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MODE OF DELIVERY AND LEVATOR HIATAL AREA

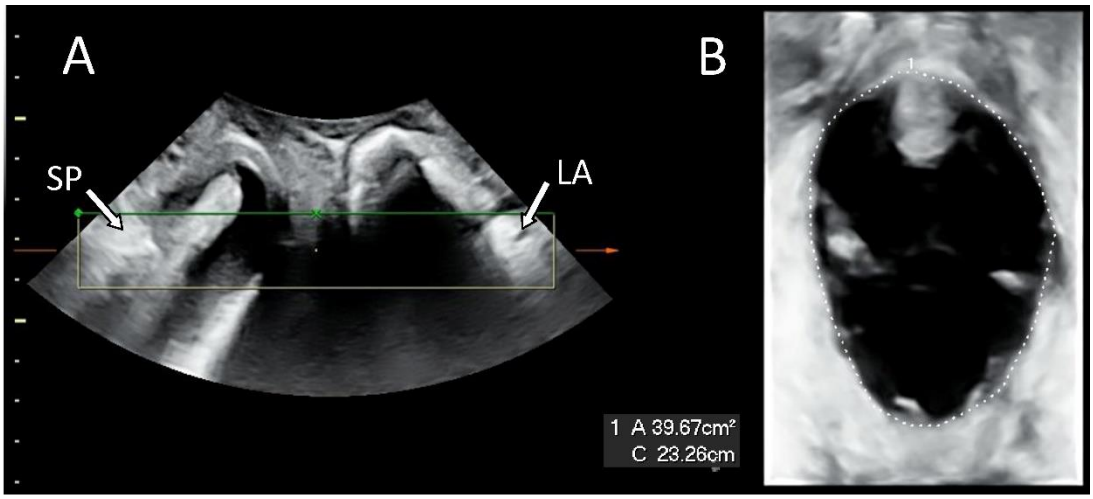
Hypothesis / aims of study

Female Pelvic Organ Prolapse (FPOP) is a form of hernia through the largest potential hernia portal in human body ie. the levator hiatus. Levator hiatal area is associated with a higher risk of FPOP and with POP recurrence after surgery.(1) The sudden distension of the puborectalis muscle during crowning of the baby's head may result in trauma in the form of actual tears (avulsion) and/or irreversible over distension (microtrauma). Mode of delivery has been shown to be linked to levator avulsion and prolapse.(2) The aim of this study was to determine associations between delivery mode and hiatal area in symptomatic women.

Study design, materials and methods

This was a retrospective study involving data of patients attending a tertiary urogynaecolo-gical unit for investigation of pelvic floor disorders between 1/2012 and 12/2014. Initial assessment included clinical history, prolapse assessment by the International Continence Society Pelvic Organ Prolapse Quantification system (ICS POPQ) and a 4D translabial ultrasound (US). US was performed after bladder emptying in the supine position; at rest, on pelvic floor muscle contraction and on maximum Valsalva manoeuvre, as previously described.(3) Off-line analysis for hiatal area on maximum Valsalva was undertaken at a later date on a desktop PC using proprietary software, blinded against all clinical data. The plane of minimal hiatal dimensions was identified in the midsagittal orthogonal plane, where the distance between the hyper-echogenic posterior aspect of the symphysis pubis and hyper-echogenic anterior border of the levator ani muscle, just posterior to the anorectal angle, is shortest. Hiatal area was measured in rendered volumes of 1-2 cm thickness containing this plane of minimal hiatal dimensions (Figure 1). Excessive distensibility, i.e., hiatal 'ballooning' was defined as 'mild' (25-29.9 cm2), 'moderate' (30-34.9 cm2), 'marked' (35- 39.9. cm2) or 'severe' (40+ cm2).

Figure 1 :



Determination of hiatal area. Image A demonstrates the plane of minimal hiatal dimensions between the symphysis pubis (SP) and the levator ani (LA) in the midsagittal plane (arrows) in a volume obtained on maximal Valsalva. A 1-2 cm rendered volume is placed at this level and hiatal area is measured in the axial plane as shown in Image B. Hiatal area in this image is 39.67cm^2.

Results

Of 1333 patients seen during the study period, 100 were excluded: 98 due to missing US volumes and 2 for missing delivery information, leaving 1233 to whom these results refer. Mean age was 56 (17 – 89) years with a mean BMI of 29 (15.1 -54.7) kg/m^2. Median parity was 2 (0-9) with 90.4% (n=1115) being vaginally parous. 65 (5.27%) were nulliparous, 53 (4.5%) had caesarean section (CS) births only, 803 (65.13%) had a normal vaginal (NVD) or vacuum assisted delivery (VD) and 312 (25.3%) had had at least one forceps assisted delivery (FD), or a failed trial of forceps. The majority presented with stress and urge urinary incontinence, 893 (72.7%) and 907 (73.8%) respectively. 647 (52.5%) had symptoms of POP. Clinically 941 (76.3%) had significant POP and 809 (65.6%) had significant POP on TLUS.

Mean Hiatal area was 29.3 (SD 10, 7.1 -76) cm2. On univariate analysis (one-way ANOVA), mode of delivery is strongly associated with hiatal area on Valsalva (Figure 2).

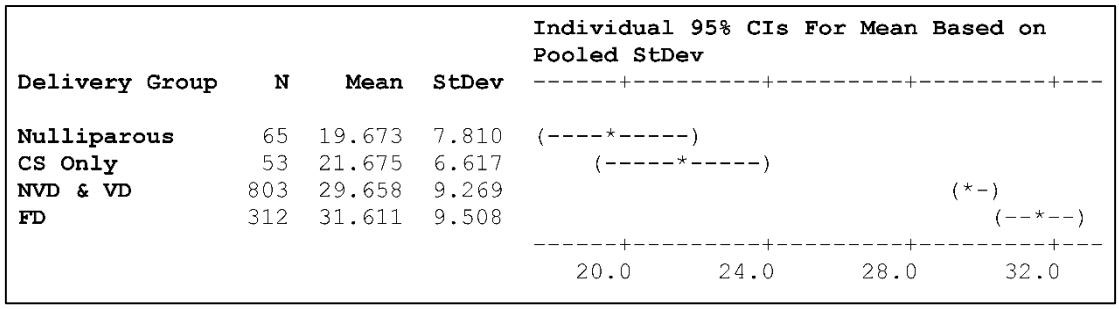


Figure 2 : A One-way ANOVA analysis showing the association between delivery mode and hiatal area on Valsalva on maximum Valsalva (P<0.001); n=1233.

On pairwise comparison, a significant difference was demonstrated in hiatal area between nulliparae and both NVD+VD, and FD groups (both P<0.001). There was also a significant difference in hiatal area between NVD+VD and FD Groups (P= 0.008), but this was not the case for a comparison of nulliparous and CS only groups (P=0.64). On multivariate analysis controlling for potential confounders such as age, BMI, parity, previous POP surgery or hysterectomy, our findings on univariate analysis were confirmed. Table 1 shows the distribution of degrees of abnormal distensibility (ballooning) for the four delivery mode groups.

Hiatal ballooning	N/1233 (%)	Delivery groups			
		NP n=65	CS-Only n=53	NVD & VD n=803	FD n=312
Normal (<25cm2), *mean 19.7*	439 (35.6)	54 (83.1)	40 (75.5)	268 (33.4)	77 (24.7)
Mild (25-29.9cm2), *mean 27.2*	254 (20.6)	4 (6.2)	9 (17.0)	174 (21.7)	67 (21.5)
Moderate (30-34.9cm2), *mean 32.3*	220 (17.8)	4 (6.2)	2 (3.8)	152 (18.9)	62 (19.9)
Marked (35-39.9cm2), *mean 37.2*	146 (11.8)	3 (4.6)	0 (0)	96 (12.0)	47 (15.1)
Severe (>=40cm2), *mean 45.9*	174 (14.1)	2 (3.1)	1 (1.9)	113 (14.1)	58 (18.6)

Table 1 : The degree of hiatal ballooning among different delivery groups; n=1233.

Interpretation of results

In this large retrospective study we observed a highly significant trend towards increasing hiatal area on Valsalva across delivery groups. 75% of women who had at least one forceps or trial of forceps showed hiatal ballooning, of which more than one third were marked or severe. In comparison, this was the case for one in 4 women after vaginal delivery without Forceps, in 2% after CS births only, and in 8% of nulliparae. This is despite the high likelihood of selection bias in a urogynaecological clinic which would tend to reduce differences between delivery groups.

Concluding message

Delivery mode is associated with levator hiatal distensibility in women symptomatic of pelvic floor dysfunction. CS seems to have a protective effect, with levator hiatal area after exclusive CS delivery being similar to that of nulliparae.

References

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Disclosures

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