

# Obstetric anal sphincter injury ten years after: subjective and objective long term effects

Eva Uustal Fornell,<sup>a</sup> Leif Matthiesen,<sup>a</sup> Rune Sjødahl,<sup>b</sup> Göran Berg<sup>a</sup>

**Objective** To establish the long term effects of obstetric anal sphincter rupture.

**Design** Prospective observational study.

**Setting** University hospital in Sweden.

**Population** Eighty-two women from a prospective study from 1990 to compare anorectal function after third degree tear.

**Methods** Women completed a structured questionnaire, underwent a clinical examination and anorectal manometry, endoanal ultrasound (EAUSG) with perineal body measurement.

**Main outcome measures** Symptoms of anal incontinence, sexual symptoms, anal manometry scores and evidence of sphincter damage on EAUSG.

**Results** Five women had undergone secondary repair and three were lost to follow up. Fifty-one women (80%) completed the questionnaire. Twenty-six out of 46 (57%) of the original study group and 6/28 (20%) of the original controls were examined. Incontinence to flatus and liquid stool was more severe in the study group than in controls. Flatus incontinence was significantly more pronounced among women with subsequent vaginal deliveries. Mean maximal anal squeeze pressures were 69 mmHg in the partial rupture group and 42 mmHg in the complete rupture group ( $P = 0.04$ ). Study group women with signs of internal sphincter injury reported more pronounced faecal incontinence and had lower anal resting pressures (24 mmHg) than those with intact internal sphincters (40 mmHg) ( $P = 0.01$ ). Perineal body thickness of less than 10 mm was associated with incontinence for flatus and liquid stools, less lubrication during sex and lower anal squeeze pressures (58 mmHg vs 89 mmHg,  $P = 0.04$ ).

**Conclusions** Subjective and objective anal function after anal sphincter injury deteriorates further over time and with subsequent vaginal deliveries. Thin perineal body and internal sphincter injury seem to be important for continence and anal pressure.

## INTRODUCTION

Obstetric anal sphincter injury occurs after 2–6% of all vaginal deliveries.<sup>1–8</sup> In a prospective study conducted in 1990, we found that as many as 40% of the affected women reported problems with faecal incontinence six months after delivery.<sup>1</sup> In recent years, a number of studies have shown similar results.<sup>1–8</sup> The natural history of anal incontinence after anal sphincter rupture is not known. The few studies on longer term effects of anal sphincter injury have methodological problems as they are not prospective in their design.<sup>5,9,10</sup>

In this study, we have re-examined a group of women who, 10 years previously, participated in a clinical study of the consequences of anal sphincter damage during vaginal delivery.<sup>1</sup>

Our aims were to establish how continence for urine, flatus and faeces, and anal sphincter pressures change over time and the effect of subsequent deliveries. Endoanal ultrasound examination, not available to us at the time of the first study, was added to elucidate sphincter morphology and perineal body thickness.<sup>8</sup>

## METHODS

In 1990 and 1991, we studied 51 women with (study group) and 31 women without (control group) anal sphincter injury after vaginal delivery.<sup>1</sup> Eleven (21.5%) women had a complete anal sphincter tear, and 40 (78.5%) a partial tear. They were clinically examined at three days, six weeks and six months after delivery. At six months they also underwent anorectal manometry. The women answered a questionnaire about social, psychological and sexual dimensions of life as well as questions about

<sup>a</sup>Department of Molecular and Clinical Medicine, Division of Obstetrics and Gynecology, University Hospital, Linköping, Sweden

<sup>b</sup>Department of Surgery, Faculty of Health Sciences, University Hospital, Linköping, Sweden

**Correspondence:** Dr E. U. Fornell, Department of Molecular and Clinical Medicine, Division of Obstetrics and Gynecology, Faculty of Health Sciences, University Hospital, S-581 85 Linköping, Sweden.

**Table 1.** Severity scores for faecal incontinence. Questionnaire scores are presented as median (range): 1 = severe problems and 6 = no problems.

	Study group (type of tear)		Control group (n = 19)	P*
	Partial (n = 33)	Complete (n = 7)		
Flatus incontinence	4 (1–6)	2 (1–4)	5 (3–6)	0.0001
Incontinence to liquid stool	4 (1–4)	2 (1–6)	6 (2–6)	0.01
Incontinence to solid stool	6 (3–6)	6 (2–6)	6 (4–6)	0.46

\* Comparison by Kruskal–Wallis test.

incontinence. The questions were derived from clinical experience, but not formally validated, because techniques for validation were not widely known or used in clinical research in 1990. Each statement was completed by the woman choosing a number between one (severe problems) and six (no problems).

Ten years later in 2000 and 2001, we contacted the women again and asked them to participate in a follow up study. The same questionnaire as in the original study was distributed by mail with a reminder after one month. A hospital visit was offered where anorectal manometry, endoanal ultrasound as well as gynaecological examination were performed. Questionnaire answers were checked for reproducibility against patient history for each patient who attended.

At the visit, one specialist nurse performed anorectal manometry<sup>11</sup> on all women in the left lateral position using a 1.7-mm diameter microtransducer (Honeywell MTC P. Honeywell Inc. Minneapolis, Minnesota, USA) connected to an amplifier (Lectromed HDA 12/15) and a pen recorder (Flatbed L6010/6510, Lectromed, St Peter, Jersey, Channel Islands, UK). The catheter was introduced into the rectum and the resting and squeeze pressures were recorded at defined distances from the anal verge. The maximal squeeze pressure was defined as the highest recorded pressure found in the anal canal.

Ultrasound images and clinical signs were recorded before the patient history was collected. Endoanal ultrasound images were recorded on a Cheetah 2003 machine with a 360° rotating rectal transducer 8539 (B-K Medical Ab, Hägersten, Sweden) at three levels with the patient in a half-sitting dorsal lithotomy position. Perineal body thickness was measured between the probe and the echo of the examiner's finger being applied without pressure to the distal posterior vaginal wall. Perineal body

thickness was defined as the distance between the probe and the finger-echo.<sup>12</sup>

Ultrasound images of the external and internal anal sphincters were classified subjectively as intact or damaged according to whether there was any visible hypoechoic gap or splaying of the muscle fibres. Gynaecological examination with speculae and palpation followed. For statistical analysis, two-sample *t* test, Mann–Whitney and Kruskal–Wallis tests were used as appropriate. A 5% level of confidence was termed significant. Linköping University ethical committee approved of the study (diary number 98139). The study was funded by Linköping University Hospital research funds.

## RESULTS

Five women (9.8%) in the study group had undergone secondary repair of the anal sphincter because of faecal incontinence. These women were not examined again. Three (5.9%) women in the control group had moved from the county. Fifty-nine of the remaining 74 women (80%) completed questionnaires, 40 (87%) from the study group (33 partial tears and 7 complete tears) and 19 (68%) from the control group. Twenty-six of the study women (51%) agreed to be examined (22 partial tears and 4 complete tears). There were no differences in original symptoms or manometry data between these women and the non-participants (data not shown). Four women in the study group had been delivered by caesarean section because of their previous sphincter injury.

The reproducibility of questionnaire answers about urinary and faecal incontinence compared with patient history was good ( $\kappa = 0.9$ ). Subjectively reported incontinence for flatus and liquid stool was more severe in the study

**Table 2.** Influence of subsequent pregnancy upon faecal incontinence severity (all women). Questionnaire scores are presented as median (range): 1 = severe problems and 6 = no problems.

	No subsequent delivery (n = 6)	One delivery (n = 13)	More than one delivery (n = 4)	P*
Flatus incontinence	3 (3–5)	3 (2–6)	2 (2–4)	0.03
Incontinence to liquid stool	2 (2–6)	5 (2–6)	5 (2–6)	0.69
Incontinence to solid stool	6 (5–6)	6 (5–6)	6 (2–6)	0.82

\* Comparison by Kruskal–Wallis test.

**Table 3.** Manometric pressures and reported incontinence. Manometric pressure values are presented as mean (SD) in mmHg. Normal values: resting pressure 47 (25); maximal squeeze pressure 139 (74).

	Study group (type of tear)		Control group	<i>P</i> *
	Partial	Complete		
<b>Original study results (1)</b>	<i>n</i> = 40	<i>n</i> = 11	<i>n</i> = 31	
Resting pressure	46 (16)	37 (11)	43 (12)	0.40
Maximal squeeze pressure	84 (26)	58 (15)	105 (38)	0.0001
<b>Follow up study</b>	<i>n</i> = 22	<i>n</i> = 4		
Resting pressure	39 (14)	31 (9)		0.57
Maximal squeeze pressure	69 (26)	42 (17)		0.04

\* Comparison by *t* test or Mann–Whitney *U* test.

group than in the control group after 10 years (Table 1). Women who had had a subsequent vaginal delivery, regardless of anal sphincter rupture, had significantly worse subjectively reported flatus incontinence compared with women with no subsequent vaginal deliveries (Table 2).

In the original study, there was no difference in libido, ability to orgasm or enjoyment of sex/intercourse between the study and the control groups.<sup>1</sup> This finding was maintained in the current study at 10 years (data not shown). Lubrication at arousal had been significantly impaired in the sphincter rupture group in the original study but there was no difference at 10 years. Libido was associated with how satisfied the women were with their partners in general but not with earlier sphincter injury (data not shown).

Anal manometry data are shown in Table 3. The original data are repeated for comparison. Maximal squeeze pressure had been lower in the study group compared with the controls, and lower in the women with complete tears compared with partial tears. At 10 years, maximal squeeze pressures were significantly lower (64 [27] mmHg) in all women with sphincter rupture than they had been after six months (76 [26] mmHg) (*P* = 0.001). All women in the study group had maximal squeeze pressures below normal values, and mean squeeze pressure was lower in the women with complete tears compared with those with partial tears.

The internal anal sphincter showed ultrasound signs of damage among 10 women in the study group. All women

**Table 4.** Anal manometry and symptom severity by ultrasound appearance of internal sphincter. Symptom scores are presented as median (range): 1 = severe problems and 6 = no problems. Maximal squeeze pressure (mmHg) are median (range).

	Intact ( <i>n</i> = 11)	Damaged ( <i>n</i> = 10)	<i>P</i> *
Resting pressure	40 (21–62)	24 (18–62)	0.01
Maximal squeeze pressure	72 (35–132)	49 (28–92)	0.03
Incontinence for flatus	3 (1–5)	3 (1–4)	0.01
Incontinence for loose stool	5 (2–6)	5 (1–5)	0.01
Incontinence for solid stool	6 (5–6)	5 (2–6)	0.1

\* Comparison by Mann–Whitney *U* test.

**Table 5.** The influence of perineal body thickness on symptoms and anal manometry. Symptom scores are presented as median (range): 1 = severe problems and 6 = no problems. Maximal squeeze pressure (mmHg) are median (range).

	Thickness ≤ 10 mm ( <i>n</i> = 14)	Thickness > 10 mm ( <i>n</i> = 12)	<i>P</i> *
Libido	5 (2–6)	4 (1–6)	0.38
Orgasm by intercourse	5 (3–6)	5 (1–6)	0.70
Vaginal dryness	5 (2–6)	4 (1–6)	0.03
Flatus incontinence	3 (1–5)	4 (1–6)	0.04
Anal squeeze pressure	58 (33–92)	89 (28–172)	0.04

\* Comparison by Mann–Whitney *U* test.

with internal sphincter damage also had scarring of the external sphincter. These women had significantly lower resting and squeeze pressures than those without ultrasound signs of internal sphincter damage. Incontinence for flatus and loose stool was significantly more severe in women with internal sphincter damage (Table 4). Two women in the original control group were found to have ultrasound evidence of anal sphincter injury.

There was no difference in perineal body thickness between women with complete and women with partial sphincter injury (11 [3.2] mm vs 11 [7.0] mm). However, women with perineal body measurement of 10 mm or less reported significantly more vaginal dryness, more severe flatus incontinence and had lower maximal squeeze pressures than those with a measurement of more than 10 mm (Table 5).

## DISCUSSION

This study adds to the sparse data on long term consequences of anal sphincter rupture. Seven out of 51 women were eligible for secondary repair. This must be considered a strong substitute marker for unsatisfactory results of primary repair. Five women had undergone secondary anal sphincter repair before the follow up study, after which two more were referred for secondary repair due to faecal incontinence. Audits after secondary repair show that only around half of the patients get better.<sup>13</sup> Poor results have been identified in women with anterior defects from obstetric trauma, especially if they were obese, older than 50 years of age and had perineal descent.<sup>14</sup> In view of this, prevention of and optimal primary repair and follow up after anal sphincter rupture and perineal body injury are important.<sup>15</sup>

The response rate to the questionnaire (80%) and reproducibility ( $\kappa$  = 0.9) were acceptable. Attendance for clinical examination was low, especially in the control group. Because there were no differences in manometry and symptoms in the original study between those who participated in the second study and those who did not, we still propose tentative conclusions. The numbers available

from this study for paired analyses were small, and concepts such as flatus incontinence are subject to individual interpretation.<sup>16</sup>

Incontinence for flatus continued to be common among women with anal sphincter rupture even 10 years after delivery. Conservative therapy to regulate bowel function and facilitate rectal emptying should be remembered when dealing with women with this complaint.

We did not demonstrate any impairment of sexual function except for lubrication. Our original study may have been too early to assess because not all couples had reassumed sexual activity by then. On the other hand, over 10 years different life events may have influenced sexuality more than sphincter damage.

Anal pressures were decreased after 10 years. Whether this is due to ageing or the injuries at delivery is unclear. The women in the follow up study were still premenopausal so decrease in oestrogens would not yet be an important factor. Squeeze pressures in women with partial sphincter injury showed the largest decrease.

Our findings indicate that a perineal body over 10 mm thick may be of importance both in regard to anal squeeze pressure, flatus incontinence and lubrication. The perineal body functions as a tethering point for the transverse perineal muscles, the rectovaginal fascia and the bulbocavernosus muscle (connecting to the clitoris) as well as the external anal sphincter.<sup>17–19</sup> Bidigital anal/vaginal palpation is a simple way of assessing the perineal body thickness postpartum. Shobeiri *et al.*<sup>20</sup> have shown excellent correlation between ultrasound measurement and digital assessment using 10 mm as cutoff point. We suggest routine bidigital examination of the perineal body after delivery especially where third degree tears are present. This simple manoeuvre may help with the difficult diagnosis of anal sphincter rupture<sup>8</sup> and the perineal body itself could be reconstructed even in the absence of anal sphincter rupture. Prospective studies on the role of perineal body reconstruction after delivery in prevention of perineal descent, sexual dysfunction, prolapse and incontinence are needed.

The internal anal sphincter is important for continence. The diagnosis of internal sphincter injury is obvious in fourth degree ruptures, but there is no self-evident way of dealing with internal anal sphincter injury when the external sphincter is intact or partially torn. Immediate postpartum ultrasound may help in the diagnosis of internal sphincter injury in this situation.

Long term reduction in anal sphincter function after injury was further aggravated by subsequent vaginal delivery. This is in line with the findings of other authors.<sup>21,22</sup> Recommendations in regard to mode of subsequent delivery for women with anal sphincter injury must be influenced by the patients' own wishes. The risk for complications associated with an elective caesarean section is low and must be weighed against the risk for aggravated incontinence in this particular group of women.

Diagnosis of anal sphincter injury postpartum can be difficult.<sup>21</sup> Faltin *et al.*<sup>23</sup> found a 28% incidence of clinically undetected sphincter tears using EAUSG immediately after delivery. We found two cases of missed sphincter injury. In two cases, partial sphincter injury had been diagnosed but anal ultrasound showed no trace of injury. We can only speculate that either healing had been exceptional in these cases or the diagnosis was wrong from the beginning.

## CONCLUSION

Subjective and objective anal function after anal sphincter injury deteriorates further over time and with subsequent vaginal deliveries. Internal anal sphincter injury leads to more severe faecal incontinence and lower anal resting pressures than external sphincter injury alone. Anal sphincter injury is difficult both to diagnose and suture satisfactorily. Perineal body thickness may be important for continence, anal pressure and vaginal lubrication.

## References

1. Fornell EK, Berg G, Hallbook O, Matthiesen LS, Sjødahl R. Clinical consequences of anal sphincter rupture during vaginal delivery. *J Am Coll Surg* 1996;**183**(6):553–558.
2. Kamm MA. Obstetric damage and faecal incontinence. *Lancet* 1994;**344**(8924):730–733.
3. Gjessing H, Backe B, Sahlin Y. Third degree obstetric tears; outcome after primary repair. *Acta Obstet Gynecol Scand* 1998;**77**(7):736–740.
4. Møllerup Sørensen S, Bondesen H, Istre O, Vilmann P. Perineal rupture following vaginal delivery. Long-term consequences. *Acta Obstet Gynecol Scand* 1988;**67**(4):315–318.
5. Sultan AH, Monga AK. Anal and urinary incontinence in women with obstetric anal sphincter rupture. *Br J Obstet Gynaecol* 1997;**104**(6):754–755.
6. Walsh CJ, Mooney EF, Upton GJ, Motson RW. Incidence of third-degree perineal tears in labour and outcome after primary repair. *Br J Surg* 1996;**83**(2):218–221.
7. Zetterström J, Lopez A, Anzen B, Norman M, Holmström B, Mellgren A. Anal sphincter tears at vaginal delivery: risk factors and clinical outcome of primary repair. *Obstet Gynecol* 1999;**94**(1):21–28.
8. Sultan AH, Stanton SL. Occult obstetric trauma and anal incontinence. *Eur J Gastroenterol Hepatol* 1997;**9**(5):423–427.
9. Haadem K, Öhrlander S, Lingman G. Long-term ailments due to anal sphincter rupture caused by delivery — a hidden problem. *Eur J Obstet Gynecol Reprod Biol* 1988;**27**(1):27–32.
10. Poen AC, Felt-Bersma RJ, Strijers RL, Dekker GA, Cuesta MA, Meuwissen SG. Third-degree obstetric perineal tear: long-term clinical and functional results after primary repair. *Br J Surg* 1998;**85**(10):1433–1438.
11. Sundblad M, Hallböök O, Sjødahl R. Anorectal manometry with a microtransducer. *Eur J Surg* 1993;**159**:365–370.
12. Zetterström JP, Mellgren A, Madoff RD, Kim DG, Wong WD. Perineal body measurement improves evaluation of anterior sphincter lesions during endoanal ultrasonography. *Dis Colon Rectum* 1998;**41**(6):705–713.
13. Morren G, Hallböök O, Nyström P-O, Baeten CGMI, Sjødahl R. Audit of anal sphincter repair. *Colorectal Dis* 2001;**3**:17–22.

14. Nikiteas N, Korsgen S, Kumar D, Keighley MR. Audit of sphincter repair. Factors associated with poor outcome. *Dis Colon Rectum* 1996;**39**(10):1164–1170.
15. Fitzpatrick M, Cassidy M, O'Connell PR, O'Herlihy C. Experience with an obstetric perineal clinic. *Eur J Obstet Gynecol Reprod Biol* 2002;**100**(2):199–203.
16. Uustal Fornell E, Wingren G, Kjölhede P. The prevalence of urinary and fecal incontinence and symptoms of genital prolapse in women. *Acta Obstet Gynecol Scand* 2003;**82**(3):280–286.
17. Hudson C, Sohaib S, Shulver H, Reznek R. The anatomy of the perineal membrane: its relationship to injury in childbirth and episiotomy. *Aust N Z J Obstet Gynaecol* 2002;**42**(2):193–196 (May).
18. Woodman P, Graney D. Anatomy and physiology of the female perineal body with relevance to obstetrical injury and repair. *Clin Anat* 2002;**15**(5):321–334.
19. DeLancey J. Structural anatomy of the posterior pelvic compartment as it relates to rectocele. *Am J Obstet Gynecol* 1999;**180**(4):815–823.
20. Shobeiri S, Nolan TE, Yourdan-Jovet R, Echols KT, Chesson RR. Digital examination compared to trans-perineal ultrasound for the evaluation of anal sphincter repair. *Int J Gynaecol Obstet* 2002;**78**(1):31–36.
21. Fynes M, Donnelly V, Behan M, O'Connell PR, O'Herlihy C. Effect of second vaginal delivery on anorectal physiology and faecal continence: a prospective study. *Lancet* 1999;**354**(9183):983–986.
22. Sangalli MR, Floris L, Faltin D, Weil A. Anal incontinence in women with third or fourth degree perineal tears and subsequent vaginal deliveries. *Aust N Z J Obstet Gynaecol* 2000;**40**(3):244–248.
23. Faltin D, Boulvain M, Irion O, Bretones S, Stan C, Weil A. Diagnosis of anal sphincter tears by postpartum endosonography to predict fecal incontinence. *Obstet Gynecol* 2000;**95**(5):643–647.

Accepted 28 June 2004