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THE SEVERITY OF DEFECTS SEEN IN THE LEVATOR ANI MUSCLE ON MAGNETIC RESONANCE IMAGING CORRELATE WITH OBSTETRIC HISTORY.

Aims of Study

Levator ani defects have been demonstrated in women with stress urinary incontinence and pelvic organ prolapse. Vaginal delivery is the most likely causative factor. The exact relationship between vaginal delivery and levator ani defects has not been previously studied. This study will test the null hypothesis that the severity of levator ani defects seen in primiparous women on MR imaging are independent of obstetric history.

Methods

MR images of the pelvis were obtained on 240 women as part of a case control study on urinary incontinence. 80 primiparous incontinent cases were matched with 80 primiparous continent controls and 80 nulliparous continent controls. Multiplanar 2-dimensional fast spin (echo time, 15ms; repetition time, 4000ms) proton density MR images of all women were obtained by use of a 1.5 tesla superconducting magnet (Signa; General Electric Medical Systems, Milwaukee, Wisc.) with version 5.4 software as previously described (1). Images 5 mm apart were obtained in axial, coronal and sagittal views. The morphology of the levator muscle was studied on each side and classified as normal or abnormal based on normal anatomy as defined in nulliparous scans (2). Two observers blinded to continence and parity independantly reviewed all scans. Abnormal morphology was characterised by a defect seen in the levator muscle on one or both sides in more than one image and on more than one view. The pubovisceral and iliococcygeus portion of the levator ani had visible defects. Defects in the pubovisceral muscle were classified according to severity on each side on a scale of 0-3, with 0 being normal and 3 meaning a complete absence of pubovisceral muscle on that side. Defects were said to be major if a total score (both sides) was greater than 3 or equal to 3 if it was a unilateral defect. Finally obstetric data was recorded from the delivery sheet as all primiparous women delivered at this hospital.

Results

There were 32 defects identified in 160 primiparous women (20%); 29 involved the pubovisceral muscle. Major defects were found in 22 women. Example of defects are shown in Figure 1. Image A shows normal muscle bilaterally, score 0, Image B has a major defect shown bilaterally, score 6 and image C shows a unilateral defect, score 3.

Women with defects visible on MR imaging were 3.5 times more likely to have had an operative delivery and 3 times more likely to have sustained an anal sphincter rupture (Table 1). Women with a defect had a second stage that was 1 hour longer than women who delivered and had normal appearing levator ani muscles. An episiotomy was performed more frequently in women with a defect . A major defect was seen in 50% of women who had a forceps delivery, 23% who had a vacuum delivery and 7% who had a normal delivery. Differences in gestational age, birth weight, head circumference, oxytocin use and epidural between women with defects and those with normal levator ani did not reach statistical significance.

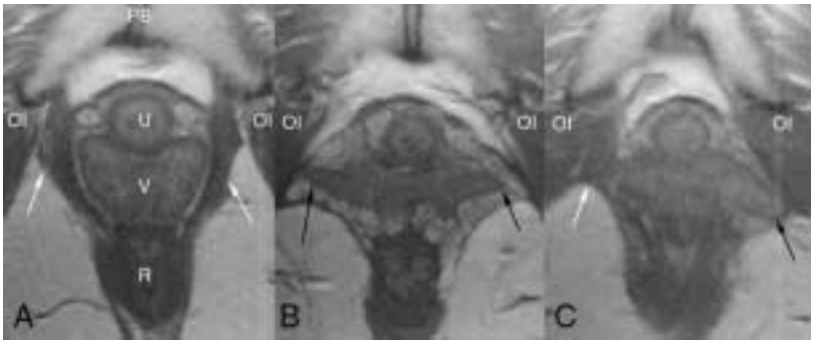

Figure 1. Axial proton density scans of a nulliparous woman (A) with normal levator ani muscles (white arrows) with: PB, pubic bone; R, rectum; U, urethra; V, vagina also shown. Panels B and C show 2 parous women with birth associated levator injury. In B, the levator muscles is lost on both sides (black arrows) so

the vagina extends to the obturator internus muscle (OI) on each side. C shows a unilateral loss of the levator muscle on the right of the picture (black arrow). The levator is present on the left of the image (white arrow).

Table 1

Obstetric variable	**Normal**	**Defect**	**Statistical Significance**	**Difference (%)**
	(Mean±SD)	(Mean±SD)		
Gestational age (weeks)	39.1±1.5	39.4±1.2	NS	0.3 (0.7%)
Second stage (mins)	95.0±69.9	156.8±116.2	p=.0002	61.8 (65%)
Birth weight (g)	3448±0.4	3622 ±0.5	NS	174.0 (5%)
Head circumference (cm)	34.9±1.3	35.4±1.4	NS	0.5 (1.4%)
	(%use)			Relative Risk
Oxytocin use (%)	45.3	53.1	NS	1.2
Epidural use (%)	69.5	65.6	NS	0.8
Operative vaginal delivery (%)	12.2	48.3	p=.0001	3.5
Episiotomy (%)	33.6	59.4	p=.0004	2.3
Sphincter rupture (%)	16.4	59.4	p=.0001	4.7
Vaginal birth after cesarean(%)	2.3	6.3	NS	2.1

Conclusions

Women who have major defects visible in the levator ani muscle on MR imaging following one vaginal delivery have a significantly higher rate of operative delivery and anal sphincter rupture. Levator ani defects are not visible in nulliparous women and are found more frequently in women who have had difficult vaginal deliveries.

References

1. A structured system to evaluate urethral support anatomy in magnetic resonance images.Am J Obstet Gynecol 2001: 185:44-50.
2. Women with localized levator ani abnormalities on MR images and stress incontinence have weaker muscles and decreased pelvic organ support. Neur urol 1999: 18:4;311-13.