

THE EFFECT OF CHILDBIRTH ON THE DIMENSIONS OF THE LEVATOR HIATUS

Hypothesis / aims of study

Vaginal delivery is a risk factor for pelvic organ prolapse. This may be mediated by trauma to the insertion of the puborectalis muscle which is commonly found after vaginal childbirth(1). Pelvic organ descent has also been found to be significantly correlated with hiatal area at rest and on Valsalva in nulliparous women with an intact levator muscle (2). It seems reasonable to hypothesize that changes in levator hiatal dimensions after vaginal childbirth may be an aetiological factor in the development of female pelvic organ prolapse, even if there is no obvious macroscopic trauma to the muscle. The aim of our study was to determine changes in levator hiatal dimensions after childbirth.

Study design, materials and methods

296 nulliparous women carrying an uncomplicated singleton pregnancy were seen at 36-38 weeks' gestation and again 3-6 months postpartum. They underwent an interview and 4D translabial Ultrasound after voiding, in the supine position. Data analysis was later performed on a desktop PC using the proprietary software 4DView v5. Minimal hiatal diameters, circumference and area were measured as previously described (2). To determine muscle strain, we also measured the bone arc length, this was subtracted from the hiatal circumference to obtain the muscular component of the levator hiatus. Muscle strain on maximum Valsalva and during levator contraction were calculated as previously described (3). Delivery data were collected from the hospital database.

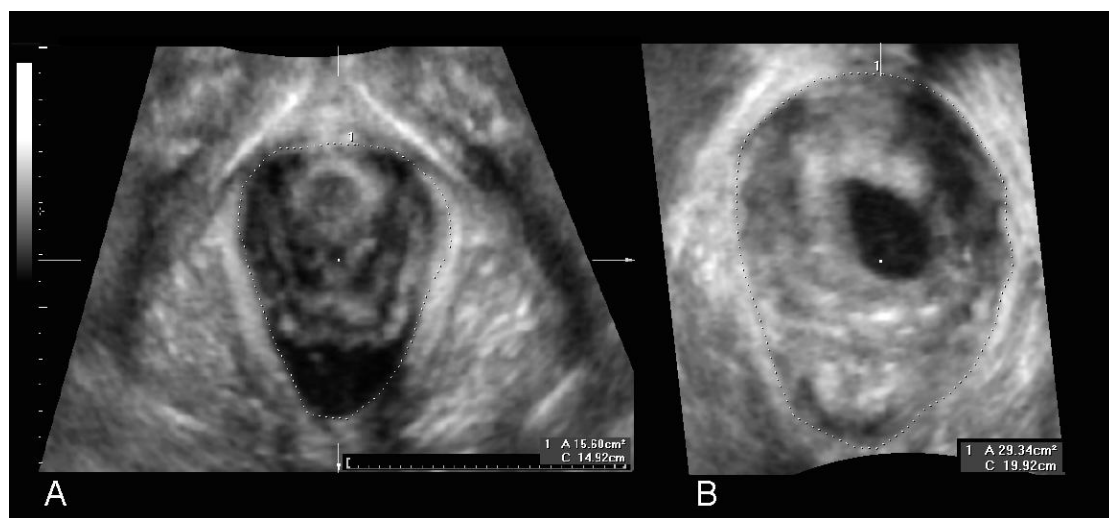


Figure 1: Antepartum and postpartum ultrasound images (single slice axial planes in the plane of minimal hiatal dimensions) of a patient with left sided avulsion after Forceps delivery. The hiatal area on maximum Valsalva at 38 weeks (on the left, image A) was 15.6 cm². It was measured at 29.3 cm² at 4 months postpartum (image B).

Results

Mean age at the time of the first assessment was 25.8 (17.7 to 40) years. Mean BMI was 30.7 (19.2 to 52.3). Of 296 women seen antepartum, 208 (70%) returned for a postnatal assessment after normal vaginal delivery (n=99, 48%), vacuum or forceps (n=31, 15%) and Caesarean Section (n=78, 38%). In women after Caesarean Section, there was a decrease in hiatal area on Valsalva after delivery (P=0.003). After vaginal delivery there was a significant increase in hiatal area on Valsalva of about 7% (see Table). In those women who suffered an avulsion injury, the mean hiatal area on maximum Valsalva increased by approximately 25% from 20.52 to 25.64 cm² (P= 0.003). After Caesarean Section however there was a significant reduction in hiatal area from 20.93 to 18.87 cm² (P= 0.003, see Table). In cases with avulsion injury, hiatal area on PFMC (P= 0.001) also increased significantly, and strain on PFMC was reduced by about half (P= 0.008).

	Vaginal delivery with avulsion (N= 26)	Vaginal delivery without avulsion (N=104)	Caesarean Section (N= 78)
Mean hiatal area on Valsalva antepartum	20.52 cm ²	21.11cm ²	20.93cm ²
Mean hiatal area on Valsalva postpartum	25.64cm ²	22.56cm ²	18.87cm ²
Paired T-test P-Value	0.003	0.019	0.003

Table 1: Antepartum and Postpartum mean hiatal area on Valsalva in relation to mode of delivery

Interpretation of results

Vaginal childbirth results in an enlargement of the levator hiatus. The minimal hiatal area on Valsalva is increased significantly 3-6 months after vaginal childbirth, especially if the puborectalis muscle is avulsed from the pelvic sidewall, an event which occurred in 20% of patients delivering vaginally. Traumatic overdistension of the pubovisceralis muscle after vaginal delivery may be another mechanism leading to pelvic organ prolapse, but numerically it seems to be of lesser importance compared with avulsion injury. After Caesarean birth, on the other hand, there seems to be a significant reduction in hiatal dimensions, suggesting reversible, possibly hormonal effects of pregnancy on hiatal distensibility.

It is interesting to see that the mean hiatal area on Valsalva at 36-38 weeks' gestation in this study is markedly higher than the 14 cm² we have determined previously in a group of nulligravid volunteers (2), data that has been confirmed by others. A longitudinal study assessing women prior to and after conception will be needed to further investigate the effect of pregnancy itself.

Concluding message

It appears that changes in levator hiatal dimensions after childbirth are largely mediated by macroscopic levator trauma, i.e., avulsion injury, which enlarges the hiatus by about 1/4 on average. Four months after Caesarean Section we documented a reduction in hiatal dimensions as compared to late pregnancy.

References

1. Obstet Gynecol 2005; 106(4): 707-712
2. Ultrasound Obstet Gynecol 2005;25: 580-585.
3. Ultrasound Obstet Gynecol 2008;31: 201-205.

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<i>Is this a clinical trial?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	Yes
<i>Specify Name of Ethics Committee</i>	Ethics Review Committee of the Sydney West Area Health Service
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	Yes