

## THE ASSOCIATION BETWEEN INDIVIDUAL COMPONENTS OF THE ST. MARK'S INCONTINENCE SCORE AND SONOGRAPHIC ANAL SPHINCTER DEFECTS

### Hypothesis / aims of study

Anal incontinence (AI) or involuntary loss of mucus, fluid, gas and solid / liquid stool, is a socially and functionally debilitating condition, affecting 2-24% of women. The aetiology is multifactorial, but obstetric anal sphincter injury (OASI) plays a major role.(1) The severity of AI can be assessed by St Marks Incontinence Score (SMIS) which includes information on incontinence to solid and liquid stool, gas, lifestyle modification, faecal urgency, pad and constipating medication use. It is an objective and valid tool for the purpose.(2) The degree of bother from symptoms of AI can be quantified by visual analog scale (VAS). Transperineal tomographic ultrasound (TPUS) allows assessment of the anatomical integrity of the external anal sphincter (EAS).(3) We aimed to determine the association between SMIS/ SMIS components and EAS integrity on TPUS, and correlations with VAS bother.

### Study design, materials and methods

This is a retrospective analysis involving 518 women seen in a tertiary urogynaecological unit for lower urinary tract and pelvic floor dysfunction from 5/13 to 8/14. All women underwent a standardised assessment including clinical history, examination and TPUS using 4D capable systems, stored in the form of volume data sets obtained on pelvic floor muscle contraction. SMIS was obtained in women who responded 'yes' to the question: "Do you experience leakage from the back passage / anus". The SMIS quantifies anal incontinence with a score from 0 to 4 for individual components, rating prevalence of incontinence as 'never' (score 0), 'rarely' (1), 'sometimes' (2), 'weekly' (3) and 'daily' (4). Bother was assessed by VAS using a validated, non-segmented, continuous scale indicating bother from 'none' to 'worst imaginable.' Responses were noted to the nearest millimetre. SMIS and bother were assumed to be zero in those without AI. Stored US volume datasets were analysed for EAS integrity, at a later date, blinded against all clinical data. A 'significant' residual defect is defined as the presence of a defect of  $\geq 30^\circ$  in EAS circumference in at least 4/6 slices on tomographic ultrasound imaging (TUI), encompassing the entire EAS (Figure 1). Spearman correlation coefficient was calculated to assess correlation between SMIS and VAS. Non-normally distributed continuous data were analysed using the Mann-Whitney U test. Categorical data was analysed using Chi-square tests. A  $P < 0.05$  was considered statistically significant.

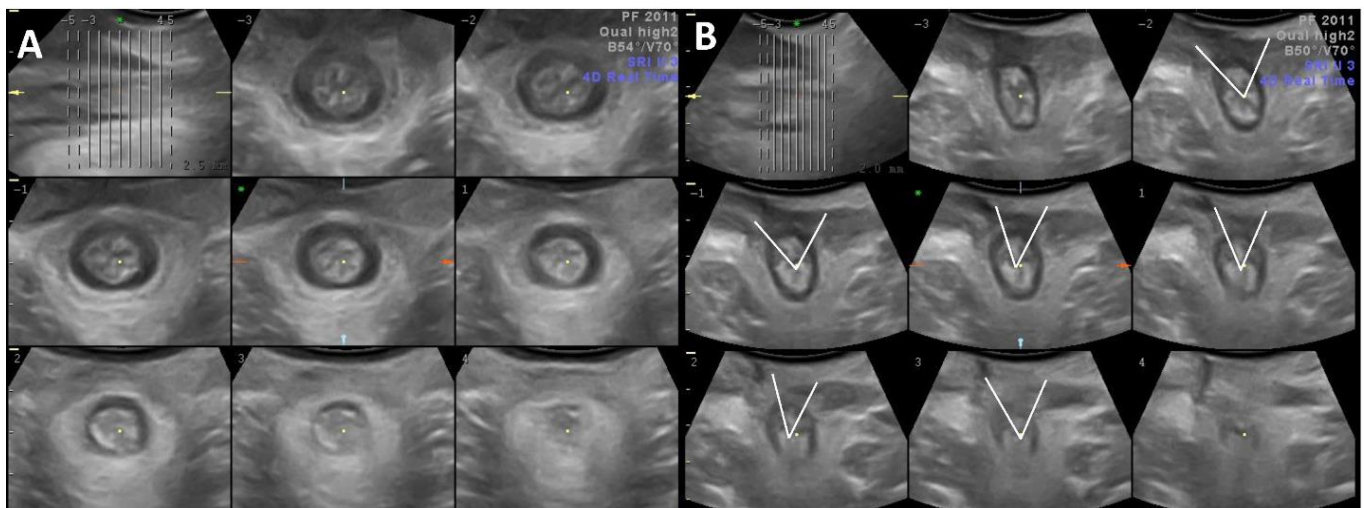


Figure 1 : Transperineal tomographic imaging of an intact / normal EAS (A) and a significant residual defect of the EAS (B). The angled lines show defect location and size.

### Results

Of 518 women seen during the inclusion period, 30 were excluded due to missing US volumes and two due to missing SMIS data, leaving 486. Subsequent results pertain to these 486 women, unless otherwise stated. Mean age was 57.1 (SD 13.4, range 17.1-89.1) years with a mean Body Mass Index of 29.1 (SD 6.6, range 16.3-58.8) kg/m<sup>2</sup>. 71.4% (n=347) were postmenopausal. Median parity was 3 (IQR 2-3, range 0-9) and 93.4% (n=453) were vaginally parous with a mean age at first delivery of 24.0 (SD 4.9, range 15-39) years. A history of forceps delivery, hysterectomy and incontinence / prolapse surgery was given in 23% (n=111), 33.1% (n=161) and 12.8% (n=62), respectively. 17% (n=83) complained of AI at a median bother of 4.4 (IQR 2.4-7.7, range 0.5-10) and a mean SMIS of 11.4 (SD 5.4, range 1-24). Of these women, 67% (n=56), 82% (n=68) and 81% (n=67) had incontinence to solid, liquid stool and flatus respectively, at a median score of 1 (IQR 0-1), 2 (IQR 0-1) and 2 (IQR 1-4). Lifestyle was affected in 67% (n=56), with 36% (n=30) having to wear pad / anal plug and 19% (n=16) taking constipating drugs. 65% (n=54) suffered from faecal urgency at a median score of 4 (IQR 0-4). SMIS was strongly correlated to VAS (Spearman  $r=0.523$ ,  $P < 0.001$ ). Associations of individual SMIS components and VAS are shown in Table 1.

	<b>Bother (VAS) Median (IQR)</b>	<b>P- value</b>
<b>Incontinence to solid (n=56)</b>	4.6 (2.5-7.9) vs 3.8 (2.2-7.8)	0.53
<b>Incontinence to liquid (n=68)</b>	4.9 (2.5-7.9) vs 2.6 (1.9-6.8)	0.09
<b>Incontinence to gas (n=67)</b>	4.6 (2.2-8.0) vs 2.9 (2.5-6.5)	0.46
<b>Impact on lifestyle (n=56)</b>	5.0 (2.9-8.2) vs 2.7 (1.7-4.3)	0.002
<b>Use of pad / plug (n=30)</b>	6.9 (4.6-10.0) vs 2.9 (1.9-5.0)	<0.001
<b>Constipating medicine (n=16)</b>	5.0 (3.1-9.5) vs 4.3 (2.2-7.5)	0.19
<b>Faecal urgency (n=54)</b>	4.9 (2.6-8.5) vs 3.2 (2.0-5.9)	0.05

**Table 1 :** The association between individual components of SMIS and bother from AI (VAS) by Mann-Whitney U test in those symptomatic for AI (n=83).

On TUI, significant residual defects of the EAS were diagnosed in 15.2% (n=74/486) overall, or 23% (n=19/83) of symptomatic women. On univariate analysis, the complaint of AI and the numerical SMI score were both associated with significant residual defects of the EAS (P=0.03, OR 1.88, 95%CI 1.05-3.37) and (P=0.04, Z= -2.08) respectively. Of the individual components of SMIS, only 'impact on lifestyle' was associated with significant EAS defect, see Table 2.

	<b>EAS defect</b>		<b>OR (95% CI)</b>	<b>*P</b>	<b>#P</b>
	<b>0 (n=412)</b>	<b>1 (n=74)</b>			
<b>Incontinence to solid (n=56)</b>	43 (10%)	13 (18%)	1.83 (0.93-3.60)	0.08	0.06
<b>Incontinence to liquid (n=68)</b>	56 (14%)	12 (16%)	1.23 (0.62-2.43)	0.55	0.59
<b>Incontinence to gas (n=67)</b>	52 (13%)	15 (20%)	1.76 (0.93-3.33)	0.08	0.08
<b>Impact on lifestyle (n=56)</b>	41 (10%)	15 (20%)	2.30 (1.20-4.42)	0.01	0.02
<b>Use of pad / plug (n=30)</b>	23 (6%)	7 (10%)	1.77 (0.73-4.28)	0.20	0.17
<b>Constipating medicine (n=16)</b>	12 (3%)	4 (5%)	1.91 (0.60-6.07)	0.27	0.21
<b>Faecal urgency (n=54)</b>	42 (10%)	12 (16%)	1.71 (0.85-3.42)	0.13	0.13

**Table 2 :** Association between individual SMIS components and sonographically determined significant EAS defects. \*Chi-square test for EAS status vs. AI symptoms (presence/ absence). #Mann-U Whitney test for median individual SMIS score between groups (N=486)

#### Interpretation of results

Individual components of the St Mark's Incontinence score are associated with bother of AI as quantified by VAS, but the strength of this association seems to vary. Only impact on lifestyle, fecal urgency and use of pad/plug reached significance. SMIS and SMIS components are also associated with sonographically diagnosed EAS defect, but only lifestyle impact reached significance. This may be due to power issues attributable to the low prevalence of AI in our population.

#### Concluding message

Patients' bother from AI is strongly associated with its impact on lifestyle as quantified by individual SMIS components. SMI score and lifestyle impact are associated with significant residual defects of the EAS as diagnosed by translabial ultrasound.

#### References

1. Gastroenterology 2009;137(2):512-7, 7 e1-2.
2. Gut. 1999;44(1):77-80.
3. Ultrasound Obstet Gynecol 2013;42(4):461-6.

#### Disclosures

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