Intra-operative Diagnosis of Lower Segment Scar Dehiscence in a Second Gravida After One Previous Lower Segment Cesarean Section: Should We Advocate for Routine Antenatal Uterine Scar Thickness Testing?

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ABSTRACT

BACKGROUND: Uterine dehiscence is a separation of uterine musculature with intact uterine serosa. It can be encountered at the time of cesarean delivery, suspected on obstetric ultrasound or diagnosed in-between pregnancies. The antenatal diagnosis may occasionally elude the Obstetricians. This particular case demonstrates an intra-operative diagnosis of uterine dehiscence with missed antenatal ultrasound diagnosis in an asymptomatic woman.

CASE PRESENTATION: She was a 32-year-old Nigerian second gravida who booked for antenatal care at 32 weeks of gestation following a referral from her attending Obstetrician from a neighboring state due to relocation. She had 3 antenatal visits and 2 antenatal ultrasound investigations without uterine scar thickness report. She subsequently had elective Cesarean section (CS) at a gestational age of 38 weeks plus 2 days due to persistent breech presentation on a background of a previous lower segment CS scar. There was no previous uterine curettage prior to or after the previous lower segment CS scar and there was no labor pains prior to the elective CS. The surgery was successful with intra-operative findings of moderate intra parietal peritoneal adhesions with rectus sheath and obvious uterine dehiscence along the line of the previous CS scar. The fetal outcomes were normal. Immediate post-operative condition was satisfactory and the woman was discharged on a third-day post operation.

CONCLUSION: Obstetricians are charged to maintain a high index of suspicion when managing pregnant women with history of emergency CS in order to avert the adverse consequences of uterine rupture from asymptomatic uterine dehiscence. Based on this report, it may be useful to routinely assess the lower uterine segment scar of women with previous emergency CS using the available ultrasound facilities. However, more studies are needed before advocating for routine antenatal uterine scar thickness testing following emergency lower segment CS in low and middle-income settings.

KEYWORDS: Antenatal ultrasound, cesarean section, pregnant women, uterine niche, uterine rupture

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Introduction

Uterine scar dehiscence is a common complication of cesarean delivery, which increases the risk of uterine rupture.[1] Uterine rupture is a complete separation of all 3 layers of the uterus: the perimetrium, myometrium, and endometrium (decidua). However, uterine dehiscence is considered an incomplete division of the 3 layers, allowing visibility of the fetus through the perimetrium. Uterine dehiscence is often asymptomatic.[2]

Cesarean section (CS) refers to the delivery of a fetus, placenta and membranes through an anterior abdominal and uterine incision.[1] In the past 35 years, the rate of CS has steadily increased from 5% to 30% and over this time, the maternal mortality ratio has also decreased drastically.[2] CS is an obstetric procedure used in cases where vaginal delivery is either not feasible, or would pose undue risks to mother or baby. However, this also results in the weakening of the uterine wall at site of the scar.

One of the most important complications of cesarean deliveries is the formation of scar dehiscence-disruption and separation of the scar tissue. When this occurs in pregnancy, it possess a great risk to fetomaternal wellbeing, occasionally resulting to fatal outcomes. The learning points in this case report is centered on whether we should advocate for routine antenatal lower segment uterine scar thickness testing especially in women with previous emergency lower segment CS in low and middle-income settings. The implications for this is discussed as well as the feasibility. We present the case of a 32-year-old booked second gravida lady with uterine scar dehiscence diagnosed intra-operatively at elective CS due to persistent breech presentation at early term on a background of previous lower segment CS, with antenatal ultrasound failing to report the diagnosis.

Case Presentation

Our patient is a 32 year old Nigerian second gravida who presented to our antenatal clinic for late booking at 32 weeks with a written referral letter from her attending Obstetrician from a neighboring state on account of birth preparedness (husband was out of town and she had need to be near her family). She had 3 antenatal care visits with us and was booked for an elective CS at a gestational age of 38 weeks plus 2 days due to one previous CS with persistent breech presentation.

The index pregnancy was desired and was spontaneously achieved. The pregnancy so far had been uneventful. She booked for antenatal care in secondary health care facility (General hospital) in a neighboring state at a gestational age of 26 weeks. Prior to her booking, she was on routine hematinics. Her booking investigations were as follows: packed cell volume: 34%, hepatitis B surface antigen (HBsAg), hepatitis C virus (HCV) antibody, venereal disease research laboratory test (VDRL), and retroviral disease were non-reactive. The genotype was HbAA and blood group was A Rhesus "D" positive. The first and second obstetric scans done made impressions of normal viable intrauterine fetus at 12 weeks + 4 days and 25 weeks + 5 days of gestation, respectively. She received 2 doses each of intramuscular tetanus toxoid and intermittent preventive therapy for malarial prophylaxis. There was no history of labor pains prior to the elective CS.

A general physical examination done revealed a young woman, afebrile, not pale, anicteric, acyanosed, not dehydrated, with no pedal edema. Abdominal examination revealed a uniformly enlarged abdomen which moved with respiration with no scar tenderness noted, symphysiofundal height was 37 cm compatible with her gestation, singleton fetus in longitudinal lie, breech presentation, on dorsoanterior position, presenting part was 5/5th palpable per abdomen, fetal heart rate was 132 beats/minute asynchronous with maternal pulse. There was no palpable uterine contractions. Vaginal examination revealed a closed and uneffaced cervical os. She was counseled on findings and her diagnosis. An informed consent was obtained and she subsequently had an elective CS due to persistent breech presentation at a gestational age of 38 weeks plus 2 days on a background of one previous CS with the following intra-operative findings : moderate peritoneal adhesions, uterine dehiscence along the small area of the line of the previous scar (the thinned-out dehisced myometrium later repaired in 2 layers with Vicryl 2 suture in interlocking and simple continuous fashion, respectively; Figure 1), a live female neonate APGAR scores of 8 and 10 in 1 and 5 minutes respectively and birth weight of 3.4 kg was delivered. The placenta was fundal and not low lying. There were normal looking tubes and ovaries bilaterally. Estimated blood loss was 250 ml. The immediate post-operative condition was satisfactory.

Post-operatively, she was managed with intravenous fluids (0.9% Normal Saline alternated with 0.5% dextrose water), intravenous antibiotics (Ceftriazone and Metronidazole), and parenteral analgesics (pentazocine and paracetamol) for 48 hours. Her drugs were converted to orals 48 hours post-surgery.

Contraceptive counseling was offered, and the need for adequate observation of inter-pregnancy interval of up to 3 years was advised. She opted for long-acting reversible contraception in the form of progesterone implant. Patient had nil complaints and was discharged home with oral medications and hematinics on third day post-surgery. Her postnatal visits at 2 and 6 weeks post-surgery were uneventful, mother and baby were fine.

Her previous confinement in 2020 was uneventful. Pregnancy was carried to term, and delivery was via emergency CS due to fetal distress during labor induction. The outcome was a live male neonate with good APGAR score and a birth weight of 3.5 kg. The baby is currently alive and well. She had no post-operative complications. She attained menarche at 13 years and have an average menstrual flow of 5 days in a regular 28-day cycle. An informed consent for publication of this case report was duly received from her.

Discussion

Uterine scar dehiscence refers to the separation of the uterine musculature at a scar site, with the uterine serosa still intact, or a subperitoneal separation of the uterine scar in the lower uterine segment, with the chorioamniotic membranes visible through the peritoneum.[3] This rare complication of cesarean delivery can be encountered at repeat cesarean delivery, or diagnosed in between pregnancies and its management is usually a riddle for Obstetricians regardless of timing of onset.

The occurrence of uterine scar dehiscence is rare (incidence 0.06% to 3.8%) and its symptoms in the postnatal period are usually non-specific. Patients can present with abdominal pain, sepsis, or postpartum hemorrhage.[1,2,4,5] However, occasionally these patients are asymptomatic as our index patient was. Arguably, owing to the lack of routine evaluation protocol for uterine scar dehiscence in our hospital and most centers in Nigeria, the patient had intra-operative diagnosis of uterine dehiscence.

The formation of uterine scar defects depends on different etiological factors/events. The typical causes of uterine dehiscence are: previous lower segment CS especially with indications such as obstructed labor, chorioamnionitis as these can hamper the healing of the scar, intra-operative hematoma and endomyometritis causing uterine dehiscence by also disrupting scar healing. Other causes include: classical CS, previous uterine trauma, and abnormal placenta implantation. The technique and experience of the surgeon may also play a role. Underlying anatomical defects in the uterus which would have been corrected prior to pregnancy like uterine septum or fibroid uterus may weaken the uterus and the resultant scar of the CS. In some patients, uterine scar after CS heals incompletely and as a result, the uterine niche is formed.[5] Other reported risk factors applicable to many patients includes diabetes mellitus, emergency surgery, infection, preterm delivery, tertiary cesarean delivery or higher, incision placed too low in the uterine segment and short inter-delivery interval of $\leqslant$24 months.[6] Our patient had a previous emergency lower segment CS.

There is currently no gold standard for diagnosis and treatment (best surgical approach for repairing CS scar dehiscence) of uterine scar dehiscence.[3] The diagnosis of a cesarean scar defects such as a uterine scar dehiscence in the postnatal period remains elusive due to the vagueness of its presentation, and its occasional asymptomatic nature.[4] Notwithstanding, delay in diagnosis or outright failure to diagnose can lead to untold complications in subsequent pregnancies with poor fetomaternal outcomes. Our patient with one previous scar was at risk of uterine rupture if vaginal birth after cesarean section (VBAC) had been tried, giving that she had scar dehiscence and was asymptomatic.[2,5,7,8] Fortunately, her fetal breech presentation precluded the attempt of VBAC. In symptomatic cases, diagnosis can be made antenatally, and appropriate treatment given. In some cases, following diagnosis, the dehiscence can be repaired via a laparoscope or robotic approach. A case of a successful robotic repair of a symptomatic cesarean scar defect has been reported by La Rosa et al .[3]

There are several methods for detecting uterine dehiscence, of which transvaginal ultrasonography (TVUS) and saline infusion sonohysterography (SIS) are the simplest and most useful. Ultrasonography is widely available, and can be performed at the patient's bedside, by an experienced sonographer who may reliably detect a uterine dehiscence, especially if the pre-existing index of suspicion is high.[9] On transvaginal sonography, it is often described as a triangular or dome-shaped anechoic defect, often referred to as a "niche" between the uterus and bladder.[2,10] In one recent study in Egypt, transvaginal ultrasound was more accurate in assessing the thickness of the lower uterine segment than transabdominal ultrasound.[11] In the previous study, a total lower uterine segment thickness of $<$3.65 mm was considered a thin scar, and $<$2.85 mm was associated with a higher risk of uterine dehiscence.[11] Performing SIS further allows the TVUS results to be clearer and facilitates an accurate diagnosis. Hence patients being evaluated should undergo SIS, in addition to TVUS. It should be noted that SIS can only be done in the non-pregnant period because it is contra-indicated in pregnancy. However, our case study was an asymptomatic patient with an incidental finding of scar dehiscence intraoperatively during a repeat CS.

Computed tomography (CT) is also useful in investigating patients with intraabdominal collections and ruling out rarer pathologies such as an arteriovenous malformations in patients suspected to have uterine dehiscence. However, diagnosing an uterine dehiscence on CT poses a radiological challenge due to the significant commonality with the normal appearance of a uterus post-CS. Several elusive findings have been isolated as "red flags" for a dehiscence. Large pelvic hematomas and bladder flap hematomas larger than 5 cm should alert the obstetrician to the likelihood of a dehiscence. The presence of an extrauterine collection and evidence of gas tracking from the uterine incision into the parametrium on a CT scan or MRI is pathognomonic for a uterine rupture.[4]

Magnetic resonance imaging (MRI) is a valid alternative in patients with inconclusive ultrasound scan and CT scan findings or those with an allergy to contrast media. MRI enables a better delineation of soft tissues and can distinguish between all the uterine layers, and establish a breach in the serosa.[5] In expectant management of uterine dehiscence during pregnancy, MRI can be used to confirm the diagnosis, and then the lesion can be followed by ultrasonography if it is adequately visualized by the latter modality.

Recently, Savukyne et al investigated the prevalence of a CS scar niche during pregnancy, assessed by transvaginal ultrasound imaging, and to relate scar measurements, demographic and obstetric variables to the niche evolution and final pregnancy outcome.[12] In their study, the CS scar niche ("defect") was defined as an indentation at the site of the CS scar with a depth of at least 2 mm in the sagittal plane. The

Figure 1. Image showing uterine scar dehiscence (arrow head showing uterine scar dehiscence with fetal membranes bulging through the gap).

authors measured the hypoechogenic part of the CS niche in two dimensions, as myometrial thickness adjacent to the niche and the residual myometrial thickness (RMT). In the second and third trimesters of pregnancy, the full lower uterine segment (LUS) thickness and the myometrial layer thickness were measured at the thinnest part of the scar area. The results showed that the scar was visible in 77.9% of the women. Among those with a visible CS scar, the incidence of a CS scar niche was 51.6%. Uterine scar niches were seen in 56.3% of the women who had undergone uterine curettage, compared with 34.4% without uterine curettage ($P = .045$). The authors also observed an absence of correlation between the uterine scar niche at the first trimester of pregnancy and mode of delivery ($P = .337$) and 2 cases (4.7%) of uterine scar dehiscence were confirmed following a trial of vaginal delivery.[12] The authors concluded that based on ultrasonography examination, the CS scar niche remained visible in half of the cases with a visible CS scar at the first trimester of pregnancy and could be reproducibly measured by a transvaginal scan. While the previous uterine curettage was associated with an increased risk for uterine niche formation in a subsequent pregnancy, and uterine scar dehiscence might be potentially related to the CS scar niche.[12] Additionally, Savukyne et al in another study aimed at evaluating the changes in uterine scar thickness after previous cesarean delivery longitudinally during pregnancy, and to correlate cesarean section (CS) scar myometrial thickness in the first trimester in 2 participants groups (CS scar with a niche and CS scar without a niche) with the low uterine segment (LUS) myometrial thickness changes between the second and third trimesters, the authors concluded that CS scar myometrial thickness changes throughout pregnancy and the appearance of the CS scar niche was associated with a more significant decrease in LUS myometrial thickness between the second and third trimesters.[13]

A number of factors could predispose to uterine dehiscence. In one recent study, it was reported that compared with single-layer closure, a double-layer closure of the uterus at previous cesarean delivery is associated with a thicker third-trimester lower uterine segment and a reduced risk of lower uterine segment thickness <2.0 mm in the next pregnancy.[14] On the contrary, a systematic review that involved 9 RCTs with 3969 participants, revealed that single- and double-layer closure of the uterine incision following CS are associated with a similar incidence of cesarean scar defects, as well as uterine dehiscence and rupture in a subsequent pregnancy.[15]

Exploratory laparotomy is considered an important tool for diagnosis and treatment for uterine scar dehiscence, where conservative repair (resuturing after debridement) can be chosen. However, with the presence of marked wound infection, endomyometritis and/or intra-abdominal abscess, early recurse to hysterectomy should be considered.

In patients who desire to bear children, treatment requires the use of surgical repair, of which multiple options including microsurgical, laparoscopic and robotic surgical repair/uterus reconstruction are available, with less morbidity and hospital stay.[3] For instance, in a recent report in Canada by Edwards et al , involving a 35-year-old, gravida 2, para 1 woman with a previous CS and presented at 10 weeks and 3 days gestational age with complete uterine dehiscence at the site of her previous CS scar, which was diagnosed by antenatal ultrasound, an ultrasound-guided laparoscopic repair was successfully done.[16] The treatment helped in demonstrating a restoration of approximately 8 mm of myometrial thickness across the cesarean scar defect on antenatal follow-up. The woman subsequently had a term live birth via CS.

However, in women who do not desire to bear children, the treatment choices involve either low doses of monophasic contraceptives or total hysterectomies.[5] A total hysterectomy is a radical surgical treatment that many patients may be reluctant to undergo. Our case study desired to have more children, so had a repair during the index repeat CS. It is also worthy of note that during CS with uterine dehiscence, the choice of uterine incision should be carefully considered, depending on the degree of myometrial thinning, to prevent extension and further damages to surrounding structures.[7]

Several measures can be employed to prevent the occurrence of uterine scar dehiscence. These would include ensuring asepsis during surgery by using appropriate solutions to scrub the skin, use of potent broad spectrum antibiotic prophylaxis pre, peri and post-surgery, 2 layer closure of the uterine incision, closure of the deep subcutaneous layer in patients with subcutaneous tissue thickness greater than 2 cm. These will improve

the post-operative outcome and limit the possibility of dehiscence.[5]

This case report describes one of the more uncommon causes of uterine rupture following one previous CS. Similarly, in a previous case reports by Abdelazim et al , a 35-year-old gravida 2, with a previous CS due to preterm premature rupture of membranes and breech presentation at 30 weeks was admitted for elective CS at 38 plus 3 days gestation.[17] During the second elective CS, it was seen that the site of the previous CS scar was very thin along its whole length and the anterior uterine wall was completely deficient, leaving visible bulging fetal membranes and moving baby underneath. Similar to this previous case report, our limitations included the lack of follow-up on the patient after lower segment CS using uterine scar thickness.[17] Another limitation was that we could not obtain the detailed problems or intra-operative findings of the previous surgery. While the patient reportedly and willingly elected for repeat CS, the assessment of uterine scar thickness following emergency CS during the subsequent pregnancy are yet to be evaluated. Further studies assessing the risk of uterine dehiscence following emergency CS may be required.

Conclusion

In conclusion, preoperative detection of uterine scar dehiscence in women with previous emergency lower segment cesarean delivery helps prevent maternal and neonatal morbidity and mortality. However, the maximum benefit can only be obtained by obstetrics ultrasound scanning at appropriate intervals during pregnancy and accurate recognition of the ultrasonographic features of uterine scar dehiscence. Prompt identification of uterine scar dehiscence is key to averting the possible catastrophy its existence in pregnancy could cause, and this requires a high index of clinical suspicion and utilization of radiological signs seen on ultrasonography, the CT or MRI scan. Our report of intra-operative diagnosis of uterine dehiscence is intended to increase awareness among obstetric care providers who are involved in managing pregnant women with previous lower segment CS. Based on this case report, it may be useful to routinely assess the lower uterine segment of women with previous emergency CS using the available ultrasound facilities. Of course, there is a literature gap in this area regarding the appropriate standard of care as to whether we should advocate for routine antenatal uterine scar thickness testing especially in women with previous emergency lower segment CS in low and middle-income settings.

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Author Contributions

GUE, GOU, CGO, TKN, CCO1, and CCO2 conceived, supervised the study and performed the surgery; EPI, OCE, EUN, DEM, and OOD analyzed data; PCO, ECE, JCN, OCO, CMO, NCO, KCO, BKN, CCM, LCO, and HCU wrote the manuscript; EPI, CGO, OOD, and GUE made manuscript revisions. All authors reviewed the results and approved of the final version of the manuscript.

Availability of Data and Materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Ethical Consideration

An informed consent was obtained from the patient to allow the reporting of this case as well as the use of her intraoperative picture.

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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