

Screening models for prediction of spontaneous preterm birth in women with previous full dilatation caesarean section

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Objective

To evaluate caesarean section (CS) scar characteristics by transvaginal ultrasound (TVUS) in pregnant women with previous full dilatation caesarean section (FDCS) and develop multiparameter screening models for prediction of spontaneous preterm birth (SPTB).

Methods

This is a single centre prospective cohort study of singleton pregnant women with a previous term FDCS attending a high-risk preterm birth surveillance clinic (2017–2021). Women underwent serial TVUS assessment of cervical length (CL) between 14–24 weeks gestation. The FDCS scar position was measured relative to the internal cervical os (scar distance) and CS scar niche parameters (length, depth, width, residual and adjacent myometrial thickness) were recorded. SPTB prophylactic interventions (cervical cerclage or vaginal progesterone) were offered for short CL (≤ 25 mm) or in women with a previous history of SPTB/late miscarriage after FDCS. Primary outcome was prediction of SPTB <37 weeks of gestation. Secondary outcomes included short CL (≤ 25 mm) and prophylactic intervention. Multivariable logistic regression analysis was used to develop models based on a combination of CS scar parameters, cervical length, previous FDCS history and maternal risk factors. The predictive performance of the models was examined using the area under the receiver-operating-characteristics curve (AUC) and the detection rate (DR) at a fixed false-positive rate (FPR) of 25%.

Results

CS scar was visualised in 220/243 (90.5%) women. SPTB rate was 4.1% (10/243) and 12.8% (31/243) of women had short CL. History ($n=4$) or ultrasound ($n=19$) indicated cerclage was performed in 23/243 (9.5%) women; two delivered preterm. In screening for short CL, predictive models based on scar distance and scar distance and niche parameters, had AUC of 0.791 (95% CI, 0.71–0.87) and 0.808 (95% CI, 0.73–0.89). At a 25% FPR the DR was 73%. Combination of scar parameters with previous FDCS history and maternal risk factors did not further improve the predictive ability of the model, AUC was 0.747 (95% CI, 0.635–0.858), with a DR of 67%. Prediction of SPTB based on scar distance had AUC of 0.729 (95% CI, 0.568–0.89) and a DR of 60%, respectively. SPTB was more likely when the CS scar was <5 mm above or below the internal os, aOR 6.87 (95% CI 1.34–58), $p=0.035$.

Conclusion

In pregnancies after FDCS, our multiparameter screening models with CS scar parameters can predict a high proportion of women having a short CL and at risk of subsequent SPTB. SPTB rate was low overall but increased in women where the scar was located close to the internal os. These findings suggest that FDCS compromises the internal os integrity and maintenance of a closed long cervix. A multiparameter screening approach which includes maternal characteristics, CL, and scar assessment is the method of choice for clinical surveillance in women with previous FDCS.