

VAGINAL DELIVERY RESULTS IN SIGNIFICANT TRAUMA TO THE LEVATOR ANI MUSCLE

Hypothesis / aims of study

There is very little evidence to date on the incidence and extent of levator trauma in labour. While anal sphincter trauma is well defined and of proven clinical relevance, there have been no imaging studies in the published literature comparing the state of the pelvic floor musculature before and after childbirth. All data currently available is limited to describing postnatal appearances. Defects of the levator muscle have been identified by MRI postnatally and in symptomatic women (1), and it has been speculated that such defects very likely arise during vaginal childbirth, probably at the time of crowning of the fetal head (2). Proof for this hypothesis has been lacking to date due to the inherent limitations of Magnetic Resonance Imaging. As a result of recent technological developments, 3D/ 4D pelvic floor ultrasound is now capable of demonstrating the puborectalis muscle at little cost and with minimal inconvenience to the patient (3).

Study design, materials and methods

In a prospective observational study undertaken at a tertiary obstetric unit, 63 nulliparous women were seen at 36-40 weeks' gestation. The assessment included an interview and 3D/ 4D translabial ultrasound using a Philips HDI 4000 system with 7-4 MHz transducer. The examination was performed supine and after voiding, with volume datasets obtained at rest, on levator contraction and on valsalva. The assessment was repeated 3-6 months postpartum. Analysis of ultrasound volume datasets was undertaken at a later time, using the software GE Kretz 4D View V 2.1, with the operator blinded against all clinical data, including delivery outcome. An avulsion of the puborectalis/ pubococcygeus complex was diagnosed when there was a loss of continuity between muscle and pelvic sidewall in all volume datasets. Whenever there was any doubt, a direct comparison of antenatal and postnatal rendered volumes and axial plane single frames was undertaken (see Figures). Clinical data was obtained from the institutional database and individual records. The study had been approved by the local Human Research Ethics Committee.

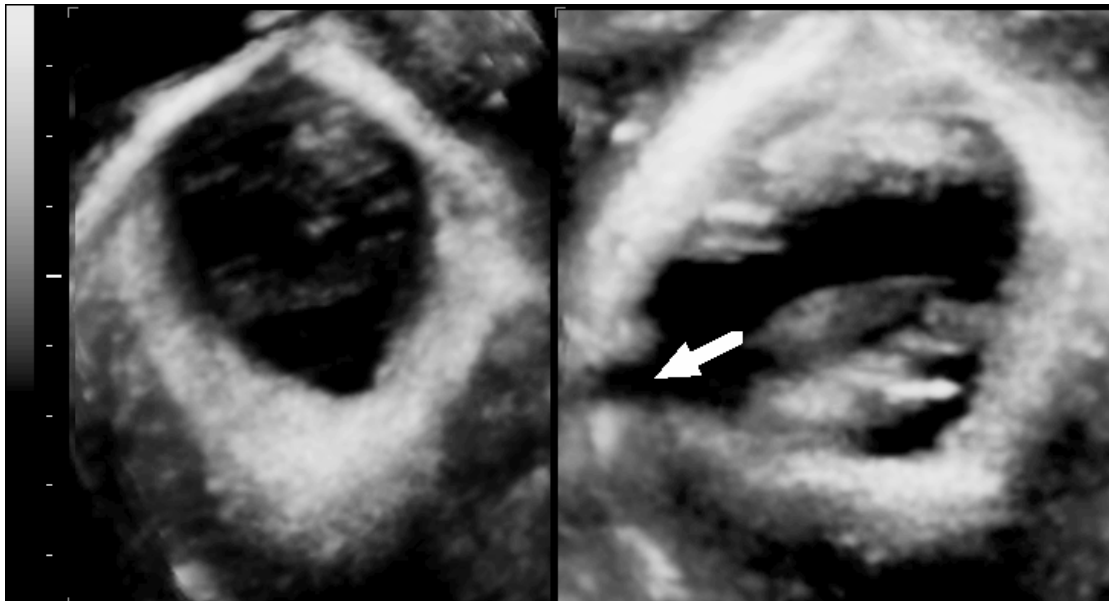


Figure 1: Axial rendered volume of the puborectalis/ pubococcygeus complex on 3D pelvic floor ultrasound (36 weeks' gestation on left, 3 months postpartum on right). Both images were obtained on Valsalva manoeuvre. The arrow indicates a right sided avulsion injury which was palpable and associated with de novo stress urinary incontinence.

Results

50 women (82%) returned for their postpartum visit 2-6 months after their delivery. 39 had been delivered vaginally (27 NVD, 8 Vacuum, 4 Forceps), one patient had been delivered by elective Caesarean Section, the remainder had undergone an emergency Caesarean Section. In the 39 women delivered vaginally, levator avulsion was diagnosed in 14 (36%). Defects were on the left (n=8), on the right (n=4) or bilateral (n=2). There were associations or trends towards associations with higher maternal age (P= 0.03), vaginal operative delivery (P= 0.07) and worsened stress incontinence postpartum (P= 0.09). Bladder neck descent was markedly increased postpartum (P< 0.0001), and more so in those with defects (+7.8 mm vs. +20 mm, P=0.001). No defects were seen in those 11 women delivered abdominally.

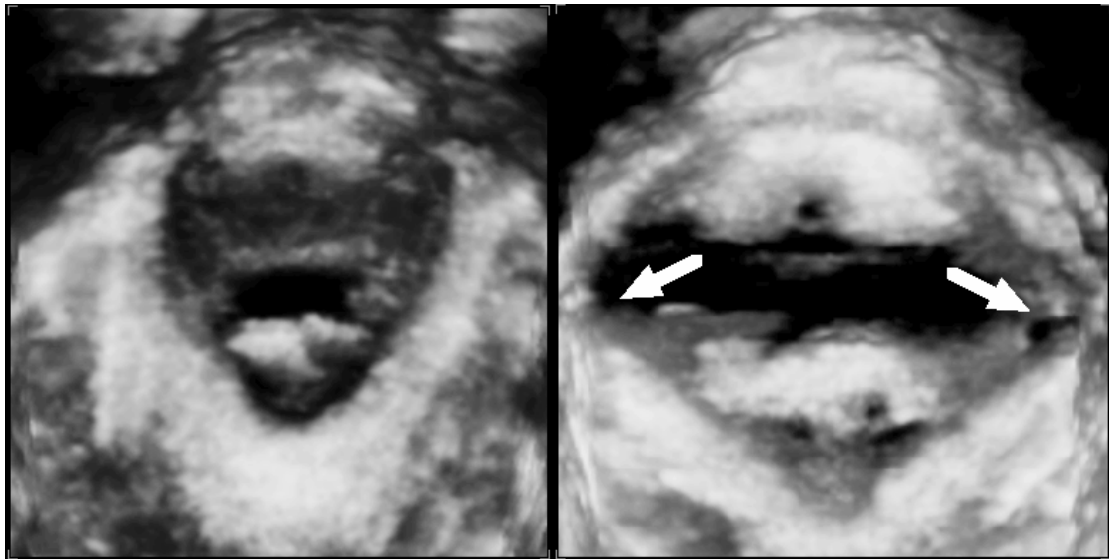


Figure 2: Axial rendered volume representation of the puborectalis/ pubococcygeus complex on 3D pelvic floor ultrasound (38 weeks' gestation on left, 4 months postpartum on right). Both images were obtained on Valsalva manoeuvre. The arrows indicate a bilateral avulsion injury which was associated with markedly increased pelvic organ descent.

Interpretation of results

This is the first study to conclusively demonstrate soft tissue trauma to the levator ani after vaginal delivery. The incidence of such defects in women delivered vaginally was surprisingly high at approximately 1/3. This is twice the prevalence of such defects in parous women as imaged by MRI (1) and on 3D ultrasound (own unpublished data). As it seems unlikely that avulsion of the muscle off its insertion would 'heal' and become invisible, one may hypothesize that this difference in prevalence could be due to changing obstetric practice and demographic developments. It has recently been shown that age at delivery is a strong predictor of future stress urinary incontinence. One wonders whether the continuing rise in women's age at first delivery may result in a higher likelihood of pelvic floor trauma such as demonstrated in this study.

Concluding message

Vaginal delivery can cause significant pelvic floor trauma. Avulsion of the pubovisceral muscle off the pelvic sidewall is common and can be visualized using 3D/ 4D translabial pelvic floor ultrasound. The clinical significance of such trauma however remains to be established.

References

- 1 *Obstet Gynecol* 2003 (101); 46-53
- 2 *Obstet Gynecol* 2004 (103); 31-40
- 3 *Ultrasound Obstet Gynaecol* 2004 (23); 615-625.