the cystic artery which arises from a caterpillar hump right hepatic artery is frequently short and stubby, it is relatively easily avulsed from the parent trunk (particularly when strong traction is applied to the gallbladder), again producing brisk bleeding with possible unfortunate sequence of events outlined above.

c. It must be emphasized that an artery resembling the cystic artery in its course and paralleling the cystic duct is not necessarily the cystic artery but may be the right hepatic artery because the caliber of the vessels to be divided is not a reliable index if it is the cystic or right hepatic artery. It is therefore essential to visualize the right hepatic artery above and below the origin of the cystic branch

Conclusions
The advent and popularity of LC has led to a new look and insights into biliary anatomy especially of the Calot’s triangle area. The term 'laparoscopic anatomy has actually found a place in anatomy texts, educational multimedia, and on the World Wide Web (e.g. Online Laparoscopic Technical Manual. [http://www.Laparoscopy.net] & Laparoscopy Hospital. [http://www.laparoscopyhospital.com/article.HTML].

Anatomical recommendations for a safe laparoscopic cholecystectomy:
Surgeons do not perform routine imaging investigations other than a preoperative ultrasound; thus, they should rely on solid anatomical knowledge. Although a detailed discussion of all the factors peculiar to laparoscopy that contribute to an increased incidence of injuries is beyond the scope of this study, a good knowledge of anatomy and the expectation of its intricacies are regarded as the corner stone in performing a safe procedure.

1. Attention should be paid to the dissection of Calot's triangle.
2. Retraction should be applied on the fundus and infundibulum of the gallbladder.
3. Cystic duct dissection should start from Hartmann's pouch.
4. a space should be demonstrated between the cystic duct and the liver,
5. the superficial branch of the cystic artery facilitates dissection for the stem,
6. the surgeon should stay lateral to the cystic node during dissection of the cystic pedicle, stay away from the liver
during gallbladder detachment, and get acquainted with a new anatomical view encountered during laparoscopic cholecystectomy

**Vascular injury**

The most obvious danger is that of haemorrhage from large blood vessels lying anterior to the biliary tree. Such vessels are inconstant but frequent the posterosuperior pancreaticoduodenal artery to the retroduodenal portion of the common bile duct, is the vessel most frequently encountered [1]. The cystic artery is an example of some pitfalls to be expected.

1. It may be single or double, short or long.
2. It may be passing anterior or posterior to the right and left hepatic ducts, the common hepatic or the common bile duct.
3. It may be large, mimicking a small right hepatic artery.
4. It may bifurcate at the neck of the gallbladder or two arteries may have a separate origin.
5. Bleeding from veins of the gallbladder bed or from veins of the common bile duct is a minor complication, injury to the portal vein [4] or the inferior vena cava is more serious, these vessels must be repaired at once.
6. A second complication is ischemia to the liver from unintended ligation of the right hepatic artery or an accessory replacing of aberrant right hepatic artery. Interference with the blood supply of the common bile duct may result in ischemia and stricture. Other surgeon feel that the blood supply is good and that collateral circulation will prevent local ischemia [5], [6], [7].

**Vascular variations**

Uncontrolled arterial bleeding during laparoscopic cholecystectomy is a serious problem and may increase the risk of bile duct damage. Therefore, accurate identification of the anatomy of the cystic artery is important [8]. The common pattern of a cystic artery arising from the right hepatic artery and appearing smaller and farther away from the cystic duct in the laparoscopic view was present in about (85%) of the patients (Fig.3-1). Other studies revealed the typical pattern of the cystic artery to be present in 72% [9], 73.5% [10], and 76.6% [11] of patients operated laparoscopically. The nomenclature of arterial variants and their types vary from one study to another [9],[10],[11]. Absence of cystic artery in Calot's triangle was reported in H.1”( 9) and 5.5%[10] of the cases. A cystic artery that runs inferior to the cystic duct was found in 6% of the cases [9]. In this study, the low inserted cystic artery and the cystic artery originating from a right hepatic artery in the liver bed imply absence of the artery in Calot's triangle; this was observed in 8% of the cases.

The right hepatic artery normally courses behind the bile duct and joins the right pedicle high up in the Calot's triangle. In the caterpillar configuration, the right hepatic artery comes very close to the gallbladder and the cystic duct the form of a hump. Although the incidence of this variation was 4% in this (Fig.3-2), it seems that its incidence may be as high as 50% [12]. If such a is present, the cystic artery in turn is very short. In this situation the right hepatic artery is either liable to be mistakenly identified as the cystic artery or torn in attempts to ligate the cystic artery. The ensuing bleeding in turn predisposes to biliary injury [8].

A rare anatomical variation encountered in this study was a right hepatic artery coming very close to the gallbladder so that it was found in its bed (Fig.3-6). An accessory or replaced right hepatic artery from
superior mesenteric artery has been reported in almost 15% of individuals, whereby the right hepatic artery courses through the Calot's triangle and therefore nearer the gallbladder [8]. Nevertheless, a right hepatic artery within the gallbladder bed has not been previously reported. The presence of such an artery renders the cystic artery short and may require meticulous dissection of the gallbladder from its bed. In addition, right hepatic vascular injury has been reported to lead to liver necrosis in the right liver lobe [13]. The possibility of the presence of a right hepatic artery in the bed of the gallbladder emphasizes the necessity to dissect close to the gallbladder rather than the liver parenchyma. Accessory cystic arteries were observed in 7.4% of the cases and doubling of the cystic artery was observed in (22%) [9] and (15.5%) [10] of the cases. Doubling of the cystic artery was indicated to be the most common cystic artery variation [10]. In this study a double cystic artery was found in Calot’s triangle in 4% of the cases (Fig.3-3); however, the double artery was found to originate from a single stem in a Y-shaped configuration. A cystic artery originating from the gastroduodenal artery was found in (4.5%) patients. In this study a low inserted cystic artery of obscure origin was found in (4%) of the cases. The long course of such an artery and its course anterior to structures in the free margin of lesser omentum were also reported. Small branches of the cystic artery, suggested to be named Calot's arteries, supply the cystic duct and may cause troublesome bleeding during laparoscopic dissection in the hepatobiliary triangle. These small vessels have been better appreciated in the era of laparoscopic cholecystectomy and need to be divided to obtain a length of cystic duct before division [8].

Careful identification of arterial anomalies should help to reduce uncontrolled bleeding and the incidence of bile duct injuries during laparoscopic cholecystectomy. Investigations pre and intra-operative do not give any clue about arterial variation so knowledge of anatomy is crucial.

Some golden rules in case of difficulty [14]

- When the anatomy of the triangle of Calot is unclear, blind dissection should stop.
- Bleeding adjacent to triangle of Calot should be controlled by pressure and not by blind clipping or clamping.
- When there is doubt about the anatomy a fundus first cholecystectomy dissecting on the gallbladder wall down to the cystic duct, can be helpful.
- If the cystic duct densely adherent to the common bile duct and there is possibility of Mirizzi syndrome (stone ulcerating through into the common duct) the infundibulum of gallbladder should be opened and the stone removed and the infundibulum oversewn.
- Occasionally, the gallbladder bed bleeding profusely, the use of suction and diathermy is advisable for laparotomy and laparoscopic operation.
- The gallbladder bed may be filled with omentum and a drain placed over the omentum (not between the bed and the omentum).
- Regardless of the direction of the procedure the junction of the cystic and common hepatic ducts should be identified.
- Short cystic duct may cause inadvertent injury to the common bile duct.
Figure 3-1: The most common configuration of cystic duct and artery encountered in this study. Cystic duct (‡), cystic artery (interrupted arrow).

Figure 3-2: Short cystic artery (‡) arising from caterpillar right hepatic artery (interrupted line).
Figure 3-3 early divided cystic artery. (A) The anterior and posterior branches of the cystic artery (arrows) traverse Calot’s triangle. (B) Further traction of the gallbladder reveals the two arteries (arrows) arising from a single cystic artery (*) in a Y-shaped configuration.

Figure 3-4: (A) Low inserted cystic artery (‡) passing in front of the cystic duct (*); (B) Low inserted cystic artery (‡) passing inferior to the cystic duct (*)
**Figure 3-5:** cystic artery (‡) originated from proper hepatic artery (*). Note that the cystic artery lies posterior to the cystic duct (D).

**Figure 3-6:** (A) right hepatic artery (‡) in the bed of the gall bladder (*); (B) cystic artery (interrupted arrow) arising from the right hepatic artery (‡) within the bed of the gall bladder.
anatomical landmark to start dissection of the cystic duct during laparoscopic cholecystectomy. (A) Hartman’s pouch(*) (B) the junction of the neck of the gallbladder with cystic duct ( ) where dissection of the cystic duct was started.

Figure 4-2 cystic lymph node as an anatomical landmark. (A) cystic lymph node (*) overlying the cystic artery ( ): (B) traction on the cystic node(*) reveals the underlying cystic artery ( ) and exposes the boundaries of the calot’s triangle. Note the common hepatic duct (the interrupted arrow) at the medial border of the triangle.
the superficial branch of the cystic artery as an anatomical landmark. (A) the superficial branch (arrow) leading to the parent cystic artery (*). (B) extracted gall bladder showing the superficial branch of the cystic artery ( ) and its continuation with clipped cystic artery (*).

References

Abstract

Background: Management of 3rd stage of labour with its unpredictable life threaten complication has been debated for centuries and still arouses much discussion. There is some evidence that cord drainage of placental blood may reduce the duration of 3rd stage of labour and the need for manual removal of placenta.

Aim of the study: To evaluate the effectiveness of placental blood drainage via the umbilical cord in reducing the duration and blood loss in 3rd stage of labour and the incidence of PPH.

Method: A prospective study involving 200 women having vaginal delivery were divided into drainage group(100 women) and control  group (100 women) . The main outcome measures were duration of 3rd stage and amount of blood loss.

Result: The mean duration of 3rd stage was (5.35±2.3 minutes ) in the study group and (8.9±4.9 minutes ) in control group. The average blood loss was (184.3±118 ml ) in the study group and (249.7±147 ml ) in control group. Retained placenta was reported in only two cases of control group which needed manual removal of placenta. One case of postpartum hemorrhage due to inertia required blood transfusion was reported in the control group.

Conclusion: Placental cord drainage is simple, safe, and non invasive method in reducing the duration and blood loss in 3rd stage of labour thereby preventing PPH.

Introduction

The 3rd stage of labour refers to the interval from delivery of the fetus to the separation and expulsion of the placenta. The major complication associated with this period is postpartum...
hemorrhage, which is the most common cause of maternal morbidity and mortality in developing countries. Even in developed countries although maternal mortality rates are much lower, postpartum hemorrhage remains major concern.[1] Numerous factors lead to increase incidence of postpartum hemorrhage like prolonged labour, multifetal gestation, large baby, anemia, eclampsia and operative vaginal delivery. However two third of pph cases occur in women with no known risk factors hence all pregnant women at risk for this catastrophic event.[2] The third stage of labour is generally managed using two different approaches: active and physiological or expectant management. The active management involves administration of oxytocic drugs, clamping and cutting the cord as well as controlled cord traction. The physiological or expectant mainly involves maternal effort assisted by gravity or putting the baby to the breast without using artificial oxytocine or early clamping or controlled cord traction[3]. In women at low risk of pph many studies have suggested that active pharmacological management does not reduce blood loss when compared with physiological management [4]. Active management was however associated with an increase of unpleasant side effects as nausea and vomiting and hypertension when ergometrine were used [5]. In the management of 3rd stage nowadays it is a common practice to clamp both sides of the cord and cutting it then wait until there are signs of placental separation then deliver the placenta by controlled cord traction (brandet Andrews maneuver)[6] Un clamping the cord at maternal side and releasing of placental blood has been suggested for facilitating delivery of the placenta it is physiologically plausible that draining blood from the placenta would reduce its bulkiness allowing the uterus to contract and retract effectively leading to delivery of placenta and may reduce the duration of 3rd stage of labour,[6] Cord drainage in 3rd stage of labour involves unclamping the previously clamped and separated umbilical cord and allowing the blood from the placenta to drain freely into appropriate receptacles.[7] Aims of the Study To assess the effect of placental cord drainage on the duration of 3rd stage of labour and to clarify the safety of this method regarding to postpartum hemorrhage, retained placenta, incidence of manual removal of placenta and the need for blood transfusion. Materials and Methods Study design and setting Prospective study conducted at Babylon teaching hospital for maternity and pediatrics throughout the period between Jan –July 2010. The study involves 200 women in their 3rd stage of labour after uncomplicated vaginal delivery. Inclusion criteria - uncomplicated singleton pregnancy - pregnancy with vertex presentation. - Patients expected to have spontaneous vaginal delivery. - Multipara less than 5. Exclusion criteria - induced labour - previous history of pph - Hemoglobin less than 10 g/dl Ante partum hemorrhage- - Multiple pregnancies Instrumental delivery- - Known coagulation disorder - Over distended uterus (hydramnios. Large fetus)
After a detailed history taken general physical and obstetric examination were performed. Informed consent was taken from those who fulfilled the inclusion criteria. Once the women delivered vaginally they divided into two groups (study and control).

In the study group a of total number of 100 women placental end of the cut umbilical cord 1st clamed for few seconds and then unclamped and left open to drain blood in a vessel until flow ceased. This will prevent the drained blood from getting mixed with blood lost in the 3rd stage.

In the control group a total number of 100 women placental end of the cut umbilical cord will be kept clamped.

Blood loss in the 3rd stage of labour was measured using a plastic sheath which was used during delivery and the blood lost was collected.

Placenta will be delivered by controlled cord traction once signs of placental separation were seen intramuscular ergometrine will be given after delivery of placenta in both groups after exclusion of contraindications of its use. The duration of 3rd stage was calculated using a stopwatch.

The pulse rate, blood pressure and state of uterus were noted immediately the women were kept under observation for next one hour for any complications; blood transfusion will be given whenever indicated.

The primary outcome measures were the duration of 3rd stage of labour and the amount of blood loss.

Secondary outcome measures were the incidence of retained placenta, manual removal of placenta, postpartum hemorrhage and need for blood transfusion.

A t-test was used for statistical analysis.

**Results**

Both study and control groups were comparable regarding their age, gravity, parity, number of miscarriage and gestational age. Table (1)
The mean age in study group was (26.5±5.8) and (27.9±5.1) year in control group.

Gestational age was (39±1) weeks in study group and (38.9±1) weeks in control group

Labour was spontaneous in 67% of study group and 54 % in control group and accelerated in 33% of study group and 46% in control group.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Study group N=100</th>
<th>Control group N=100</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>26.5±5.8</td>
<td>27.9±5.1</td>
<td>0.02</td>
</tr>
<tr>
<td>Parity</td>
<td>2.2±1.9</td>
<td>2±1.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Miscarriage</td>
<td>0.8±0.9</td>
<td>0.93±0.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Gestational age (wks)</td>
<td>39±1</td>
<td>38.9±1</td>
<td>0.4</td>
</tr>
<tr>
<td>Spontaneous labour (no.)</td>
<td>67</td>
<td>54</td>
<td>0.06</td>
</tr>
<tr>
<td>Accelerated labour (no.)</td>
<td>33</td>
<td>46</td>
<td>0.06</td>
</tr>
<tr>
<td>Hemoglobin level gm/dl</td>
<td>11.7±1.3</td>
<td>12.4±1.2</td>
<td>0.09</td>
</tr>
</tbody>
</table>

**Outcome of the study**

The average duration of 3rd stage of labour was 5.35±2.3 minutes in study group and 8.9±4.9 minutes in control group. This difference was highly significant (p< 0.001).

The average 3rd stage blood loss was 184.3±118 ml in the study group and 249.7±147 ml in the control group.

This difference was highly significant (p<0.001).
There were two cases of retained placenta that required manual removal in the control group, no such cases reported in the study group.

One case of postpartum hemorrhage due to inertia was reported in control group and required blood transfusion. No reported cases of postpartum hemorrhage in the study group.

Table 2 the outcome of the study

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Study group N=100</th>
<th>Control group N=100</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>length of 3rd stage (minutes)</td>
<td>5.35 ± 2.3</td>
<td>8.9 ± 4.9</td>
<td>0.000001</td>
</tr>
<tr>
<td>Blood loss (ml)</td>
<td>184.3 ± 118</td>
<td>249.7 ± 147</td>
<td>0.0006</td>
</tr>
<tr>
<td>Retained placenta (no.)</td>
<td>0</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>Manual removal of placenta(no.)</td>
<td>0</td>
<td>2</td>
<td>0.15</td>
</tr>
<tr>
<td>Postpartum hemorrhage(no.)</td>
<td>0</td>
<td>1</td>
<td>0.31</td>
</tr>
<tr>
<td>Blood transfusion(no.)</td>
<td>0</td>
<td>1</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Discussion
The 3rd stage of labour begins immediately after the birth of the baby and ends with the expulsion of the placenta and fetal membranes; it is preceded by a sudden reduction of uterine size and concurrent contraction and retraction of the uterus. Reduced uterine size and limited placental elasticity and a tight compression by the uterus lead to separation of the placenta from the spongy deciduas (lining of the uterus).[7]

The 3rd stage of labour is always a time of anxiety as the normal case can within minutes become abnormal and successful delivery can swiftly turn into maternal mortality.

The commonest cause of maternal mortality is postpartum hemorrhage which account for about 25-30% of maternal mortality. [2] Most of these deaths are due to postpartum hemorrhage resulting from atonic uterus [8].

The main purpose of this study was to assess the effect of placental cord drainage on the duration of 3rd stage of labour.

The secondary objective is to clarify the safety of this method regarding pph, retained placenta, incidence of manual removal of placenta and need for blood transfusion.

Razmkhah in 1999 1st reported the duration of 3rd stage of labour was significantly shorter when using the placental cord drainage method similar result was reported by other investigators.[4, 5]

However one study [9] found no extrabenefit from placental cord drainage.

Regarding postpartum complication, most studies found no significant increase in complication. [5, 7].

However postpartum hemorrhage increase in one study. [9]

The practice of placental cord drainage was not spread in many countries except in Belgium where it was policy in 32% of maternity unite and Portugal when it was a policy in 24 %[10].

Giacalone reported a randomized study comparing 239 women who had placental cord drainage with 238 women with expectant delivery of the placenta. The median value of duration of 3rd stage of labour was 8 minutes in cord drainage group and 15 minutes in the control group. [4]

Gulati et al studied 200 women to evaluate placental blood drainage during vaginal delivery as a method of shortening the duration of 3rd stage and reducing the amount of blood loss and
concluded that duration of 3rd stage of labour in the control group was 5.72 minutes and in the study group it was 2.94 minutes, the amount of blood lost in the 3rd stage was 247.59 ml in the control group and 193.63 ml in the study group. Incidence of pph was 12% in the control and 6% in the study group. Retained placenta was observed in 4% in the control group and 0% in the study group.[11]

Sharma et al reported a study on 958 women having vaginal delivery, who were randomized to the drainage method (478 women) or control cord traction method (480 women) for placental delivery. The mean duration of 3rd stage of labour was 3.24 minutes and 3.2 minutes in the placental drainage group in contrast to 8.57 minutes and 6.2 minutes in controlled cord traction method in primigravida and multigravida respectively. [5]

The Cochrane data base of systematic review studied the effect of placental cord drainage on the 3rd stage of labour and concluded that cord drainage result in statistically significant reduction in the length of 3rd stage of labour[7].

In our study we found that the duration of 3rd stage was (5.35±2.3 ) minutes in study group and (8.9±4.9 ) minutes in control group. The amount of blood loss was (184.3±118) ml in study group and (249.7±147) ml in control group.

Shravage J and Silpa P in their study found that the duration of 3rd stage was 5 minutes in the study group and 7.4 minutes in the control group. The average blood loss was 175 ml in the study group and 252 ml in the control group this result was comparable with our study.

The incidence of pph was less in the study group (3% vs. 10%) none of women required blood transfusion [2]. In our study only one case of postpartum hemorrhage due to inertia reported in control group.

Giacalone in his study found that no significant difference between 2 groups with regard to the incidence of manual removal of retained placenta or pph[4]

In our study the incidence of manual removal of placenta found to be zero in study group compared with 2% of control group. Blood transfusion required for only one case of control group while it was not required for study group.

There is some evidence that placental cord drainage may reduce fetomaternal transfusion which can occur with placental separation as there is small risk that the baby’s blood cells may get into the mother circulation and stimulate antibody production (isoimmunization)[12,13]

Regarding the placental cord drainage data from study done by piphat and sackna revealed that there was no pph, uterine atony, hypovolemic shock in neither group (study and control)[6]

**Conclusion**

Placental blood drainage is simple, safe and non invasive method which reduces duration and blood loss of 3rd stage of labour thereby preventing postpartum hemorrhage.

**Recommendations**

- Further investigation of the effect of cord drainage on the maternal and neonatal outcome is needed.
- Placental cord drainage should be encouraged for management of 3rd stage of labour when no routine drug administration is planned because it is safe noninvasive and not requiring any effort, cost or equipments and this is relevant in rural areas.
References
1- Royston, E, Armstrong, S. Preventing maternal death, Geneva: world health organization; 1989.p.30
4- Giacalone PL et al. a randomized evaluation of two technique of management of the third stage of labour in women at low risk of postpartum hemorrhage. BJOG, 2000; 107(3):396-400.
13- Prendiville W. ElbourneD. Care during the third stage of labour. oxford oup; 1989.p 1145-69.
Abstract

Background: A variety of cements have been used in dentistry through many years for two primary purposes: as restorative filling materials, either alone or with other materials, and to retain restorations or appliances in a fixed position within the mouth. In addition, certain cements are used for specialized purposes in the restorative, endodontic, orthodontic, periodontic, and surgical fields of dentistry. Cement solubility and water sorption could be a primary cause of restoration failure.

Aim of study: To evaluate the water sorption and solubility of different commercially available dental cement materials.

Materials and Methods: Thirty disks (9×2 mm) of zinc polycarboxylate, zinc phosphate and glass ionomer cements (ten disks for each one) were prepared according to manufactures instructions. After setting, they were desiccated and weighed and each specimen were immersed in distil water for 7 days, then removed and weighed again. Then disks were again desiccated and weighed. Solubility and water sorption values were calculated from these different measures.

Results and Conclusion: The results shows that the polycarboxylate cement show the highest value of water sorption and water solubility followed by zinc phosphate cement. Glass ionomer cement shows the lowest values of the three materials tested regarding both water sorption and water solubility.

Introduction

Although dental cements are used in small quantities, they are the most important materials in clinical dentistry because of their application as luting agents, orthodontic attachments, cavity linings and bases, and restorations for teeth. These multiple uses of dental cements require more than one type of cement; since no one material has yet been developed that can perform all the desirable requirements, these different applications require different physical
properties and appropriate clinical manipulative characteristics [1]. Solubility and water sorption is an important feature in assessing the clinical durability of dental cements. Consequently, solubility of dental cements has been widely evaluated both in vitro and in vivo [2-4]. Water sorption and solubility may cause degradation of the cement, leading to debonding of the restoration and recurrent decay [2, 5, 9]. However, most of these tests are static solubility tests, unrelated to the conditions found in the oral environment, and in particular, applied only to short-term solubility, While some investigators study the solubility in dynamic state (different pH) [6, 7]. It’s clear that the clinical success of fixed partial prostheses is heavily dependent on the cementation procedure, because dental cement must be used to act as a barrier against microleakage [8, 15]. Dental cements can degrade when exposed to saliva in the mouth, and the resulting gap between the tooth and the restoration predisposes the tooth to caries, post operative hypersensitivity, pulpal inflammation and periodontal disease [9]. Water sorption and solubility of cements leads to dimensional changes, loss of retention, staining and breaking in margin contours and may affect the mechanical behavior such as the flexural strength, Vickers hardness and mechanical stability [10-13]. The solubility of dental luting cements influences both their rate of degradation and their biological compatibility [14]. Because of this, the water sorption and solubility of dental cements are of considerable clinical importance and can not be overlooked.

Materials and Methods
The ADA specification #8 (zinc phosphate cement solubility) [24] was adapted with few modification to design the methodology used in this study, distilled water used as storage media as the ADA specification #8 suggests , and the storage time were 1 week [16]. The materials used in this study and its composition are listed in table (1) and shown in figure (1). Thirty discs were prepared (ten discs for each material) measured (9 mm in diameter and 2 mm in thicknesses). The powder –liquid ratio and mixing of the components of each material was carried according to manufacturer instructions. The samples were prepared using a specially designed plastic syringe (with a stopper on its body) (figure 2), the resulting space inside the syringe has 9 mm diameter and 2 mm thickness. The syringe were loaded with the cement material with slight excess and pressed against a polyester strip placed on glass slab, after setting of the cement we remove the excess material and remove the stopper of syringe and push the plunger to extrude the disc of cement. Then the samples weighed with precision weighing scale (Denver instruments MXX-123-USA) (figure 3), the initial weight is termed (W$_1$). Immediately after weighing the samples, they were immersed in individually numbered distilled water tubes and held in stand (figure 4) at 37 ºC for 1 week in an incubator (Memmert, Germany) (figure 5), removed and weighing again (W$_2$). The samples then dehydrated in an oven at 37 ºC for 24 h and weighed again (W$_3$). The loss of material (solubility) was obtained from the difference between the initial and final drying mass of each sample (W$_1$-W$_3$). The water sorption was obtained from the difference between initial weighing and the wet weighing (W$_2$-W$_1$). The values of water sorption (W$_{sp}$) and solubility (W$_{sol}$), in µg/mm$^3$ for
each sample were calculated using the following equations [10, 17]:

\[
W_{sp} = \frac{(W_2 - W_1)}{V}
\]

\[
W_{sol} = \frac{(W_1 - W_3)}{V}
\]

Where \( V \) is the volume of sample in mm\(^3\) = (127.17 mm\(^3\)).

The data were subjected to one-way ANOVA, and LSD test at a 0.05 significance level.

### Table 1 Materials used in this study

<table>
<thead>
<tr>
<th>Material</th>
<th>Compositions</th>
<th>Batch #</th>
<th>Manufacturer</th>
</tr>
</thead>
</table>
| Adhesor (zinc phosphate)  | **Powder:** zinc oxide, magnesium oxide, aluminum trihydroxide and boron trioxide.  
                           | **Liquid:** aqueous solution of phosphoric acid and aluminum orthophosphate.  | N1-1911639 Exp. 12-2013 | Spofadental a.s. Marakova- CZ |
| Adhesor carbofine (zinc poly carboxylate) | **Powder:** oxides (Zn, Mg, Al), boric acid.  
                           | **Liquid:** acrylic acid, maleic acid anhydride, distilled water.  | 1880391-2 Exp. 11-2013 | Spofadental a.s. Marakova- CZ |
| Medicem (glass ionomer)   | Poly acrylic acid , fluoro silicate and parabens                            | 0844212 Exp. 03-2014 | Promedica Germany |

**Figure 1** Materials used in this study
Figure 2  the syringe used in this study

Figure 3  Precession weighing device
Results
The Mean values of W1, W2, W3, for all materials used in this study are shown in table (2).
The water sorption and water solubility are shown in table (3).

The mean values shows that the polycarboxylate cement show the highest value of water sorption and water solubility followed by zinc phosphate cement. Glass ionomer cement shows the lowest values of the
three materials tested regarding both water sorption and water solubility as shown in figure (6) and figure (7).

**Table 2** Mean values in gram for weighing.

<table>
<thead>
<tr>
<th>Material</th>
<th>W1 (mean)/gm</th>
<th>gµ</th>
<th>W2 (mean)/gm</th>
<th>gµ</th>
<th>W3 (mean)/gm</th>
<th>gµ</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIC</td>
<td>0.2538</td>
<td>253800</td>
<td>0.2804</td>
<td>280400</td>
<td>0.2481</td>
<td>248100</td>
</tr>
<tr>
<td>Zn.Ph.</td>
<td>0.5179</td>
<td>517900</td>
<td>0.5499</td>
<td>549900</td>
<td>0.5107</td>
<td>510700</td>
</tr>
<tr>
<td>Zn. Polycarboxylate</td>
<td>0.3234</td>
<td>323400</td>
<td>0.3723</td>
<td>372300</td>
<td>0.31478</td>
<td>314780</td>
</tr>
</tbody>
</table>

**Table 3** Mean values in µg/mm$^3$ of W.Sor and W.Sol. for all materials.

<table>
<thead>
<tr>
<th>Material</th>
<th>W.Sor (µg/mm$^3$)</th>
<th>W.Sol (µg/mm$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIC</td>
<td>219.17</td>
<td>44.82</td>
</tr>
<tr>
<td>Zn.Ph.</td>
<td>251.63</td>
<td>56.62</td>
</tr>
<tr>
<td>Zn. Polycarboxylate</td>
<td>345.99</td>
<td>61.34</td>
</tr>
</tbody>
</table>

**Figure 6** Bar chart showing the mean values for weighing in grams.
The water sorption values showed correlation with the solubility values: the higher the water sorption, the greater the solubility for the evaluated materials. The data were subjected to one-way ANOVA, and LSD test at a 0.05 significance level. For water sorption, ANOVA test shows significant difference among the materials tested ($p < 0.05$) (table 4).

**Table 4** ANOVA test for sorption values

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>156289.021</td>
<td>2</td>
<td>78144.511</td>
<td>7.836</td>
</tr>
<tr>
<td>Within Groups</td>
<td>259289.805</td>
<td>26</td>
<td>9972.685</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>415578.826</td>
<td>28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Post hoc (LSD) test for water sorption values shows a significant difference between all materials ($p < 0.05$) except between zinc phosphate and glass ionomer cements (table 5).
Table 5 LSD test for sorption values

<table>
<thead>
<tr>
<th>(I) Material Type</th>
<th>(J) Material Type</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIC</td>
<td>Zn.Ph</td>
<td>-42.462845</td>
<td>-44.660239</td>
<td>.350</td>
<td>-134.26328-49.33759</td>
</tr>
<tr>
<td>Zn.Poly</td>
<td></td>
<td>-1.752685E2</td>
<td>45.884034</td>
<td>.001</td>
<td>-269.58443-80.95247</td>
</tr>
<tr>
<td>Zn.Ph</td>
<td>GIC</td>
<td>42.462845</td>
<td>44.660239</td>
<td>.350</td>
<td>-49.33759-134.26328</td>
</tr>
<tr>
<td>Zn.Poly</td>
<td></td>
<td>-1.328056E2</td>
<td>45.884034</td>
<td>.008</td>
<td>-227.12159-38.48962</td>
</tr>
<tr>
<td></td>
<td>Zn.Poly</td>
<td>175.268451*</td>
<td>45.884034</td>
<td>.001</td>
<td>80.95247-269.58443</td>
</tr>
<tr>
<td></td>
<td>Zn.Ph</td>
<td>132.805606*</td>
<td>45.884034</td>
<td>.008</td>
<td>38.48962-227.12159</td>
</tr>
</tbody>
</table>

*. The mean difference is significant at the 0.05 level.

For water solubility, ANOVA test shows non significant difference among the materials tested (p < 0.05) (table (6)), however the mean values shows that zinc poly carboxylate has greater solubility values followed by zinc phosphate, the glass ionomer has the least values.

Table 6 ANOVA test for solubility values

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2581.483</td>
<td>2</td>
<td>1290.741</td>
<td>.378</td>
<td>.689</td>
</tr>
<tr>
<td>Within Groups</td>
<td>88775.752</td>
<td>26</td>
<td>3414.452</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>91357.234</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Post hoc (LSD) test for water solubility values shows a non significant difference between all materials (p <0.05) (table (7)).

Table 7 LSD test for solubility values

<table>
<thead>
<tr>
<th>(I) Material Type</th>
<th>(J) Material Type</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zn.Poly</td>
<td></td>
<td>-23.328353</td>
<td>26.848254</td>
<td>.393</td>
<td>-78.51573-31.85902</td>
</tr>
<tr>
<td></td>
<td>GIC</td>
<td>23.328353</td>
<td>26.848254</td>
<td>.393</td>
<td>-31.85902-78.51573</td>
</tr>
</tbody>
</table>

Discussion

The water sorption and solubility of dental restorative materials are of considerable clinical importance and cannot be neglected [10, 18]. According to Tae Hyung Kim [19], high strength and low solubility are desirable for any base or lining material. A strong base material is needed to support the overlying restoration and the subsequent occlusal forces acting upon it during clinical function. Some reduction observed in compressive strength may be attributed...
to dissolution or water sorption during storage. Moreover, marginal infiltration may influence on liners hardness, which reinforces the need for studies related to their physical properties.

The water sorption measurements actually measured the net gain in weight of a specimen as a result of the ingress of water molecules and egress of monomers and other small molecules [20]. From an atomic point of view diffusion mechanisms are a stepwise migration from one site to another. Generally two patterns are known for diffusion of water through polymeric materials [21]: one is the pattern following the (free volumetric theory), in which the water diffuses through a microvoids without any mutual relationship to the polar molecules in the material. The other pattern is called (interaction theory), in which water diffuses through material binding successively to the hydrophilic groups. In the case were there was a negative correlation between the diffusion and equilibrium water uptake, the later pattern of diffusion was supposed to occur mainly. Recently it has been assumed that both approaches could be valid, each one for a defined specimen family or both simultaneously.

Solubility is the ability of a substance to dissolve in another, expressed as the concentration of saturated solution of the former in the latter. When solubility is tested, there is no particle in suspension (the solvent remains limpid) [30].

This study was aimed at elucidating essential values for the evaluation of the quality of each employed material, which is of important clinical applicability. In fact, lining, base and luting materials have to be resistant to dissolution in water, organic solvents and acid-etching solutions, in order to maintain their pulp protective effect [22]. In addition, dissolved and smeared cement may contaminate acid etched enamel, and produce an inferior bond, which is not desirable [23].

The choice for the three kinds of cements here evaluated was based on the fact that Zinc phosphate, Zinc polycarboxylate and Glass ionomer cement are the most commonly used conventional lining and luting materials in the clinical practice.

Water sorption and solubility tests were applied according to the ADA’s #8 specification [24], though with few alterations to meet the objectives of this study.

The results of this study shows higher mean values (both sorption and solubility) for poly carboxylate cement followed by zinc phosphate and the least values were for glass ionomer cement.

The results of Yoruc and Karaaslan [1] showed that commercial dental polycarboxylate cements absorbed most of the water within 1st day of water storage. They continued to absorb the water at a slower rate for 28 days until equilibrium was reached. They further assumed that the results of their investigation showed that the water absorption of the commercial dental polycarboxylate cements was significantly depend on material composition.

Zinc polycarboxylate cement is a water-based material that hardens following an acid-base reactions between zinc-rich powder and an aqueous solution of polyacrylic acid [25]. The hydrophilic nature of a polymer is a function of the chemistry of its monomers and polymerization linkages. The presence of hydroxyl, carboxyl and phosphate groups in monomers and their resultant polymer make them more hydrophilic and more prone to water sorption [13], these cements include water in their formulation.
Glass ionomer cements are sensitive to water erosion [26]; it may be due to same hydrolysis of the cement components, this phenomenon is apparently aggravated in oral environment due to presence of aggressive compounds in saliva. Clinical success of glass ionomer cements depends on early protection from hydration and dehydration; it’s weakened by early exposure to moisture, while desiccation on the other hand causes shrinkage and cracks [10]. Deniz et al [27] found that higher levels of solubility were associated with earlier exposures of mixed cement to water, and glass ionomer luting cements were highly sensitive to water contact during the first 6 minutes after mixing.

It was reported in previous studies that long–time storage of dental cements in water affected the mechanical properties of the cements [1, 14]. Cattani-Lorente et al [11] found that deterioration of the physical properties of the cements after long–term storage in an aqueous environment could be related to the water absorption of these materials. Part of the absorbed water acted as a plasticizer, inducing a decrease in strength. Weakening resulted from erosion and plasticizing effect of water.

The results of this study are agreed with that of Hajmiragha etal [6], Yanikoglu et al [7], Keyf et al [10], Tuna et al [14], Nomoto et al [29], Nomoto et al [30] and Eisenburger et al [31], however some of these researchers use different storing solution and different specimen preparation technique and size.

Hajmiragha et al [6] uses artificial saliva at pH 5 and pH 3 and found that Weight changes of polycarboxylate cement were greatest, and there were significant differences among all the materials (P<0.05). Solubility of the cements in the two medium decreased in the following order: polycarboxylate, zinc phosphate and glass ionomer. Solubility of the cements were more in the acidic medium (P<0.05).

Yanikoglu etal [7] uses artificial saliva at different pH values and found that statistically significant differences were found among the specimens stored in acidic, basic and neutral artificial saliva, it was observed that the cements were more soluble in acidic media and more stable at pH 7. The highest solubility found in zinc phosphate followed by zinc polycarboxylate and the least is glass ionomer cement.

Keyf et al [10] found that the water sorption of zinc poly carboxylate more than zinc phosphate and the two is more than glass ionomer cement, while for solubility he found that glass ionomer has greater solubility than zinc poly carboxylate and the least is zinc phosphate.

Tuna et al [14] has exactly the same finding of Keyf et al [10]. Nomoto et al [29] found that the erosion (using 0.1 and 0.02 lactic acid solution) of three different kinds of cement; zinc phosphate, polycarboxylate and glass ionomer, were evaluated by measuring the depth loss of the cement in a cavity. Differences in the eroded depths of the three types of cements clearly emerged. The depth losses of polycarboxylate cements (up to 300 µm) were more than those of zinc phosphate cements (up to 200 µm), which were more than those of glass ionomer cements (up to 100 µm) after 24 h immersion in 0.1 M buffer solution.

Nomoto et al [30] found that the eroded depth are in the same order zinc polycarboxylate more than zinc phosphate more than glass ionomer cement and stated that the volumetric
method for investigation are more applicable than gravimetric method.

Eisenburger et al [31] stated that profilometric measurements show a higher susceptibility of zinc phosphate cement than glass ionomer cement for acid erosion. Comparison with erosion depth of enamel and dentine measured in vitro reveals a higher substance loss of zinc phosphate cement at all pH values, whereas glass ionomer cement shows a lower erosion depth than the dental tissues.

**Conclusion**

Within the limitation of this study, zinc poly carboxylate has greater values of water sorption and solubility than zinc phosphate, and the least values were found in glass ionomer cement.

**References**

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