

SHORT COMMUNICATION

Assessment of third degree tears using three-dimensional anal endosonography with combined anal manometry: a novel technique

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Three-dimensional anal endosonography has enabled sagittal and coronal reconstructions of the anal canal to be matched with longitudinal pressure data, to present a combined picture of structure and function. This novel technique has been applied to a group of women with a clinical diagnosis of a third degree tear. Endosonography showed that only 68% of women had ultrasound evidence of sphincter damage. Anal canal anatomy and pressure profile did not differ significantly between those with and those without sphincter damage, but the anterior external anal sphincter and the puborectalis tended to be shorter and the pressures were lower in those with sphincter disruption.

Introduction

A third degree tear, defined as a perineal tear extending into the striated muscle of the external anal sphincter, has been reported in about 1% of vaginal deliveries^{1–3}. The recent development of three-dimensional anal endosonography⁴ allows multi-planar reconstruction of the anal canal, so that sagittal images may be combined with longitudinal pressure measurements, and structure may be compared directly to function⁵. The purpose of this study was to relate the longitudinal profile manometry to the endosonographic findings in a group of women with a clinical history of external sphincter trauma.

Methods

Of the 104 third degree tears with primary repair recorded in the delivery unit during 1998 (incidence of 1.8%), 62 (60%) could be contacted, and 19 agreed to take part in the study. Written informed consent was obtained after full ethical approval had been granted. Each woman had longitudinal profile manometry of the anal canal, three-dimensional anal endosonography and assessment of faecal

incontinence using the St Mark's faecal incontinence questionnaire⁶ (Table 1).

Anal manometry was performed using a water-perfused (0.5 mL/minute), radially arranged, eight-channel catheter and the mean maximal incremental squeeze pressure recorded at 0.5 cm intervals starting at 6 cm from the anal verge, with pressures averaged at each position⁵. Three-dimensional endo-anal ultrasound was performed using a B & K Medical (Sandhoften, Denmark) ultrasound scanner type 3535 with a 10 MHz rotating rectal probe⁴. External anal sphincter trauma was assessed separately by two observers (ABW & CIB), with the images then reviewed jointly to achieve consensus. Scans were classified as having no evidence of previous trauma, minimal scarring with close apposition of the external sphincter demarcating the site of repair and a defined defect in the external sphincter due to scarring in a persistent tear.

Sagittal endosonographic reconstructions of the anal canal were combined with the pressure data, using the anal verge as a common reference point. The lengths of the anterior external anal sphincter and the puborectalis were measured in the mid-sagittal plane, and the anal canal anatomy was related to the pressure profile and continence data.

Results

Of the 19 women studied, six (32%) had no evidence of external anal sphincter trauma on endosonography, nine (47%) had an external anal sphincter defect and four (21%) had endosonographic evidence of external anal sphincter scarring but no defect. Most of the tears were between 10 and 12 o'clock, with a median of two hours and a maximum of five hours. The age of the women with and

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Table 1. The scoring system for the 28-day diary kept by the patient⁶.

Frequency of incontinence to	Never	<1/12	<1/52	<1/7	Daily
Solids	0	1	2	3	4
Liquids	0	1	2	3	4
Gas	0	1	2	3	4
Change of lifestyle	0	1	2	3	4
Need to wear pad +2					
Need to take constipating medication +2					
Unable to defer defaecation +4					

without sphincter trauma was similar (mean 34 years [SD 4]). There was disagreement as to the *presence* of an internal sphincter defect in one case (Kappa 0.77), and an initial disagreement in the *classification* of the external sphincter in three cases (Kappa 0.68).

There was no difference in the incontinence scores between women without external anal sphincter trauma [median 4 (range 1–18)], and those with either a defect or scarring [median 5 (range 0–13), $P = 0.95$ Mann–Whitney U testing]. The overall maximum squeeze pressure was lower in women with sphincter trauma (mean 47 cm/H₂O [SD 21]), compared with those without (mean 55 cm/H₂O [SD 33]), although within the sample size, this was not significant ($P = 0.55$).

The longitudinal pressure profile for both groups is shown in Fig. 1. There was no difference between the pressure profiles of women with (Fig. 2) or without endosonographic evidence of sphincter trauma. The women with sphincter

damage tended to have shorter anterior external anal sphincters (mean 16 mm [SD 5 mm]) *vs* (18 mm [SD 5 mm]) and puborectalis muscles (23 mm [3 mm]) *vs* (25 mm [SD 5 mm]) although neither difference achieved significance.

Discussion

This study was designed to determine the value of assessing anal sphincter tears using a combination of three-dimensional endo-anal ultrasound and a pressure profile manometry in a group of women who had suffered a third degree tear during vaginal delivery. Surprisingly, only 68% were found to have endosonographic evidence of an external sphincter tear or repair.

There could be several reasons for this. Third degree tears are not always recognised⁷, however, our study suggests over-, rather than underdiagnosis. Repairs may have aligned the sphincters so well as to leave no residual deformity detectable on ultrasound. This is unlikely, as the converse has been shown for primary repair⁸.

Any self-selection by the group would be expected to favour women who were symptomatic, and perhaps more likely to have significant residual tears. However, incontinence scores in this study were similar to five women in a prospective longitudinal study⁹ who had an endosonographically confirmed external sphincter tear, where the pre-delivery continence score of 1 changed to a postpartum score of 4. Women who did not sustain trauma in this study

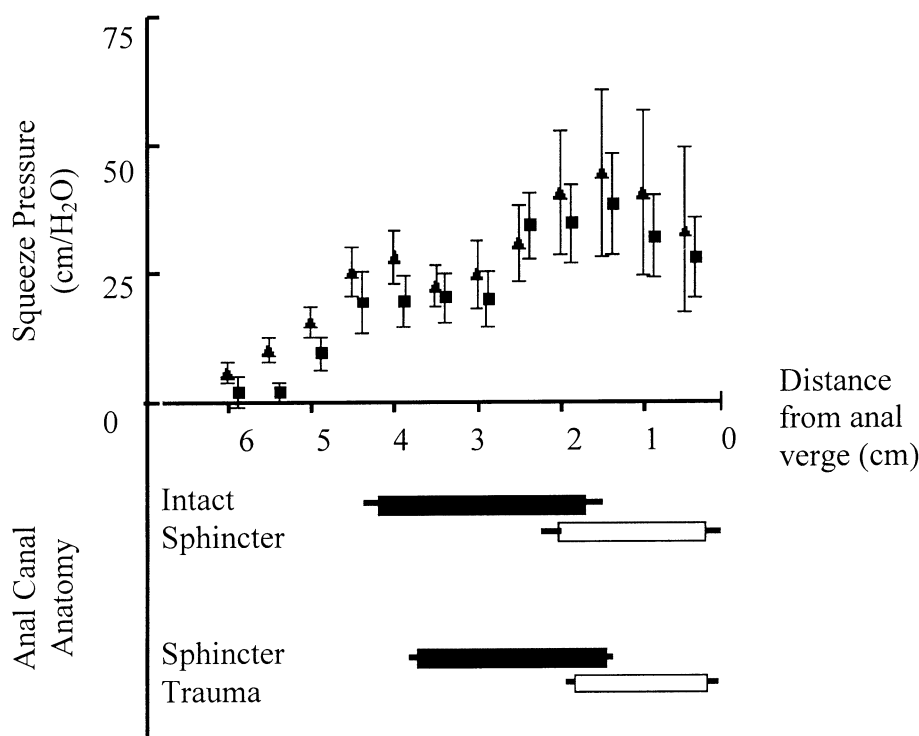


Fig. 1. Plot of anal canal squeeze pressures in women with (■) and without (▲) endosonographic evidence of external anal sphincter damage, combined with details of anal canal anatomy (■ = puborectalis, □ = external anal sphincter). All pressures and lengths are mean with SEM.

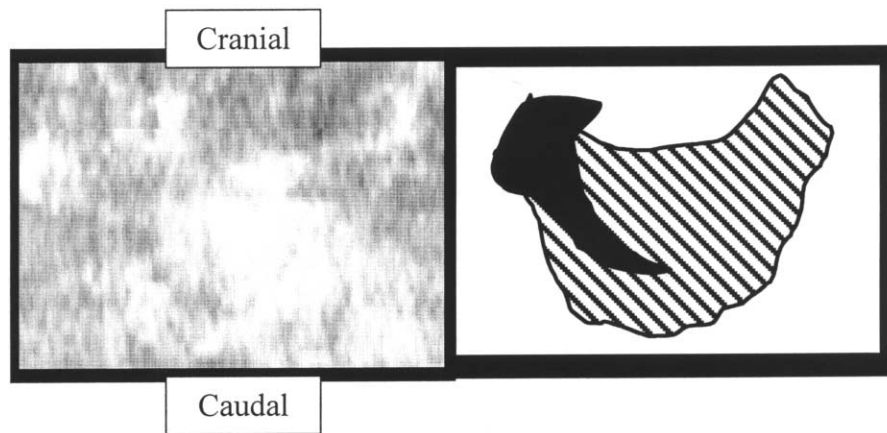


Fig. 2. Coronal anal endosonography showing a third degree tear. The left-hand image is a coronal scan taken through the anterior part of the external anal sphincter. The right-hand picture depicts the anatomy of the external anal sphincter (hatched); the scar (black fill in) is seen to traverse the sphincter.

had a minimal change of score after vaginal delivery (median score pre-delivery 1, to median post-delivery 1).

No observer-based test is completely reliable. Endosonography has been well researched, achieving 100% accuracy for the diagnosis of external sphincter tears in a study of 12 patients in whom the final arbiter was histology following sphincter repair¹⁰. The Kappa value of 0.68 in this study confirmed good inter-observer agreement. Undoubtedly, assessment of the external sphincter was complicated by the presence of a primary repair. The incidence of occult sphincter trauma, where there is no clinical evidence of a tear, remains debatable and obviously depends on obstetric practice, such as the incidence of forceps-assisted delivery. An initial report suggested an incidence of 35% in primiparous deliveries¹¹, but more recent work⁹ indicates a lower figure of 11% with 18% having tears of the puboanalis or transverse perineii. These structures have been defined endosonographically only recently, and may previously have been considered as external sphincter tears.

It is most interesting that those women with endosonographic evidence of external anal sphincter damage had similar, although slightly lower, pressure profiles to those without trauma. One might conclude that this simply reflects the functional adequacy of primary repair. Another viewpoint could be that although the accuracy of diagnosis was questionable, a third degree tear as diagnosed clinically was a marker of traumatic delivery. This involves not only the sphincter, but also its nerve supply to a variable degree, and that the latter was sufficient to mask a significant functional difference based purely on endosonographic appearances.

This study has demonstrated the feasibility of combining pressure profile manometry with three-dimensional anal endosonography. The exact clinical diagnosis and functional significance of a third degree tear remains uncertain, especially in the light of the above findings. However, the

clinical diagnosis does imply functional damage, although the combined manometry and endosonography has not isolated the sphincteric component.

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