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Case Report

The role of diffusion weighted imaging in demonstrating communication between periuterine collection and uterine cavity following caesarean section

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Abstract. A 32 year-old woman presented with pelvic collection and fever following caesarean section. Diffusion weighted MRI showed the exact nature and cause of the collection, which on ultrasound appeared like tubo-ovarian mass. She was kept on conservative management and the collection was followed with repeated sonography until its complete resolution.

Key words: Diffusion weighted imaging, periuterine collection, uterine cavity, caesarean section

1. Introduction

Uterine perforation following lower segment Caesarean section is rare (0.09%) but a serious iatrogenic complication (1). Chorioamnionitis, prolonged rupture of the amniotic membrane, vaginal manipulations during prolonged labour, postoperative hematoma, improper wound closure and inadequate sterilization of skin are the predisposing (1). Uterine perforation, if small and diagnosed early, may respond to conservative management. However, chronic abscess may require re-exploration and hysterectomy.

Uterine perforation can be diagnosed on ultrasonography especially on transvaginal sonography but recently the MRI has depicted the uterine defects more clearly than sonography and is currently considered the most useful imaging modality to evaluate uterine incision healing following caesarean section (2). Role of diffusion weighted MRI has been well described in neuro-imaging to diagnose various pathologies (3). Recently, diffusion imaging is being explored for body imaging.

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Diffusion-weighted imaging is an evolving technology with the potential to improve tissue characterization when findings are interpreted in conjunction with findings obtained with other conventional MR imaging sequences (4).

Case report

A 32 year-old woman (G2+0) who underwent Caesarean section, presented with continuous mild fever, pain and heaviness in the left lower abdomen on 10th post partum day. This was her second delivery; previous delivery was also by caesarean section 5 yrs ago, for fetal distress.

Her blood pressure was 120/76 mm Hg, pulse was 82/min, and temperature was 101.4^{0}F. On abdominal examination, caesarean stitch wound was healthy with signs of healing and palpation revealed mild tenderness on left lower abdomen.

On laboratory investigations TLC was initially higher (14.5x1000/microlit) later it came to normal (9x1000/microlit) after conservative treatment. Blood film for malaria parasite was negative. All other lab investigations were within normal limits.

On Sonography, a small septated collection (approx- 136 cc) was noted in the left adnexal region and a possibility of a complex ovarian cyst/ tubo-ovarian mass was considered. Since there was persistence of the fever, the patient was advised MRI for better definition of the lesion.

MRI was performed on 3T GE (signa HD XT, USA) machine. Axial T2 (TR-5600 msec TE-126.9 msec), coronal T2W (TR-4520 msec TE-127.1 msec), diffusion weighted imaging (DWI)

with (TR-8350 msec TE-72msec, b-value 0 and 1000 sec/mm^2), fast imaging employing steady state acquisition (FIESTA) with (TR-4.1msec TE-1.8msec), 3D liver acquisition with volume acquisition (LAVA) pre and post contrast axial and coronal plane (TR-4.4msec TE2.2msec) were performed. 0.1ml/kg body weight of multihance (gadobenate dimeglumine; Bracco, Milan Italy) was used as a contrast agent.

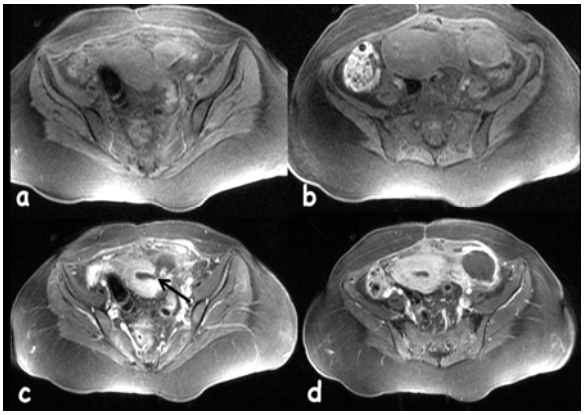

Fig. 1. Pre and post contrast LAVA sequence (pre contrast a and b: post contrast c and d) showing perforation track (arrow fig. 1c) and peripheral enhancement in the pelvic collection (fig. 1d).

There was a small collection showing hyperintensity on T2, hypointense on precontrast LAVA (Figures 1a and b) with peripheral enhancement on post contrast study (Figure 1d), noted on the left side of the pelvis communicating with the uterine cavity through a small defect (Figure 1c) in the anterior wall of lower part of uterine body. This collection was intensely hyperintense on DWI (Figures 2a and b) and showed restriction on computing ADC (Figures 2c and d), with mean ADC value of $0.591x10^{-3}$ s/mm^2. DWI better depicted the communication as an intensely hyperintense track between the endometrial cavity and the collection. A Uterine wall defect and a communication track between the collection and the uterine cavity which was not seen on ultrasound was better depicted on DWI. Left ovary was well visualized separately from the collection.

Following MRI, ultrasound guided aspiration of the collection was done and it came out sterile after 5 day of BACTEC culture. The patient was managed conservatively with antibiotics and antipyretics. After 15 days of conservative treatment, she improved clinically, with normalization of the TLC and reduction in size of collection. Patient was followed on sonography which showed resolution of the collection in one month.

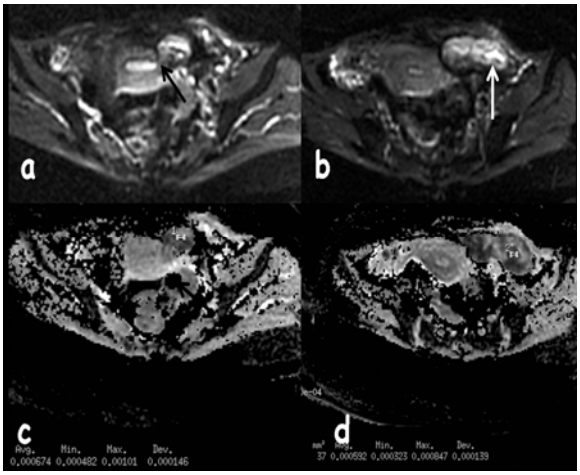

Fig. 2. a and b - axial DWI images (b-1000 sec/mm2) showing uterine perforation track (arrow, fig 2a) and collection (arrow, fig 2b) showing hyperintensity and restriction on ADC map (image c and d).

3. Discussion

Uterine dehiscence after Caesarian section is a very rare entity. Theoretically any insult to the uterine wall in the form of curettage, myomectomy or previous caesarian section cause weakening of the uterine wall which can lead to uterine perforation in subsequent pregnancies (2). Post caesarian uterine perforation can be due to wound dehiscence. Vaginal bacteria adhering to the fetal head may contaminate the incision wound of the uterus and skin during a Cesarean section, causing postpartum pelvic abscess and cutaneous wound infection. Therefore, after closure of the uterine wound in high-risk patients, disinfection of the incision wound by the use of betadine followed by copious irrigation with normal saline is considered (5). Ultrasound as a primary investigation can detect the pelvic collection, however the origin and the exact site of uterine defect is very difficult to visualize (1).

Contrast CT may show the defect but full thickness myometrial defect is rarely seen. Abdominal free fluid, bowel distension, and a bladder flap hematoma seen on CT or sonography may be an indirect evidence of uterine incisional necrosis (6).

MRI has a very good soft tissue resolution and depicts the myometrial defect which may not be picked up on ultrasound and CT. MRI has been shown to be the most useful imaging modality to evaluate uterine incision healing following caesarian section (2). With addition of DWI to routine MRI, it can very well visualize the pelvic

collection, defect in uterine wall and its communications without the use of exogenous contrast agent 7.

In the present case, ultrasound showed a complex echogenic mass in the adnexa and the differential diagnosis included postpartum pelvic abscess, tubo-ovarian mass, hematoma or a degenerated myoma. MRI showed a collection in the left side of pelvic cavity communicating with endometrial cavity through a defect in the lower anterior wall of uterus best demonstrated on diffusion imaging. The mean ADC value of the collection was 0.591x10-3 s/mm^2 and was consistent with abscess formation.

The degree of restriction of water diffusion in biologic tissue is inversely related to tissue cellularity and the integrity of cell membranes (8). Restricted diffusion in collection is due to a combination of inflammatory cells, necrotic debris, viscosity, and macromolecules (3). The restricted diffusion in the cavity in the absence of positive culture was probably due to increased number of intact inflammatory cells in it. The addition of diffusion-weighted sequences to routine abdominopelvic MR imaging protocols has been found to yield diagnostically useful information with only a minimal increase in imaging time.

4. Conclusion

Diffusion-weighted imaging is useful in demonstration of the uterine rupture with associated infection and should be included as an additional sequence in the evaluation of Cesarean section related complications.

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