697

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DOES IT MATTER WHETHER AVULSION IS DIAGNOSED PRE- OR POSTOPERATIVELY?

Hypothesis / aims of study

Levator muscle avulsion occurs in 15-30% of primiparae (1). It is associated with pelvic organ prolapse (POP) and with prolapse recurrence after surgery (2). Avulsion is usually diagnosed on tomographic translabial ultrasound imaging(3) by assessing the insertion of the puborectalis muscle. Several authors, including this group, have used postoperatively diagnosed avulsion as a proxy for preoperative avulsion, assuming that prolapse surgery would not change appearances. This study was designed to ascertain whether this assumption is true, by comparing pelvic floor assessment for avulsion in pre- and postoperative volume imaging data sets.

Study design, materials and methods

This is a retrospective study on 207 patients seen in a tertiary urogynaecology unit before and after prolapse surgery. All underwent a standardised interview, clinical assessment (ICS POP-Q), and 3D/4D transperineal ultrasound (using GE Kretz Voluson 730 expert and Voluson I systems with RAB 8-4 Mhz transducers). The same assessment was repeated postoperatively. Inclusion criterion was any form of POP surgery during the inclusion period between February 2007 and November 2011, with both pre- and postoperative volume data sets available.

Offline analysis of volume datasets was performed blinded against all clinical data, by a single observer at a later date using the software GE Kretz 4D View v 10.0. In order to diagnose avulsion we determined the axial plane of minimal hiatal dimensions in a volume obtained on pelvic floor muscle contraction and assessed this plane and two planes 2.5 and 5 mm cranial to the first. If all three slices showed abnormal insertions and a levator urethra gap or LUG (3) of 2.5 cm or more on one side, we diagnosed an avulsion. We then tested agreement between pre- and postoperative diagnoses by determining kappa values for single slices and for the overall diagnosis. In addition we validated both pre- and postoperative diagnoses against a history of Forceps delivery and prolapse recurrence, both of which are commonly found to be associated with avulsion. Statistical analysis was performed using SPSS V16. We did not perform power calculations due to the absence of pilot data.

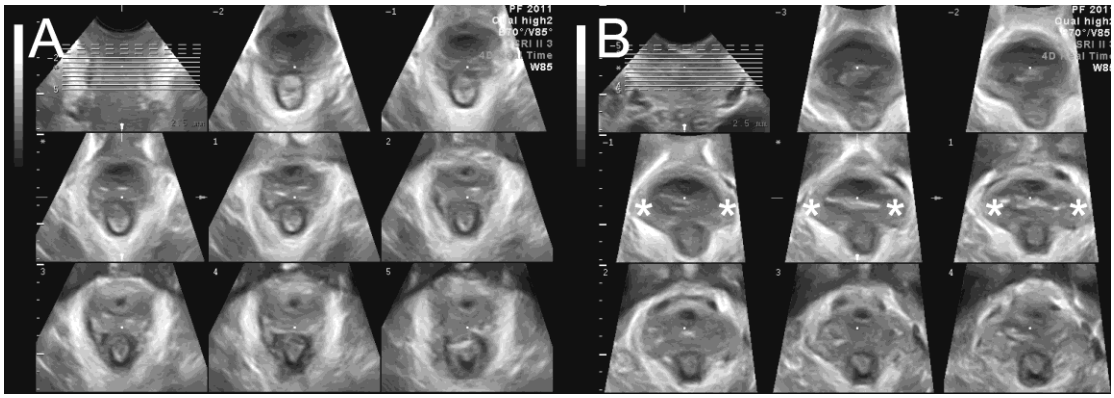

Figure: Tomographic imaging of the pelvic floor. The left hand set of images (A) shows an intact muscle, the right set (B) a complete bilateral avulsion. An avulsion is diagnosed if there is an abnormal insertion of the muscle (indicated by *) on the inferior pubic ramus in at least the three central slices, ie., the slices obtained at the plane of minimal hiatal dimensions and two slices obtained 2.5 and 5 mm cranial to the former.

Results

Two hundred and forty patients underwent prolapse surgery during the inclusion period. Minimum time from surgery to eligible follow up visit was 3 months. There were 32 missing ultrasound volumes, and one patient was lost to follow up, leaving 207 for analysis. Mean age was 59 ± 11.8, median parity 3 ± 1.4, and body mass index 29.7 ± 5.8. Of those 207 patients, 205 (99%) were vaginally parous, 56 (27.1%) had had a vaginal operative delivery. Preoperativey, 174 (84.1%) complained of symptoms of prolapse. The remainder was operated for rectocele or recto- enterocele due to symptoms of obstructed defecation. Objective assessment showed a stage 2 prolape or worse on ICS POP-Q assessment in all patients. It was a cystocele in 155, central compartment prolapse in 73 and prolapse of the posterior compartment in 156. The procedures performed included vaginal hysterectomy (n=56), anterior fascial repair without mesh (n=95), anterior compartment mesh (Perigee n=52, elevate n=5, Uphold n=4), defect specific posterior repair (n=149), sacrospinous fixation (n=94) and suburethral slings (Monarc n=107, TVT n=7). Mean follow up was 1.3 years (0.2-5.5). Post-operatively 82.1% of patients were satisfied and 87.9% felt improved or cured as regards their prolapse.

Levator avulsion was diagnosed using TUI in 111 (53.6%) patients pre-operatively and 109 (52.7%) patients post-operatively, with both assessments blinded against each other. The kappa value for the association between pre-operative and post-operative diagnosis on TUI was 0.864 (95% CI 0.796-0.933). The kappa for single slice agreement was 0.646. In order to validate both pre- and postoperative diagnosis, we ascertained the association with vaginal operative delivery and with prolapse recurrence, both of which are commonly associated with avulsion. The odds ratio of avulsion after forceps delivery was 2.5 (1.3- 5.1) for the preoperative and 2.4 (1.2- 4.8) for the postoperative diagnosis. The odds ratio for prolapse recurrence was 2.5 (1.3-4.5) for the preoperative and 2.3 (1.3- 4.2) for the postoperative diagnosis.

Interpretation of results

The diagnosis of levator avulsion by tomographic translabial ultrasound imaging can equally be performed before and after prolapse surgery. Such surgery seems to have no effect on the visibility or prevalence of such defects, that is, there was no systematic error, and validity as tested by its association with vaginal operative delivery and prolapse recurrence was similar. The association between pre- and postoperative findings was so high that discrepancies can be explained by the innate intra-observer variation of the method.

Concluding message

Our results show that the postoperative diagnosis of avulsion by tomographic ultrasound imaging can be used as a proxy for the preoperative state of the pelvic floor. Hence, avulsion can be identified postoperatively and used for subgroup analysis in prospective surgical intervention trials to define a high- risk group of patients.

References

1. Aust NZ J Obstet Gynecol 2013; 53: 220–230
2. Int Urogynecol J 2011; 22: 1085-1097
3. Int Urogynecol J 2011; 22: 699-705

Disclosures

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