258

Kashihara H[1], Shek K[2], Dietz H[2]
1. *Osaka Police Hospital,* ***2.*** *Sydney Medical School Nepean*

CAN WE IDENTIFY THE LIMITS OF THE PUBORECTALIS MUSCLE ON TOMOGRAPHIC TRANSLABIAL ULTRASOUND?

Hypothesis / aims of study

There have been several attempts at identifying levator ani subdivisions on imaging, both on magnetic resonance[1] and on endovaginal ultrasound[2]. On translabial 4D ultrasound it is not currently possible to identify levator subdivisions. However, modern transobturator tapes provide a convenient way of defining the location of the inferior margin of the obturator foramen, and therefore the limit between puborectalis and iliococcygeus muscles, the two main components of the levator ani. Any axial plane representation that does not show tape but only its acoustic shadow in the most lateral aspects of the image, i.e., close to the obturator foramen, seems very unlikely to contain puborectalis rather than iliococcygeus muscle. In order to determine the relative locations of puborectalis and iliococcygeus muscle we therefore undertook an analysis of 4D US datatsets obtained in women after suburethral sling placement.

Study design, materials and methods

This is a retrospective analysis of ultrasound data obtained in 110 women attending audit appointments after suburethral slings. Patients had undergone their procedures between July 2005 and July 2009. The postoperative assessment included an interview, clinical examination and 4D translabial ultrasound supine and after voiding, using a Voluson 730 expert system with RAB 8-4Mhz transducer, as previously described[3]. We used volumes obtained on pelvic floor muscle contraction or, if unavailable, at rest (n=5). Ultrasound analysis was performed with the help of postprocessing software (4D View V 7.0, GE Kretz Medical Ultrasound, Zipf, Austria), blinded against all pre- or postoperative clinical data. Tomographic ultrasound (TUI) was performed, with 8 slices in the axial plane, from 5 mm below to 1.25 cm above the plane of minimal hiatal dimensions (3). The levator ani muscle appears as a hyperechogenic v-shaped structure in all those slices (see Figure 1a). Hyperechogenic tape material was rated absent, present, or as producing an anechoic acoustic shadow close to the pelvic sidewall in all 8 slices, and separately for left and right. Figure 1b shows a TUI representation of a typical transobturator tape.

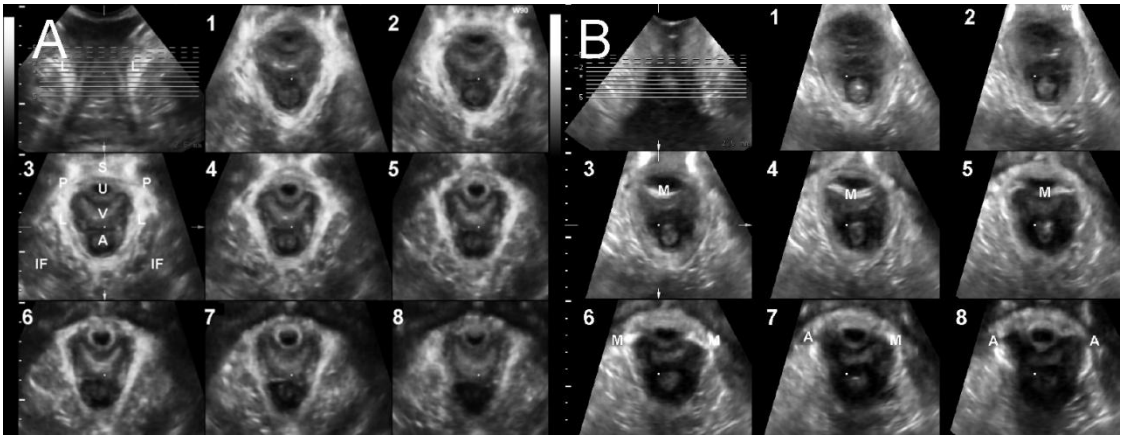

Figure 1a: Tomographic representation of a normal pelvic floor in an asymptomatic nulliparous patient. S=symphysis pubis, U= urethra, P= inferior pubic ramus, V= vagina, A= anal canal, L= levator ani, IF= ischiorectal fossa. Fig. 1b: Tomographic representation of a suburethral sling. The mesh is visible in the vagina in slices 3-5, and in the levator ani on slices 5-7. Slice 8 shows only the tape's acoustic shadow.

Results

A test- retest series in 16 patients (256 tape locations) yielded a Cohen's kappa of 0.91 (CI 0.79-1) for identification of tape or acoustic shadow close to the pelvic sidewall, signifying high repeatability. Of a total of 110 identified patients, we were able to re-analyse datasets in 102 women, with 8 patients' volume data either irretrievable due to operator or clerical error, or corrupt. All subsequently reported data relates to those 102 women. The mean age at follow-up was 57 years (27-86). Of those 102 women, 51 (50%) had concomitant prolapse procedures, the commonest a defect-specific posterior repair at 32%. The mean follow-up interval was 1.0 years (3 weeks- 4.5 years). 87% were satisfied with the outcome. 92% felt improved or cured, and for stress incontinence this was the case for 74% (cured) and 14% (improved). In 42% preoperative urge incontinence was cured, in 34% it was improved.

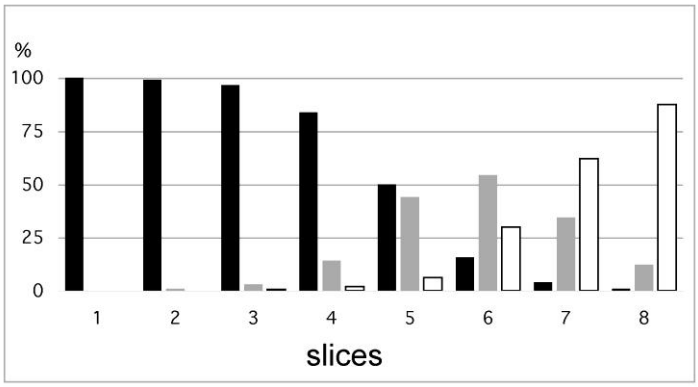

Figure 3: Location of tape/ tape acoustic shadow on TUI. The black columns signify slices without tape, the grey are slices with tape close to the pelvic sidewall. White columns signify slices with acoustic shadow traversing the levator ani/ sidewall.

TUI of the levator hiatus could be obtained in all remaining 102 cases. Three patients had to be excluded from analysis- one because of poor imaging quality, one due to a severe bilateral avulsion leaving no puborectalis in situ, and one due to possible puborectalis atrophy. On assessing tomographic data in 99 patients, the tape was located in slices 2 (n=2), 3(n=6), 4(n=28), 5(n=87), 6 (n=107), 7 (n=68), 8 (n=24). Its acoustic shadow was located in slices 3(n=1), 4(n=4), 5 (n=12), 6 (n=59), 7 (n=122) and 8 (n=172), see Figure 3.

Interpretation of results

It is currently not possible to distinguish the different components of the levator ani on translabial ultrasound. While it has been claimed that this may be possible on magnetic resonance imaging[1] and on transvaginal ultrasound imaging[2], it seems unlikely that this would apply in routine clinical practice. At any rate, for practical purposes the main issue is whether any methodology is capable of repeatably assessing the puborectalis muscle, i.e., the structure that defines the muscular part of the levator hiatus. From unpublished own work it seems clear that, on TUI, those slices that define the plane of minimal dimensions and those 2.5 and 5 mm cranial are sufficient in describing a functionally relevant avulsion of the puborectalis muscle. In this study we located transobturator tapes in standardised tomographic imaging of the hiatus and levator ani and found that slices 7 and 8 virtually always showed evidence of implant or its acoustic shadow on the pelvic sidewall (98% for slice 8 and 96% for slice 7), suggesting that those slices are located at the level of the obturator foramen. This implies that those slices do not generally contain puborectalis but iliococcygeus muscle.

Concluding message

On standardised tomographic imaging of the levator hiatus and muscle, slices located >=1cm cranial to the plane of minimal dimensions are very likely to represent iliococcygeus muscle. This implies that our current methodology of imaging the puborectalis muscle brackets this structure in its entirety in most women.

References

1. Obstet Gynecol., 2006. 107(5): 1064-9.
2. Obstet Gynecol, 2009. 114: 66-72.
3. Ultrasound Obstet Gynecol 2007. 29: 329-334.

Specify source of funding or grant	**none**
Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**the local HREC (SWAHS HREC 09/03).**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**No**