

DOES THE PREVALENCE OF LEVATOR ANI MUSCLE DETACHMENT DIFFER USING TOMOGRAPHIC ULTRASOUND IMAGING AT REST VERSUS MAXIMUM CONTRACTION?

Hypothesis / aims of study

The relationship between levator ani muscle detachment (LAD) and prolapse later in life has been established (1). In recent years, transperineal ultrasound (TPUS) has been used widely to assess LAD (2). A frequently used method is tomographic ultrasound imaging (TUI) (3). Although it has been suggested that images obtained during maximum pelvic floor muscle contraction (PFMC) rather than at rest improve diagnosis of LAD (2), this hypothesis has not been tested in comparative studies. We aimed to establish the correlation of LAD diagnosis using TPUS at rest and at PFMC.

Study design, materials and methods

191 primipara were seen postpartum (median 13 weeks; range 10-26). They underwent 3D/4D TPUS (GE Voluson 730 4-8MHz) at rest and at PFMC (best of three attempts) (Fig1). LAD was assessed using TUI in the plane of the minimal hiatal dimensions to try and correct for the non-Eucladian plane. Each side was scored separately. LAD was diagnosed if 2 or 3 of the central three slices were detached (Fig2). All scans were analysed by two independent investigators, blinded to clinical assessment. Any discrepancy was resolved by a third investigator. Digital palpation of LAM attachment to the pubic bone was performed using the index-finger. Pelvic organ prolapse was assessed using the validated POP-Q system. Intraclass correlation coefficient (ICC) was used to compare TPUS at rest and at PFMC. Differences between groups were analysed using Mann Whitney U.

Results

Of the 191 scans, one scan was not analysable. We analysed scans of 190 women, providing 380 results to compare. 36 LAD were found at rest and 35 LAD were found at PFMC (ICC 0.581; moderate correlation). 22 were identified both at rest and at PFMC (Table 1). TPUS at rest has a high specificity and negative predictive value but less favourable sensitivity and positive predictive value compared to TPUS during PFMC (Table 2). 14 LAD (in 12 patients) were diagnosed at rest only and 13 LAD (in 11 patients) were diagnosed at PFMC only. One patient was found to have a clear LAD on digital palpation, which was seen as LAD at PFMC, but not seen at rest. In all other discrepant ultrasound results, LAD was not felt on digital palpation. On POP-Q examination, more anterior compartment prolapse was found in women having LAD diagnosis made at PFMC only compared to rest only: Stage 1.1 vs. Stage 0.5 ($p = 0.080$). Again, more posterior compartment prolapse was found in women having LAD diagnosis made at PFMC only compared to rest only: Stage 0.6 vs. Stage 0.2 ($p = 0.072$).

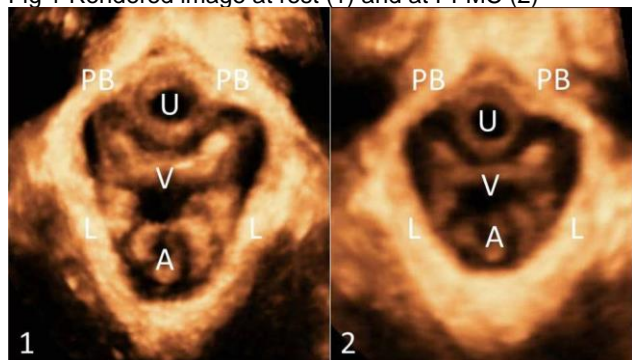
Table 1: LA morphology on transperineal ultrasound

	PFMC – LAD	PFMC – Intact	Total
Rest – LAD	22	14	36
Rest – Intact	13	331	344
Total	35	345	380

Table 2: Findings between transperineal ultrasound at rest and at PFMC

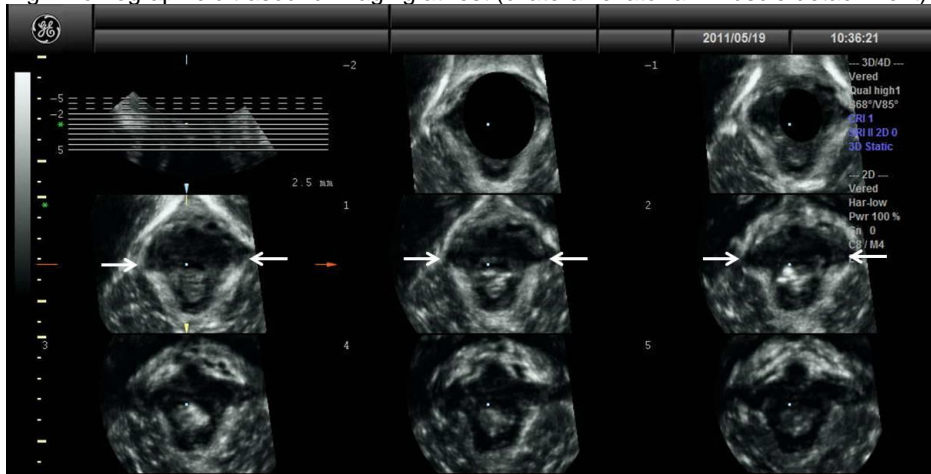
Standard vs. 'test variable'	PFMC vs. 'rest'
Sensitivity	63%
Specificity	96%
Positive predictive value	61%
Negative predictive value	96%
Overall agreement	93%

Fig 1 Rendered image at rest (1) and at PFMC (2)



PB = pubic bone, U = urethra, V = vagina, A = anal canal, L = levator ani muscle

Fig 2 Tomographic ultrasound imaging at rest (bilateral levator ani muscle detachment)



Interpretation of results

This study demonstrates that it is important to define whether LAD diagnosis was made at rest or at maximum PFMC during TPUS. TUI at rest or at PFMC are both moderately reliable techniques to diagnose LAD. By combining TPUS at rest and at maximum contraction, detection of LAD increased by 25%. The implication of our finding is that compared to at rest, identification of TPUS during PFMC may be underestimating LAD by 25%. As the sonographic appearance of LAD disappears with PFMC, it raises the question of whether this is an artefact. Furthermore, in the short term there appears to be a non-significant trend between clinically assessed prolapse using POPQ and LAD only during PFMC but not at rest. It remains to be established whether a significant relationship develops in the long term. Although this may not be as important in prospective studies such as ours where the technique is consistently maintained, it could impact on patients where such information is utilised in clinical management.

Concluding message

A quarter of levator ani muscle detachments could be missed during TPUS if images are taken only during PFMC and not at rest. On the other hand, at rest, some detachments could be over diagnosed possibly due to the nature of the pelvic floor and the non-Eucladian plane. Given its high specificity and negative predictive value there appears to be benefit in performing TPUS at rest and during PFMC. It is important to maintain consistency in technique and interpretation, particularly when implementing invasive interventions in patients.

References

1. BJOG. 2008;115:979-84
2. BJOG. 2006;113:225-30
3. Int Urogynecol J. 2011;22:699-704

Disclosures

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