20th World Congress in Fetal Medicine

Uterine caesarean section scar sonographic characteristics

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Objective

To explore the relationship between maternal characteristics, intrapartum events and postnatal caesarean section (CS) scar ultrasound features.

Methods

This single centre prospective cohort study at University College London Hospital (2021-2022) recruited women 3-12 months after one term singleton CS delivery performed in active labour at cervical dilatations between 4-10 cm. Pregnancy, labour and CS operative characteristics were collected from electronic patient records. On transvaginal ultrasound we measured the CS scar position relative to the level of the internal cervical os and the niche characteristics (length, depth, width, adjacent and residual myometrial thickness) as per study protocol (IRAS 261256, REC 20/LO/0438). Statistical analysis was performed using IBM SPSS Statistics v29. Multivariate binomial logistic and linear regression were used adjusting for confounding factors (age, body mass index, ethnicity, smoking status).

Results

The CS scar visualised in 97% (90/93) of women, was within the cervix in 42% (38/90). A niche (an indentation at the CS scar site with a depth > 2 mm) was identified in 38% (34/90) of women. For every 1cm increase in cervical dilatation at the time of CS, the CS scar position was lower within the uterus/cervix by 0.85cm (95%CI 0.60-1.11, p<0.001). Late-stage CS (8-10cm) were almost 8 times more likely to result in a CS scar located in the cervix compared to early labour CS (4-7cm) RR 7.77 (95%CI 2.59-23.39, p<0.001). CS scars located in the cervix were more likely to develop a niche compared to uterine scars (OR 1.65, 95%CI 1.03-2.64, p=0.041). Second trimester combined uterine artery pulsatility index >2.5 and postoperative haemoglobin <10 g/L were associated with an increased risk of CS scar niche (aOR 10.15, 95%CI 1.08-94.98, p<0.05 and aOR 3.14, 95%CI 1.15-8.61, p<0.05 respectively). Use of locking sutures for the first layer of uterine CS closure decreased the chance of niche development by 88% (aOR 0.12, 95%CI 0.03 - 0.40, p<0.001). Women who had a CS at full dilatation after an unsuccessful instrumental delivery were more likely to have a CS scar above the cervix compared to women in whom no instrumental delivery was attempted (OR 5.50, 95%CI 1.24-24.45, p=0.013).

Conclusion

Surgical uterine closure techniques at CS, as well as maternal and obstetrics characteristics, influence CS scar location and niche development as measured on postnatal transvaginal ultrasound. These findings may explain the higher incidence of spontaneous preterm birth in subsequent pregnancies due to the potential impact on cervical function. Postnatal assessment of the CS scar may be useful to counsel women about their risk of late miscarriage and spontaneous preterm birth after a late stage of labour or full dilatation CS.