Objective
To develop a feasible, standardised method to assess the reproducibility of caesarean section (CS) scar and niche characteristics and their position relative to the internal cervical os by transvaginal ultrasound (TVUS) in pregnant women with previous full dilatation caesarean section (FDCS).

Methods
In this single centre prospective cohort study, singleton pregnant women with previous FDCS underwent TVUS assessment of cervical length and CS scar characteristics (14 to 24 weeks’ gestation). CS scar position was measured relative to the internal cervical os identified using uterine artery color Doppler. CS scar niche was assessed in the sagittal and transverse planes (length, depth, width, residual and adjacent myometrial thickness). Kappa coefficient was calculated for assessment of agreement on CS scar visibility and presence of niche. Quantitative reproducibility of CS scar measurements was assessed in three groups of images: 1) real-time acquisition and caliper placement on two-dimensional (2D) images by two operators: ‘Real-time 2D images’; 2) offline caliper placement by two operators on stored 2D images acquired by first operator: ‘Offline 2D still images’; 3) three-dimensional (3D) volume manipulation and caliper placement on 2D images extracted by two operators: ‘3D volume images’. Reproducibility of quantitative measurements were assessed using Bland–Altman plots. More than 70 women were required by power calculation.

Results
72 women were recruited. The CS scar was visualised in ≥ 80% of images. There was high interobserver agreement for scar visibility and presence of niche in real-time 2D images (kappa coefficient 0.84 and 0.85, respectively). Overall, reproducibility was higher for 2D images compared to 3D volume images. 95% confidence intervals (CI) for intraobserver reproducibility were within 1.1 and 3.6mm; 95% CI for interobserver reproducibility were within 2.0 and 6.3mm. CS scar distance to internal cervical os was the most reproducible 2D measurement (95% CI between 1.1 and 2.7mm). CS scar distance to internal os had an intraobserver reproducibility difference within 2mm range in >95% of cases. Niche measurements were the least reproducible measurements (95% CI between 1.6 and 6.3mm).

Conclusion
The CS scar position and niche after a FDCS can be assessed in the second trimester of the subsequent pregnancy using either 2D or 3D volume ultrasound imaging with high level of reproducibility. Overall, the most reproducible CS scar measurement was the CS scar distance to internal cervical os. This protocol will enable clinicians to objectively assess the CS scar and niche characteristics, which may have potential to predict subsequent pregnancy outcomes.