OBJECTIVE: To access of the efficacy of three dimensional ultrasound (3DUS) in prediction of cesarean scar dehiscence in pregnant patients at term and comparing the outcome of measurement to the intraoperative visual assessment of the scar.

Design: Prospective study.

Participants & Methods: 70 pregnant women with a history of prior cesarean section attending Benha University hospital. All participants underwent a 3D transabdominal scan at third trimester and the data was recorded. We measured the lower segment thickness from the muscularis and mucosa of the bladder on the outer side to the chorioamniotic membrane on the inner side, with the myometrium in between and hence, depending on a 3-layered pattern. This was compared with the pregnancy outcome and the intraoperative scar condition. The data was then statistically analyzed.

RESULTS: The mean scar thickness as measured by 3D transabdominal sonography in the third trimester was 4.63±0.85 mm. The best cut-off level for predicting uterine scar defects was ≤2.5 mm (highest diagnostic accuracy) with sensitivity 25%, specificity 100%, PPV 100% & NPV 95%.

Conclusions: The current study suggests that prenatal 3D US examination determining the degree of LUS thinning in patients with previous caesarean delivery which is considered better negative screening test than positive due to higher specificity than sensitivity. 3D Ultrasound provides an additional element for assessing the risk of uterine rupture and may increase safe management of trial of labour.

INTRODUCTION

Cesarean section is the commonest procedure in obstetrics, with rising incidence in most countries. As a result of this operation late scar dehiscence may occur, which may lead to uterine rupture in a subsequent pregnancy (Klemm et al., 2005). Cesarean section is associated with post-operative complications; one of them is post-operative fever which is mainly caused by wound infection. The risk of wound infection followed a cesarean birth ranges from (2.5%) to higher than (15%) (Gabert et al., 1992). In wound sepsis, fibrous scar formation between opposed wound surfaces of
uterus was the rule. Moreover, the scar may extended through the whole thickness of the wound so that it will result in weakness of the scar (Brown Mculre et al., 1993). Wound dehiscence and wound evisceration are serious complications, being associated with a (12% and 30%) of maternal mortality rate, respectively (Mendolza et al., 1990) Cesarean scar defects have long been recognized in hysterosalpingograms as anterior Outpouching (Thurmond et al., 1996) and non-invasive alternative procedures as MRI and CT can also be diagnostic (Pedro Royo et al., 2009).

To evaluate the risk of uterine rupture in a subsequent pregnancy, investigation have used 2D ultrasound in the evaluation of the uterine scar in third trimester (Asakura et al., 2000). However, it remains insufficient because of the portion observed by 2D ultrasound is actually 1-2 cm caudal to the scar tissue (Tanik et al., 1996). Among the newest technological advances in the evaluation of cesarean scar defect is the ability to use three-dimensional (3D) ultrasound which can demonstrate more precisely the location, shape and size of a defective scar (Taiple et al., 2005). The advantage of three-dimensional ultrasound is the possibility of obtaining coronal planes and their surface reconstruction which provides new image features which are not possible to obtain with conventional two-dimensional ultrasound (Hanfy et al., 2011).

A combination of multiplanar views and 3D-rendered images usually enhances our ability to identify anatomic details and allows a comprehensive diagnosis (Valentin, et al., 2013) Three dimensional ultrasound is highly accurate in detecting cesarean scar dehiscence (Hanfy et al., 2011)

The aim of the current study was to assess the efficacy of the three dimensional ultrasound in prediction of cesarean scar dehiscence in pregnant patients at term and comparing the outcome of measurement to the intraoperative visual assessment of the scar

**PATIENTS AND METHODS**

This prospective study was conducted at Benha University Hospital Obstetrics and gynecology , department after approval of department board . The study was carried out from April to November 2013 to evaluate the efficacy of three dimensional ultrasound in prediction of cesarean scar dehiscence in pregnant patients at term and comparing the outcome of measurement to the intraoperative visual assessment of the scar showed that the incidence of dehiscent scar during a CS was 3% (Cheung et al., 2005; Jastrow et al., 2006; Bujold et al., 2009; Hanfy et al., 2011).

Calculation according to these values produced a minimal sample size of 70 cases. A total 70 women were recruited in the study. All included women were pregnant at ≥ 36 weeks’ gestation at recruitment, having at least one previous caesarean section.

Women were included according to the following criteria: Inclusion criteria: 1- History of one caesarean delivery at least, 2- Singleton pregnancy, 3- Cephalic presentation, 4- Gestational age between 36 and 39 weeks, 5- Average amniotic fluid volume, 6- Not in labor.

We excluded women with: 1- Multiple pregnancies, 2- Malpresentations, 3- Suspected placental abruption,
accrete or previa, 4- Fetal anomalies, 5- Abnormal amniotic fluid volume (oligo/o polyhydraminos), 6- Active labor, 7- Uterine leiomyomata. After obtaining informed written consent, all included women were subjected to: 1- full history taking 2- Obstetrics history, 3 -Physical examination to exclude any associated medical disorder, 4-Three dimensional ultrasound examination at 36-39 weeks gestation to assess the thickness of the cesarean section scar. On ultrasound, the lower uterine segment appeared as three layered structure: the chorioamnionitic membrane with a decidualized endometrium, the myometrium and the uterovesical peritoneal reflection juxtaposed to the muscularis and the mucosa of the bladder. The lower uterine segment thickness was measured from the muscularis and the mucosa of the bladder (on the outer side) to the chorioamnionitianic membrane (on the inner side). 3D Ultrasonography was done with partially full bladder (2 hours after the last micturition). The lower segment was visualized in sagittal section in the mid-line and lateral planes and the average value was taken. The lower uterine segment was assessed Intra-operatively during the cesarean section and graded according to the system developed by prior studies (Cheung et al., 2005; Jastrow et al., 2006; Bujold et al., 2009; Hanfy et al., 2011). Into Grade I: Well developed lower uterine segment. Grade II: Thin lower uterine segment but the content is not visible. Grade III: Translucent lower segment and contents are visible. Grade IV: Well circumscribed defect, either dehiscence or rupture (Cheung et al., 2005; Jastrow et al., 2006; Bujold et al., 2009; Hanfy et al., 2011)

**Sample size was calculated using:**

\[ N = (z)^2 \times PQ/(D)^2, \quad N = \text{minimal sample size}\]

\[ Z = 1.96, \quad P = \text{Estimate of the prevalence of dehiscence; can be obtained from published studies } = 3\% (Cheung et al., 2005; Jastrow et al., 2006; Bujold et al., 2009; Hanfy et al., 2011), Q = 1 - P, D = .04 \]

The clinical data were recorded on a report form. These data were tabulated and analyzed using the computer program SPSS (Statistical package for social science) version 16 to obtain: Descriptive data. Descriptive statistics were calculated for the data in the form of: 1) Mean and standard deviation ±SD for quantitative data., 2) Frequency and distribution for qualitative data.

In the statistical comparison between the different groups, the significance of difference was tested using one of the following tests:

Student's t-test: - Used to compare mean of two groups of quantitative data. 2- F test:- used to compare mean of more than two groups of quantitative data. 3-Inter-group comparison of categorical data was performed by using fisher exact test (FET), 4-Correlation coefficient: used to find relationships between variables. 5-ROC curve to find validity of 3D US. A P value <0.05 was considered statistically significant.

**RESULTS**

The basic characteristics of the study group including age, interval from time of cesarean section, number of previous deliveries, gestational age at delivery, maternal weight are presented in table 1.

The mean LUS thickness measurement by 3DUS was 4.63±0.85 mm as in table (2)
The numbers of the patients had one previous CS (42.9\%) and with two previous CS (31.4\%) & with intraoperative grade I (50\%), intraoperative grade II of LUS (44.3\%) as in table 3.

Also, no significant statistical difference between normal & abnormal CS scars as regard previous CS numbers (P>0. 05) & no significant statistical difference between normal and abnormal grades as regard LUS thickness using 3D US (P>0. 05). While there was no significant difference between normal & abnormal CS scars as regard maternal age, maternal weight, gestational age & duration of last previous CS (P>0.05) as in table 4.

A receiver-operator characteristic (ROC) curve was constructed using the scar thickness in the third trimester and then determining the sensitivity and specificity with a range of cutoffs (figure 1). The best cutoff value was ≥ 2.75 mm and this yielded highest diagnostic accuracy with sensitivity 25\%, specificity 100\%, Positive Predictive Value 100\% & Negative Predictive Value 95\%. The area under the curve was 51.1\%.

Table (1): General characteristics of patients underwent caesarean delivery.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age (y)</td>
<td>26.34</td>
<td>5.1</td>
<td>18.0</td>
<td>40.0</td>
</tr>
<tr>
<td>parity</td>
<td>2.33</td>
<td>1.22</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>GA at delivery (wks)</td>
<td>37.77</td>
<td>1.14</td>
<td>36.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Maternal Weight (kg)</td>
<td>88.13</td>
<td>7.59</td>
<td>70.0</td>
<td>105.0</td>
</tr>
<tr>
<td>Duration of last previous CS</td>
<td>3.65</td>
<td>3.05</td>
<td>1.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

*GA= gestational age

Table (2): Lower uterine segment thickness measurement in patients underwent caesarean delivery.

<table>
<thead>
<tr>
<th>LUS thickness</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D US (mm)</td>
<td>4.63</td>
<td>0.85</td>
<td>2.5</td>
<td>7.5</td>
</tr>
</tbody>
</table>

*3D US = 3 dimensional ultrasound
*LUS= lower uterine segment

Table (3): Obstetric characteristics of the study group.

<table>
<thead>
<tr>
<th>Cases</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous CS (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30</td>
<td>42.9</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>31.4</td>
</tr>
<tr>
<td>≥3</td>
<td>18</td>
<td>25.7</td>
</tr>
<tr>
<td>Intra-operative grading of LUS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade I</td>
<td>35</td>
<td>50.0</td>
</tr>
<tr>
<td>Grade II</td>
<td>31</td>
<td>44.3</td>
</tr>
<tr>
<td>Grade III</td>
<td>4</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Egypt. J. Med. Sci. 35 (1) 2014
Table (4): Comparison between different grades of CS scars.

<table>
<thead>
<tr>
<th></th>
<th>Grade I (n=35)</th>
<th>GradeII (n=31)</th>
<th>GradeIII (n=4)</th>
<th>F</th>
<th>P</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>LUS thickness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Age(y)</td>
<td>25.69</td>
<td>4.78</td>
<td>27.19</td>
<td>5.09</td>
<td>25.5</td>
<td>8.27</td>
</tr>
<tr>
<td>Previous CS (n)</td>
<td>1.66</td>
<td>0.91</td>
<td>2.1</td>
<td>0.91</td>
<td>2.5</td>
<td>1.29</td>
</tr>
<tr>
<td>Gestational age (wks)</td>
<td>38.06</td>
<td>1.3</td>
<td>37.5</td>
<td>0.89</td>
<td>37.25</td>
<td>0.96</td>
</tr>
<tr>
<td>3 DUS (m.m)</td>
<td>4.78</td>
<td>0.82</td>
<td>4.5</td>
<td>0.84</td>
<td>4.38</td>
<td>1.25</td>
</tr>
<tr>
<td>maternal weight (kg)</td>
<td>87.46</td>
<td>7.81</td>
<td>88.97</td>
<td>7.5</td>
<td>87.5</td>
<td>7.55</td>
</tr>
<tr>
<td>Duration of last previous CS</td>
<td>3.09</td>
<td>2.54</td>
<td>4.33</td>
<td>3.42</td>
<td>3.23</td>
<td>3.87</td>
</tr>
</tbody>
</table>

NS: not significant
DISCUSSIONS

Cesarean delivery rates have been rising over the past two decades (Martins et al., 2009).

The cesarean section rate risen from 4% in 1970 to 9% in 1980, and it almost doubled again during the 1990s, with estimated rates of 16% in 1995 and 19% by 1999. This tendency is reported in nearly all countries. Over 70% of cesarean sections can be attributed to one of the following four indications: dystocia, fetal distress, breech presentation and previous cesarean section (Jastrow et al., 2006). Little information has been gained from studies of cesarean section scar healing. It was believed that it heals by regeneration of the muscular fibers and by scar tissue formation (Washington et al., 1998). The scar may be composed entirely of fibrous tissue and may be a thin linear scar or a wide one, or it may contain a few regenerated muscle fibers. Collagen deposition, which is a main step in the scarring process, is under growth factors control also (Werner S, et al 2003) (CTGF) Connective tissue growth factor, (TGF-B) Transforming growth factor B, (BFGF) Basic fibroblast growth factor, (TNF-B) Tumor necrosis factor –α, as well as (VEGE) Vascular endothelial growth factor, and (PDGF) Platelet Derived Growth Factor have all been implicated in scar healing. The differences in the biologic behavior of LUS transverse section scarring process at the time of the first CS may explain the variable clinical phenotypes of LUS in a subse-

Figure (1): Receiver–operating characteristics curves for 3D US in prediction of intraoperative grade III of LUS.
quent pregnancy (Pollio et al., 2006) Balanced collagen deposition in the wound area is under growth factor control and also is a key step for good wound healing outcome and tissue function restitution (Werner et al., 2003) Various factors have been related to increased risk of scar dehiscence, including type of previous Cesarean section, surgical technique of closure of the uterine incision, intraoperative complications, as well as interval from previous Cesarean section, and estimated fetal weight in the current pregnancy.

However, these factors are of poor predictability and lack objectiveness and do not have definitive risk estimation. Most repeated caesarean sections are performed because of fear of intrapartum rupture, which is estimated to occur in about 1% of cases during labour after a previous caesarean section. Uterine rupture is a rare complication, but has the potential of causing severe fetal morbidity, including asphyxia, neurological sequelae and even death. Uterine rupture can also be responsible for maternal complications, such as genitourinary tract damage, hemorrhage and hysterectomy. Therefore, it is important to improve the accessing of the risk of uterine rupture before attempting vaginal delivery after a previous caesarean section. Researchers suggest that this risk can be estimated by measuring sonographically the thickness of the lower uterine segment at the end of pregnancy (Cheung et al., 2005; Jastrow et al., 2006; Bujold et al., 2009; Hanfy et al., 2011).

These studies showed that ultrasound measurement of the lower uterine segment may increase the safety of labour after a previous caesarean section, because it provides additional information on the risk of uterine rupture (Jastrow et al., 2006). Uterine rupture is an uncommon though potentially fatal complication of vaginal birth following a caesarean section. The rate in women undergoing labour after a previous caesarean section is about (0.6–1.5%) (Klemm et al., 2005) The rate is similar in women who have had multiple previous caesarean sections (0.9%) (Landon et al., 2004) Researches have shown that the risk of uterine rupture in the presence of a defective scar is directly related to the degree of thinning of the lower uterine segment (Rozenberg et al., 1996; Cheung et al., 2005; Jastrow et al., 2006; Bujold et al., 2009; Hanfy et al., 2011).

Several studies using various methods have been conducted to evaluate the correlation of LUS measurement with the risk of uterine rupture or dehiscence with relative success. In some studies, the sonographers measured the entire LUS by transabdominal ultrasound while in others, only the middle muscle layer was assessed using transvaginal ultrasound and some studies used both approaches (Rozenberg et al., 1996; Cheung et al., 2005; Jastrow et al., 2006; Bujold et al., 2009, Martins et al., 2009; Hanfy et al., 2011). To assess the risk of uterine rupture in a subsequent pregnancy, researchers have used 2D ultrasound in the evaluation of the uterine scar in third trimester (Asakura et al., 2000).

However, it remains insufficient because of the portion observed by 2D ultrasound is actually 1-2 cm caudal to the scar tissue (Tanik et al., 1996) Among the newest technological advances in the evaluation of cesarean scar defect is the ability to use three-
dimensional (3D) ultrasound which can demonstrate more precisely the location, shape and size of a defective scar (Taiple et al., 2005). It is possible that three-dimensional ultrasound could improve the reliability and validity for the measurement of in-vitro models have proved to be excellent. This might be due to the use of the multiplanar display of 3D ultrasound, which permits simultaneous longitudinal, transverse and coronal views and their surface reconstruction which provides new image features which are not possible to obtain with conventional two-dimensional ultrasound (Martins et al., 2009).

A number of objective methods have been used to evaluate the cesarean scar defects. These include hysterosalpingograms as anterior Out-pouching (Thurmond et al., 1996). As non invasive alternative procedures, MRI and CT can also be diagnostic (Pedro Royo et al., 2009). In the current study 70 women with at least previous one caesarean section were recruited. All the women participating in this study were orally informed about its content, value and absence of expected complications and their consent was obtained before inclusion. 3D abdominal ultrasound were done by the same experienced sonographer to assess whether a scar is intact or dehiscence.

Evaluation of cesarean section scar was done by 3D ultrasound technique multiplanar views using (A) box which activated in coronal plane and progressive electronic dissection starting from posterior urinary bladder till it reach anterior uterine wall detecting areas of dehiscence or fenestration. During the CS, the actual state of the uterine scar was determined whether it is intact or there is a scar dehiscence and these findings were compared to the ultrasonographic findings to determine the usefulness of three dimension ultrasound in detection of the uterine scar status. This study showed that the mean maternal age was 26.34 ± 5.1 years, the mean parity was 2.33 ± 1.22, the mean GA at delivery was 37.77 ± 1.14 weeks & the mean maternal weight was 88.13 ± 7.59 kg, the mean duration of last previous CS was 3.65 ± 3.05. Asakura et al. (2000) conducted 186 pregnant women with previous CS at 37 – 40 weeks’ gestation. In the uterine dehiscence group the mean age was 29.0±3.5, mean parity was 1.0 ± 0, the mean GA at delivery was 40.5±0.7 weeks while in the group with no uterine dehiscence the mean age was 30.2 ± 3.5, mean parity was 1.1 ± 0.4, the mean GA at delivery was 39.9 ± 1.7 Weeks. (Asakura et al., 2000). In a study by Sen et al., 71 pregnant women with previous CS were included as study group. In the study group, mean ± S.D. age was 25 ± 3 years, mean parity was 1.3 ± 0.5, mean pregnancy duration was 39.5±0.9 weeks (Sen et al., 2004) In a prospective study by Cheung, the caesarean group mean maternal age was 30.5 ± 4.2 years& mean maternal weight was 66.5 ± 5.2 kg (Cheung et al., 2005). In the current study, three dimensional ultrasound scans (sagital view) were performed to all included women to measure the thickness of the lower uterine segment at its thinnest portion. The measurement was recorded and a mean was obtained. The mean lower uterine segment thickness was 4.63 mm ± 0.85. Then 3D ultrasound scans (coronal view) were performed to all included women wish de-
scriptive dehiscence in each point of scar through progressive electronic dissection whole wall starting from posterior urinary bladder till it reach anterior uterine wall detecting areas of dehiscence. In The current study the lower uterine segment was inspected intraoperatively during the caesarean section to note the grade according prior mentioned classification. The intraoperative grading showed 35 patients grade I, 31 patients grade II & 4 patients grade III. In the current study there was no significant statistical difference between normal & abnormal CS scars as regard previous CS numbers, maternal age, BMI, gestational age & birth weight (P>0.05).

The 3D were unreliable to predict uterine scar defects AUC 51.1 %. The cut-off value with 3D ≤2.75 has sensitivity 25%, specificity 100%, PPV100% &NPV 95.7% with accuracy 95.7% proved by the ROC curve.

Asukura et al. (2000) reported scar dehiscence in 9/186 (4.84%) cases, 6 of them were accidentally found at emergency CS, 2 at planned repeat CS and 1 after VBAC. The mean lower uterine segment thickness was significantly lower in women who had scar dehiscence compared to women with intact scar (1.7 mm ± 0.7 vs. 2.6 mm ± 0.8, respectively, p<0.001). Sen et al. (2004) reported that the thickness of the lower uterine segment ranged between 1.7 and 7.3 mm (mean, 3.29 ± 1.09 mm) in the study group, whereas the mean lower segment thickness was 3.63 ± 0.64 mm in the control group. Comparing the transabdominal and transvaginal ultrasound findings in the study and control groups, P values were 0.002 and 0.007, respectively, hence statistically significant.

Thus, lower segment thickness in the study group was significantly less than in the control group (Sen et al., 2004) reported that the mean LUS thickness in the caesarean group was 1.9 ± 1.4 mm. Although the difference between the caesarean and nullipara control LUS thickness failed to reach statistical significance, it achieved significance when those patients with more than 1 prior delivery (both vaginal and caesarean) (Cheung et al., 2005). In Bujold et al. (2009) study Follow-up data after delivery were obtained in 236 patients (94%). Among them, 125 women (53%) underwent a trial of labour (TOL), with 90 women (72%) experiencing successful vaginal birth after caesarean delivery. Three cases (2.4%) of complete uterine rupture during a trial of labour (TOL) and 6 (2.5%) cases of uterine scar dehiscence were reported, for a total of 9 uterine scar defects. Receiver operating characteristic curve analysis demonstrated that full LUS thickness was linked with complete uterine rupture during a TOL with an area under the curve of 88% (95% CI, 79–98%) (Bujold E, et al 2009) In Asakura et al. (2000) sensitivity was 77.8%, specificity 88.6% (Asakura et al., 2000) This is obviously lower than that of our study. This may be due to that they measured only the muscle layer at its thinnest portion by TVS. In Sen et al sensitivity, specificity, PPV, NPV were 90.9%, 84%, 71.4%, 95.5% for transabdominal sonography and 81.8%, 84%, 69.2%, 91.3% for transvaginal sonography, respectively. Both transabdominal and transvaginal sonography were performed to all included women. The lower segment thickness was measured from the muscular is and mucosa of the bladder on the outer side to the chorioamni-
onic membrane inside. This study showed that, even if transvaginal sonography was not available or experience with it was lacking, transabdominal sonography with magnification can comparably visualize the lower uterine segment thickness (Sen et al., 2004) Cheung showed sensitivity 100% & specificity 90% (Cheung et al., 2005). The difference between Cheung and the current study is because Cheung measured only the myometrial layer thickness while here the full LUS thickness was measured. In Bujold et al study for the full LUS thickness (sensitivity 100%, specificity 75% for complete uterine rupture, and sensitivity 67%, specificity 72% for scar dehiscence) (Bujold et al., 2009) The difference between Bujold et al. and the current study may attribute to the large number of studied women while our sample size was lower.

**CONCLUSION**

The results of this study shows that there is a role of prenatal 3DUS assessment of lower uterine segment thickness in women with prior caesarean section (C-S) delivery where it could be a good negative screening test than to be positive one as there is higher specificity than sensitivity, 3DUS added another method in evaluating risk of caesarean score rupture and way increase safety of trial of labour after (C-S).

**REFERENCES**


دور اشعة الموجات فوق الصوتية الثلاثية الابعاد عن طريق البطن أثناء الحمل في التنبؤ بنتائج القيصرية السابقة

أشرف نصيف محمود المنطاوي - تامر محمود عصر

قسم النساء والتوليد كلية طب بنيا جامعة بنيا

الهدف: كي يكون نظام تشخيص الموجات فوق الصوتية في الأذن يمكن التنبؤ بهدف العملية القيصرية السابقة لدى المريضات الحوامل في الشهر الحادي عشر ومقارنته بهذه التقييمات بالقياس والذي لابد من القدرة أثناء القيصرية.

التصميم: دراسة مستقلة

المريضات وطريقة الدراسة: تم استخدام هذه الدراسة بقسم النساء والتوليد بمستشفى بنى بنيا الجامعي على سبعين سيدة، حامل بالأسياح الثلاثة الأشهر الأخيرين من الشهر التاسع عمل أشعة موجات فوق الصوتية ثلاثية الابعاد عن طريق البطن لكل هذه السيدات، وتم تسجيل هذه الاعضاء بطريقة الكترونية على جهاز تشخيص الموجات فوق الصوتية، وتم قياس سمك الجزء السفلي من الاعضاء المبطنة للجزء السفلي للكيس الرحم وحتى الفضاء المبطن للمثانة البولية، وتم قياس طول الرحم، هذه المشاهدات والترشيحات تم مقارنتها مع الذكاء السفلي من الرحم أثناء العملية، وهذه البيانات تم عمل تحليل إحصائيا لها.

النتائج: متوسط سمك الذنب السفلي من طريق أشعة الموجات فوق الصوتية في الشهر التاسع كان 4.3 ± 0.20 مم، وتم التحقق القاطعة أن الخبز موجود في الجزء السفلي من القيصرية السابقة بنسبه 25%، ونوعية 100%، التأكد من القيصرية الابعاد بنسبه 100%، والتمزق في القيصرية السفلي بنسبه 90%.

الاستنتاج: الدراسة الحالية تقترح أن استخدام أشعة الموجات فوق الصوتية ثلاثية الابعاد لقياس سمك الجزء السفلي من الرحم في السيدات التي سبق كلها تخصصية له تأثير على القدرة، وكذلك أشعة الموجات فوق الصوتية ثلاثية الابعاد توضح تقييم نسبة خطورة حدوث القصص عن رحمي وتحسين ضمان زيادة نسبة الآمن عند محاولة الولد الطبيعية بعد ولادة القيصرية.