Abstract

Objective: To evaluate the effects of maternal corticosteroids administration on Non stress test and fetal biophysical activities in pregnancies with normal fetoplacental vascular resistance.

Study Design: Prospective study.

Patients and Methods: Included singleton pregnancies at risk of preterm labour between 28 weeks and 34 weeks gestation, preterm birth was anticipated on the basis of: History of previous preterm birth, preterm contractions of the uterus, placenta previa and third trimester bleeding, preterm premature rupture of the membranes, polyhydramnios, history of recurrent spontaneous abortion.

Intramuscular dexamethasone was given as 4 doses dexamethasone (6mg/12 hours for 48hrs), a non stress test and ultrasound study for biophysical activity (FHR, breathing and limb movement, AFI) were done for all women immediately and at 2 and 4 days later.

Results: There was a statistically significant ($p<0.001$) difference in the frequency of non-reassuring fetal heart rate tracings and fetal breathing episode, limb movement 48 hours after dexamethasone.

Conclusion: Corticosteroids administration can cause a remarkable, but impermanent reduction in fetal biophysical profile scores.

Key Words: Steroids – Preterm birth – Non stress test-biophysical profile.

Introduction

PRETERM delivery is a leading cause of perinatal morbidity and mortality worldwide and remains a significant problem in modern obstetrics [1].

Synthetic corticosteroids have been successfully employed for more than 20 years to enhance fetal lung maturity in saturations where preterm delivery is anticipated [2,3].

Maternal administration of synthetic corticosteroids (betamethasone or dexamethasone), for accelerating the maturity of the fetal lung, reduces neonatal mortality, respiratory distress syndrome, intraventricular haemorrhage and necrotizing enterocolitis in preterm infants [4].

Monitoring of biophysical activities is a powerful tool for the assessment of fetal wellbeing. Recent studies have provided preliminary evidence that antenatal steroids given for enhancement of fetal lung maturity may induce a transient suppression of fetal biophysical activities [5].

In fact, conflicting results concerning the effects of betamethasone and dexamethasone on fetal heart pattern have been reported [6,7] and unwarranted iatrogenic delivery has been reported in this setting [4].

This technique can be helpful in identifying the compromised fetus and could be of clinical value in the differential diagnosis between drug-induced changes in fetal biophysical behavior and those due to fetal compromise [8].

Pathological non stress test was associated with a statistically significant increased rate of neonatal morbidity, reduced intra-uterine growth and a low one minute apgar score [9].

Patients and Methods

This study was carried out at Kasr Al-Aini University Hospital from March 2012 to March 2013 on eighty (80) women with singleton pregnancies at risk for preterm labor (history of previous...
Effects of Maternal Corticosteroids Administration for Enhancement of Fetal Lung Maturity in Preterm Pregnancy

Preterm birth, preterm contractions of the uterus, placenta previa and third trimester bleeding, preterm premature rupture of the membranes, polyhydramnios, history of recurrent spontaneous abortion) who presented at a gestational age of 28 to 34 weeks. All patients gave an informed consent and the study was approved by ethics committee, at the time of initial scanning, all pregnancies had normal umbilical artery flow velocity waveforms values.

Pregnancies with infants with major structural malformations, who had spontaneous delivery prior to completion of all examinations, those with reversed or absent end diastolic flow, Women on corticosteroids treatment for another disease, or those with any associated medical problem with pregnancy gestational diabetes, hypertension, cardiac, hepatic, thyroid diseases, RH negative mothers with history of sensitization or positive Coomb’s test or other cases of documented fetal anemia were excluded from analysis.

Intramuscular dexamethasone was given as 4 doses dexamethasone (6mg/12 hours for 48hrs), a non stress test and ultrasound study for biophysical activity (FHR, Breathing and limb movement, AFI) were done for all women immediately and at 2 and 4 days later.

Statistical presentation and analysis of the present study was conducted, using the mean, standard error paired t-test and chi-square tests. The level of significance was taken at p-value <0.050 is significant, otherwise is non-significant. The p-value is a statistical measure for the probability that the results observed in a study could have occurred by chance.

Results

80 patients received 6mg of dexamethasone (Epidrone, Epico Egypt) intramuscularly every 12 hours for 48 hours.

The patient's mean age was 24.71 ±SD of 3.21 with age ranging from 19-32 years old.

Table (1): Impact of dexamethasone on breathing episodes.

<table>
<thead>
<tr>
<th>Breathing episodes value as a percent of day (0)</th>
<th>N</th>
<th>%</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>80</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Day two</td>
<td>13</td>
<td>16.25</td>
<td>115.269 &lt;0.001</td>
</tr>
<tr>
<td>Day four</td>
<td>51</td>
<td>63.75</td>
<td>35.420 &lt;0.001</td>
</tr>
</tbody>
</table>

Table (2): Impact of dexamethasone on limb and trunk movement.

<table>
<thead>
<tr>
<th>L.M baseline</th>
<th>Normal N %</th>
<th>Decreased N %</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>100.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>L.M Day two</td>
<td>38</td>
<td>47.5</td>
<td>52.5</td>
</tr>
<tr>
<td>L.M Day four</td>
<td>64</td>
<td>80.0</td>
<td>16.0</td>
</tr>
<tr>
<td>AFI</td>
<td>80</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Tone</td>
<td>80</td>
<td>100.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

L.M : Limb Movements, AFI : Amniotic Fluid Index.

Table (3): Impact of dexamethasone on biophysical score.

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Normal N (4/8)</th>
<th>Decreased N (6/8)</th>
<th>Chi-square (8/8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>100.0</td>
<td>0.0</td>
<td>80.0</td>
</tr>
<tr>
<td>Day two</td>
<td>13</td>
<td>16.3</td>
<td>51.3</td>
</tr>
<tr>
<td>Day four</td>
<td>4</td>
<td>5.0</td>
<td>7.5</td>
</tr>
</tbody>
</table>

BPP: Biophysical profile.

Table (4): Change of acceleration rate in the non-stress test NST after dexamethasone therapy.

<table>
<thead>
<tr>
<th>Acceleration</th>
<th>Paired t-test</th>
<th>Mean±SD</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td>4.6±1.3</td>
<td>0 &amp; 2</td>
<td>14.063 &lt;0.001</td>
</tr>
<tr>
<td>Day two</td>
<td></td>
<td>2.2±0.8</td>
<td>0 &amp; 4</td>
<td>17.430 &lt;0.001</td>
</tr>
<tr>
<td>Day four</td>
<td></td>
<td>2.0±0.3</td>
<td>2 &amp; 4</td>
<td>2.094 0.038</td>
</tr>
</tbody>
</table>

Discussion

Preterm delivery is a leading cause of perinatal morbidity and mortality worldwide and remains a significant problem in modern obstetrics [1].

Preterm infants are at risk for specific diseases such as respiratory distress syndrome, intraventricular hemorrhage, broncho-pulmonary dysplasia, patent ductus arteriosus, necrotizing enterocolitis, sepsis, apnea and retinopathy [7].

Maternal administration of synthetic corticosteroids (betamethasone or dexamethasone), for accelerating the maturity of the fetal lung, reduces neonatal mortality, respiratory distress syndrome, intraventricular hemorrhage and necrotizing enterocolitis in preterm infants [4].

Eighty women with singleton pregnancies at risk for preterm delivery were subjected to standard dose of dexamethasone, followed by ultrasonographic assessment of fetal biophysical activities on baseline, day 2 and day 4.

In this study, it was observed that administering dexamethasone for the mother may lead to a significant but temporary decrease of biophysical profile scores in healthy preterm fetuses. In a study
performed by Rotmensch S [10], a profound suppression was observed on the biophysical profile scores at 48hr of steroid use which was consistent with our findings.

Jackson [7] stated that the decrease in amniotic fluid index observed may be the result of decreased fetal breathing and therefore decreased efflux of lung fluid into the amniotic sac. Since the changes in breathing episodes were transient, amniotic fluid volume was not changed in the current study.

By suppression of the multiple fetal biophysical parameters, antenatal steroids may result in a significant clinical confusion [10]. Awareness of this phenomenon might prevent unwarranted iatrogenic delivery of preterm fetuses.

Biophysical monitoring using the biophysical profile scores has been shown to decrease both mortality and morbidity in the at risk fetus. This is the most commonly used tool in at risk fetuses and also in the high-risk pregnancy monitoring [4].

In the current study, there was a statistically significant difference in the frequency of the following findings in the pre-compared to post-dexamethasone measurements: Reduction of body movements (48h, p<0.001), non-reassuring fetal heart rate tracings (48 and 96h, p<0.001) and reduction of breathing movements (48h, p<0.001).

Conclusion:
We demonstrated that corticosteroids administration can cause a remarkable, but impermanent reduction in fetal biophysical profile scores.

Misinterpretation of the post steroid biophysical depression as an evidence of fetal compromise could lead to the unwarranted delivery of a preterm fetus.

References
الملخص العربي

المقدمة: على الرغم من التقدم الذي حدث في رعاية الحمل ورعاية الأطفال حديثي الولادة فإن متلازمة الضائقة التنفسية حديثي الولادة السبب الرئيسي لتدور الصحة والوفاة في الأطفال المبكر.

إن معدلات الولادة المبكرة مازالت تتراوح ما بين 4-6% من كل الولادات. مع زيادة هذا العدد خلال السنوات الأخيرة وذلك نظراً للزيادة في عدد حمل الأمهات حيث أن التوائم معدلات أعلى من الولادات المبكرة مقارنة بالحمل في جنين واحد.

استخدام مستحضرات الستيرويدات للسيدة الحامل المعرضة لحدوث وولادة مبكرة لتقليل شدة متلازمة الضائقة التنفسية لحديث الولادة.

و هذا المقارنة يُعتقد أنه يُحسن إنتاج المادة المغلفة للتنفس السطحي داخل الحنيفات الهوائية ويساعده أيضاً تقليل حدة التعرض للنزيف داخل التجويف المبطنة للنفخ والالتهاب المعرفي المصحوب بموت الأنسجة المعوية (التهاب الأمعاء العضلي)، و أيضاً وفاة حديثي الولادة.

وقد أظهرت دراسات سابقة أن الستيرويدات لها تأثير على السلوك الجنيني الحيوى وتقليل في معدل ضرائب القلب للجنين في الواقع، تم وصف نتائج متضاربة بشأن آثار هذه المضادات في نمط ضرائب القلب الجنين مما أدى إلى حالات ولادة مبكرة غير مبررة.

يهدف البحث إلى تقدير تأثيرات إعطاء الأمهات لعلاج الستيرويدات على السلوك الجنيني الحيوى في حالات الحمل الطبيعي المعرضة للولادة المبكرة.

وفقًا لذلك، تم تجربة المقارنة على 80 امرأة تعاني من خطر الولادة المبكرة باليه تقييم بالأشعة فوق البنفسجية للسلوك الجنيني الحيوى.

نعتيد الآتي:

• السلوكيات تؤثر قوية وكان مؤقت على التنفس وحركات الجذع والأطراف، مما أدى إلى انخفاض درجة السلوكي الجنيني الحيوى.

• معرفة هذا التأثير قد يوجه القرارات غير المبررة المتعلقة بالولادة المبكرة.

نتائج البحث: