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ANAL SPHINCTER TRAUMA AND FECAL INCONTINENCE IN UROGYNECOLOGICAL PATIENTS.

Hypothesis / aims of study

Obstetric anal sphincter injuries (OASIS) are a well known risk factor for fecal incontinence (FI) in women. It may be much more common than previously assumed (1). OASIS approximately doubles the risk of FI six months after a first delivery, but long-term outcomes are less well defined, although a higher prevalence of anal incontinence is very likely. Ultrasound findings may be related to the severity of fecal incontinence, but studies to date have been limited by small numbers and short-term follow up (2-3).

The aim of our study was to determine the prevalence of residual evidence of past OASIS in a large cohort of urogynaecological women and determine its association with fecal incontinence. It has been proposed that significant EAS trauma should be diagnosed if defects are found in 2/3 of the length of the EAS. To validate this proposal we aimed to define minimal criteria for the diagnosis of significant external and internal sphincter trauma as a predictor of FI. We used translabial 4D ultrasound (1) as a novel, non-invasive technique to diagnose significant trauma of the anal sphincter complex.

Study design, materials and methods

This is a retrospective study including all patients attending a tertiary urogynecological unit between March 2012 and April 2013. All patient underwent routine clinical investigation with a standardised interview and St. Mark's score in women complaining of FI. In addition, they had a clinical examination including ICS POP-Q, and 3D/4D translabial ultrasound (US) using a GE Kretz Voluson 730 Expert system as previously described. US was performed supine and after voiding on maximal Valsalva, and on pelvic floor muscle contraction (PFMC). Archived US volumes were analysed by the first outhor, who was blinded to clinical findings. 4D View v10 (GE Kretz Medizintechnik) was used for postprocesing analysis.

Tomographic Ultrasound Imaging (TUI) was used to evaluate external and internal anal sphincter trauma on PFMC. On TUI a set of 8 slices was obtained. We bracketed the entire external anal sphincter (EAS) by placing one slice cranial to the EAS (at the level of the m. puborectalis) and another caudal to the internal anal sphincter (IAS) at the level of the anal verge, with variable interslice interval depending on the length of the EAS, leaving 6 slices to demonstrate the entire muscle (Figure 1A). The IAS was assessed similarly, with the first slice placed cranial to the IAS (at the level of the ano-rectal junction) and the most distal slice placed at the level of the subcutaneous portion of the EAS (Figure 1B). Interslice intervals were adjusted as necessary. Individual slices were rated as positive if there was a defect of >=30 degrees of EAS and IAS circumference. Statistical analysis was carried out with SAS v 9.3. Univariate and multivariate modelling was undertaken using logistic regression techniques. $P < 0.05$ was considered statistically significant. We did not perform power calculations due to the absence of pilot data and the retrospective nature of this research.

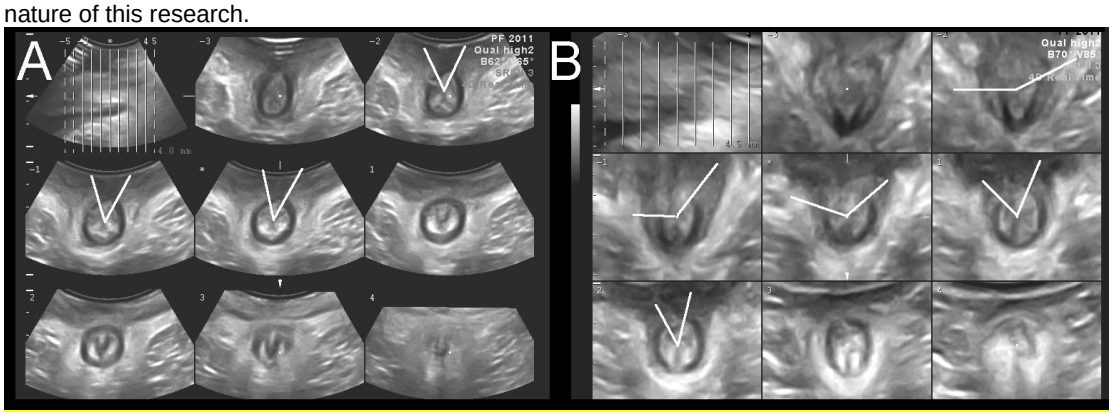

Figure 1: Assessment of EAS and IAS by translabial 4D tomographic ultrasound. (A) shows a partial EAS defect (3/6 slices of EAS length), (B) an IAS defect in 5/6 slices arranged over the entire anal canal. Note that a much higher interslice interval is required for IAS imaging.

Results:

A test re-test series was carried out on 20 patients to assess agreement between observers, showing good repeatability of the sonographic TUI diagnosis of EAS and IAS single slice defects (Cohen's kappa, 0.72 and 0.68 respectively).

543 women had been seen during the inclusion period. Ultrasound volumes were missing in 19 patients, and in 23 patients the volume datasets were insufficient in quality for assessment. Therefore, 501 datasets were included for analysis.

Mean age was 55.8 (18.4-87.4), mean BMI was 28.8 (± 5.9), mean parity was 2.5 (0-9). 435 (87%) were vaginally parous, 129 (26%) had had an operative vaginal delivery. 137 (27%) had a previous hysterectomy and 113 (23%) previous surgery for POP or incontinence. 260 (52%) patients suffered from symptoms of prolapse, 362 (72%) of stress incontinence, 354(71%) of urge incontinence, 181 (36%) of symptoms of voiding dysfunction, 132 (26%) from constipation and 318(63%) of obstructed defecation symptoms. FI was reported by 69 (14%) patients at a median St. Marks' score of 10 (IQR 7-14).

On TUI analysis of the sphincter complex, 6 slices were scored for both EAS and IAS, resulting in 6,012 assessments in total. We diagnosed significant abnormalities of the EAS in any slice in 272 (54%) women, and of the IAS in 274 (55%) women. In 88 (18%) women such defects were found in 4+ EAS slices; the same was the case in 59 (12%) women for the IAS.

Table 1 shows the results of logistic regression analysis performed to establish minimal sonographic criteria for the diagnosis of significant sphincter trauma. Optimal prediction of FI was achieved by a model including 4 positive EAS slices. IAS defects were

less likely to be associated with FI. In a multivariate model controlling for age and internal sphincter trauma, the presence of 4+ abnormal slices gave an 18 fold increase in the risk of FI compared to those with less than 4 abnormal slices (95% CI: 9-36, p<0.0001). This model yielded an AUC statistic of 0.86 (95% CI: 0.80-0.92). Using this cut-off for the sonographic diagnosis of 'significant EAS trauma', the likelihood of a false positive diagnosis seems very low as such a degree of abnormality was observed in only one out of 66 vaginally nulliparous patients.

Effect of abnormal versus normal slices				
Total Number of abnormal slices	***Model A: External Anal Sphincter***		***Model B: Internal Anal Sphincter***	
	OR (95% CI)	*P value*	*OR (95% CI)*	*P value*
0	1 (reference)	<0.0001	1 (reference)	<0.0001
1	2.9 (0.8 - 11.3)		0.14 (0.0 – 1.0)	
2	5.2 (1.7 - 16.1)		(Not measurable)	
3	1.4 (0.2 – 16.1)		5.8 (2.7 – 12.2)	
4	41.6 (14.8 – 117.1)		11.8 (5.6 - 24.5)	
5	134.4 (31.9 – 565.7)		6.9 (1.8 – 26.5)	
6	89.6 (23.9 – 335.8)		10.3 (0.6 – 171.8)	

Table 1: Result of logistic regression modelling of the risk of FI in two models for (a) external and (b) internal anal sphincter findings on tomographic ultrasound imaging (n=501).

Interpretation of results:

In this large series of women seen at a urogynecology clinic, we found a high prevalence of both FI (14%) and EAS/ IAS abnormalities. Logistic regression modeling suggests that 4/6 EAS slices should be required to be abnormal for the diagnosis of 'significant EAS trauma', with an odds ratio of over 18 for FI in such women. 'Significant EAS trauma' was seen in 88 (18%) patients, and it was highly significantly associated with FI (p <0.0001). The association between IAS abnormalities and FI was much weaker and more difficult to interpret.

Concluding message:

Both FI and 'significant EAS trauma' are common in urogynaecological patients, and strongly associated with each other. In fact, significant EAS trauma seems to explain most fecal incontinence in our patients. Abnormalities of the IAS seem to be of lesser importance. In addition, our data strongly supports defects in 4/6 slices as minimal criterion for the diagnosis of 'significant EAS trauma'.

References

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Disclosures

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