Conclusion

In this study colour Doppler was able to consistently and reliably demonstrate urine leakage through the urethra with or without indwelling catheter. Agreement between colour Doppler and fluoroscopy was very high in the controlled group with indwelling catheters and identical bladder volumes. Both velocity (CDV) and energy mapping (CDE) were used and their usefulness compared. CDV was more likely to yield a positive result and may be more convenient for producing unequivocal images due to its better motion discrimination. This results in less flash artefact and better orientation, particularly on coughing. The angle- dependency of CDV is generally not a problem. CDE may however have advantages in patients with extreme urethral rotation. Translabial colour Doppler imaging may remove the last remaining argument against the use of ultrasound in the investigation of female urinary incontinence. It has the potential to become a new imaging standard for Urogynaecology.

Literature

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R Tunn, J DeLancey*, D Howard*, J Ashton-Miller*, L Quint*, J Goedicke

Charité and University of Michigan*
Berlin, Germany, and Ann Arbor, USA

EVALUATION OF THE LEVATOR ANI MUSCLE STRUCTURE USING DIFFERENT MR IMAGING TECHNIQUES

Aims of study

Histological investigations have demonstrated age and birth related changes in the levator ani muscle (1). These changes are thought to contribute to the development of urinary incontinence and pelvic organ prolapse. MR technology provides a noninvasive assessment of the levator ani muscle structure. The intensity of the MR signal emanating from a structure reflects the chemical composition of that structure. Striated muscle tissue shows low signal intensity (dark) while fatty tissue has high signal intensity (bright). Changes in chemical composition result in either darkening (lower intensity) or brightening (higher intensity) of the image of that structure. In this study we tested the null hypothesis that levator ani muscle signal intensity would not be reflective of tissue quality and would not correlate with measures of levator ani muscle function.

Methods

MR images (1.5T) were made of 11 healthy continent nulliparous women (mean age 32, SD ±5, range 26-42 years) with normal pelvic organ support and urodynamics and 6 primiparous women (mean age 35, SD ±3, range 32-38 years) with stress urinary incontinence. Continence status was determined by a standing stress test with a full bladder. Multichannel cystometrics and an urethral pressure profile were performed using an 8F Gaeltec dual tip catheter with a bladder volume of 300 ml. Urethral closure pressures during maximum pelvic muscle contractions (Kegel urethral closure pressure: K-UCP) were recorded. Levator ani strength at rest and during a maximum pelvic muscle contraction were also measured using an instrumented intravaginal speculum (2). The pelvic region was imaged using the following sequences: transverse proton density (PD, TR/TE 4000/15), T1 (TR/TE 600/15), T2 (TR/TE 4000/120), short-tau inversion recovery (STIR, TR/TE/TI 4083/22/165), fat-saturated (FS, TR/TE 4000/15),

in-phase (IP, TR 150 in phase), and out-of-phase (OP, TR 150 out of phase).
A 160x160 mm field of view was used with an imaging matrix of 256x256 voxels. The signal intensity (SI) measurements of the levator ani muscle were carried out with Advantage Windows sdc AW 2.0.18.
The SI ratio of the levator ani to obturator internus muscle was calculated to control for interindividual differences in signal intensity.

Results

The mean MR signal intensities obtained with the different examination techniques (sequences) are shown in Table 1. The signal intensities did not correlate with maximal urethral closure pressures during kegel exercises (**K-UCP**, Table 2) or the speculum measurements. Calculating the ratio between the levator ani and the obturator internus muscle did not affect the P-values or correlations with the urodynamic data (Table 2). Nor did we find significant correlations between the different signal intensities and the body mass index or age. The mean T2 signal intensity of the obturator internus muscle was 29 ± 1 for the nulliparas and 34 ± 8 for the primiparas with urinary incontinence.

Table 1

Signal intensity	**PD**	**T1**	**T2**	**STIR**	**FS**	**IP**	**OP**
Nulliparas (n=11)	166±19	86±26	39±4	54±9	153±26	124±14	123±18
Primiparas (n=6)	174±17	112±34	52±15	58±17	145±35	130±32	120±30
P-values	0.56	0.1	**0.02**	0.58	0.6	0.57	0.81

Table 2

Correlation coeff.	**PD**	**T1**	**T2**	**STIR**	**FS**	**IP**	**OP**
SI - K-UCP	-0.27	-0.11	-0.38	-0.19	0.13	-0.05	0.24
Ratio - K-UCP	-0.32	-0.11	-0.29	-0.01	-0.54	-0.23	0.36

Conclusions

The T2-weighted sequence is the most sensitive one for describing the muscle quality (density of striated muscle fibers) of the levator ani muscle and has shown significant differences between nulliparas and primiparas with urinary incontinence. If urinary incontinence is caused by changes in levator ani muscle structure, MR imaging can objectify these changes. In contrast, urodynamic and speculum measurements did not identify the demonstrated differences in levator ani muscle signal intensity.

Comment: Since there is a 2- to 3-fold interindividual difference in levator ani muscle morphometry, the low standard deviation of the levator ani muscle signal intensity indicates a constant tissue composition in nulliparas. Primiparas, on the other hand, show birth related changes in signal intensity in the region of the levator ani and obturator internus muscles.

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SE Speights, JOL DeLancey, JA Ashton-Miller, D Howard

University of Michigan,
Ann Arbor. USA

WOMEN WITH LOCALIZED LEVATOR ANI ABNORMALITIES ON MR IMAGES AND STRESS INCONTINENCE HAVE WEAKER MUSCLES AND DECREASED PELVIC ORGAN SUPPORT

Aims of Study: The levator ani muscles (LA) are involved in pelvic organ support and urinary continence [1]. MR imaging has demonstrated localized LA abnormalities [2]. The functional status of these visibly abnormal muscles in normal women and women with stress incontinence has not been studied. This study was done to test the null hypothesis that continent and incontinent parous women with visible muscle