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ORIGINAL ARTICLE

Objective methods cannot predict anal incontinence after primary repair of extensive anal tears

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Background. An increased awareness of anal incontinence after delivery tears has developed during the last years. The aim of this study was to compare complaints with the results of physiological methods in women with complete sphincter ruptures primarily repaired at delivery.
Methods. Twenty-seven women, 16 with total rupture of the external anal sphincter and 11 who also had a ruptured internal anal sphincter were studied. Interviews on pelvic floor function, investigation with recto-anal manometry, single fiber EMG and anal endosonography were performed at 11.9 (2.5) months after delivery. Fifteen women vaginally delivered without sphincter rupture served as controls.
Results. Pelvic floor dysfunction was admitted in 74%, in particular gas incontinence (59%). Maximum squeeze pressure was significantly reduced ($p<0.01$) compared to controls, while resting anal pressure was unaffected. Fiber density was increased in 81% of patients and 91% had detectable defects on endosonography. Neither the degree of rupture nor the presence of complaints significantly correlated to the objective methods.
Conclusions. A majority of women with primarily repaired anal sphincter ruptures at delivery were incontinent. Sphincter defects and signs of neuropathy could not precisely predict symptoms.

Key words: anal endosonography; anal incontinence; anal manometry; complete sphincter rupture; single fiber EMG

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Extensive rupture of the anal sphincter during delivery is a complication with potentially debilitating long-term consequences. Pain, urinary- and anal incontinence, mostly incontinence for gas, have in later studies been frequent (36–42%) (1, 2). Significantly reduced squeeze pressure, as evidence of dysfunction of external anal sphincter (EAS), has been shown (2–4) and also reduced resting pressure (3, 4), indicating internal anal sphincter (IAS) dysfunction. Lately anal endosonography has identified sphincter defects in a high frequency (85%) after primarily repaired sphinter ruptures (4). However, the incontinence seems to have a dual pathology, caused by both the disruption of the anal sphincters and the damage of the innervation to these muscles (3, 5).

In the present study women who had suffered sphincter rupture were further evaluated with objective methods including recto-anal manometry,

Abbreviations:
EAS: external anal sphincter; IAS: internal anal sphincter.

single fiber EMG and anal endosonography and to compare these findings with patients' complaints and findings in controls.

Patients and methods

Patients

During a five year period 59 women experienced an anal sphincter division of third degree, which involved the whole external anal sphincter (EAS), or fourth degree, which also encompassed anal damage including the underlying internal sphincter (IAS). Fourteen women were not contacted because they had moved from the area or were not Swedish spoken. Eighteen women refused to participate. Twenty-seven women were enrolled in the study, 16 women with third degree rupture and 11 with fourth degree rupture. All ruptures had been primarily repaired. The investigations were performed on average 11.9, range 3–41, months post partum. Four women had had a subsequent vaginal delivery before the investigation was performed. None of them experienced another sphincter tear.

Fifteen healthy women were recruited as controls at an antenatal care unit and had been vaginally delivered without sphincter rupture. They were examined 10.8, range 3–14, months after delivery.

Interview

The interview included questions on dyspareunia, anal and urinary incontinence. Incontinence was stated when the symptom appeared once a week or more. The manometry investigations and interviews were performed by an independant nurse (IB) at another hospital. At least one year after the sphincter tear a new interview was performed.

Anal manometry

Anorectal manometry was performed using a non-compliant balloon allowing recording of anal pressure in response to graded isobaric distension of the rectum (6). The patient was lying comfortably in the left lateral position. No bowel preparation was used but patients were asked to empty their rectum and bladder before the investigation. Resting anal pressure was measured after five minutes' adaptation to the probe. Maximal squeeze pressure was taken as the best of three squeeze exercises.

Single fiber EMG

The technique used for single fiber EMG recordings has been described by Neill and Swash (7). The results are given as the mean number of single muscle fiber action potentials in 20 different needle positions.

Anal endosonography

Endosonography was performed according to a standardized procedure with the patient in the left lateral decubitus position. No bowel preparation was used. An ultrasound scanner (Brüel and Kjaer type 3535, Naerum, Denmark) with a rotating rectal probe (type 1850) and a 7 MHz transducer (focal range 2.0–4.5 cm) was used. All examinations were recorded on Super-VHS video cassettes and were interpreted by one radiologist (MA).

Statistical methods

The statistical methods included Mann Whitney U test and Student's *t*-test. A two-tailed $p<0.05$ was considered statistically significant.

The study was approved by the local ethical committee.

Results

Population characteristics

Demographic characteristics, reproductive history and obstetric data of the studied women are shown in Table I. Patients had a significantly ($p<0.01$) longer second stage of labor than controls. Age and other obstetric data except rupture were comparable. There were no differences between women with third and fourth degree tears.

Table I. Characteristics of 27 women with extensive anal sphincter rupture and 15 women vaginally delivered without sphincter rupture

Characteristic	Patients $n=27$ (%)	Controls $n=15$ (%)
Demographic		
Age years [mean (s.d.)]	28 (4)	29 (3)
Reproductive history		
Parity [mean (s.d.)]	1.3 (0.5)	1.5 (0.5)
Obstetric data		
Gestational age (weeks) [mean (s.d.)]	40 (1.4)	40 (1.5)
Instrumental delivery [number(%)]	7 (26)	2 (13)
Oxytocin stimulation [number(%)]	11 (41)	5 (33)
Episiotomy[number(%)]	11 (41)	4 (27)
Epidural anesthesia [number(%)]	4 (15)	2 (13)
Length of second stage of labor (minutes) [mean (s.d.)]	56 (41)**	29 (15)
Infant mean birth weight, (g) [mean (s.d.)]	3808 (499)	3639 (557)

Significance of difference to controls indicated by **=$p<0.01$.

Table II. Comparison of complaints of pelvic floor function between 27 patients and 15 controls

	Patients n=27 (%)	Controls n=15 (%)
Gas incontinence	16 (59)**	2 (13)
Fecal incontinence	3 (11)	0
Urinary incontinence	6 (22)	3 (20)
Dyspareunia	8 (30)**	0

Significance of difference to controls indicated by **=$p<0.01$.

Table III. Comparison of anal pressures between 27 patients and 15 controls. [Mean (s.d.)]

	Patients n=27	Controls n=15
Resting anal pressure mm Hg	56 (12)	56 (11)
Max squeeze pressure mm Hg	111 (26)**	145 (44)

Significance of difference to controls indicated by **=$p<0.01$.

Interview

Twenty (74%) of the 27 patients admitted symptoms. Sixteen patients (59 %) were incontinent for gas. Three patients (11%) with gas incontinence were also incontinent for feces, two when stools were loose and one also for normal stools. Six patients (22%) had urinary incontinence. Eight patients (30%) suffered from dyspareunia. There were no differences between women with third and fourth degree tears. All women with symptoms of anal incontinence could manage their problem and were not interested in surgical intervention for the moment.

In the second interview 24 women were included. Seven (29%) of them admitted gas incontinence. Two of the three lost women had had gas incontinence in the first interview.

Four (27%) of the 15 controls had symptoms. Two (13%) were incontinent for gas. Another two had urinary incontinence. None of the controls admitted fecal incontinence nor dysparenuia. Gas incontinence and dyspareunia were significantly ($p<0.01$) more common in patients compared to controls (Table II).

Anal manometry

Manometry was performed in all women. A significantly ($p<0.01$) lower maximum squeeze pressure was found in patients compared to controls (Table III). Anal pressures did not differ between women with third degree rupture compared to those with fourth degree rupture.

Single fiber EMG

Single fiber EMG was performed in 17 of 27 patients and in 11 of the 15 controls. The mean density in patients 1.8 (0.3) did not significantly differ compared to controls 1.5 (0.4). Compared to the expected age correlated value of 1.4, used as a standard (6) four of the patients had a normal fiber density. Thirteen (81%) had increased density compared to four (36%) of the controls. There were no significant differences between third and fourth degree tears.

Anal endosonography

In 20 (91%) of 22 patients defects were found (Table IV). All defects were situated in the region adjacent to the vagina. Thirteen patients had isolated EAS defects, eight of them with a third degee rupture. Seven patients had IAS defects, three of them with third degree rupture. One of those had an isolated IAS defect without a defect in the EAS. Six had defects affecting both the IAS and the EAS, two of whom had a third degree rupture.

Table IV. Comparison of anal sonography between 22 patients and 14 controls

	Patients n=22 (%)	Controls n=14 (%)
No defect	2 (9)***	13 (93)
Defect EAS	19 (86)***	1 (7)
Defect IAS	7 (32)*	0
Defect EAS+IAS	6 (27)*	0

Significance of difference to controls indicated by *=$p<0.05$; ***=$p<0.001$.

Table V. Sonography, single fiber EMG and anal pressures in 16 patients with gas incontinence and 11 patients without gas incontinence after anal sphincter rupture

	Gas incontinence n=16	No gas incontinence n=11
Anal endosonography:	n=12	n=10
No defects	1	1
Defect EAS	10	9
Defect IAS	4	3
Defect EAS+IAS	3	3
Single fiber EMG:	n=11	n=6
Normal density	3	1
Elevated density	1	0
Pathological density	7	5
Manovolumetry:	n=16	n=11
Squeeze pressure <100 mm Hg	7	3

Significance of difference cannot be proven.

There was significant difference compared to controls [1/14 (7%) defect in the EAS] (Table IV).

Integrative aspects

The investigations performed could not predict whether patients were gas incontinent or not (Table V). One of the two patients without sonographically detectable sphincter lesions was gas incontinent, notably this woman had the most pathological fiber density.

Discussion

In our study 20 of 27 patients (74%), who had had a primary repair for a sphincter rupture at delivery had problems related to this. The most prominent symptom was gas incontinence (59%), significantly differing from controls. Fecal incontinence for solid stools was reported by one patient and for loose stools by two patients. Incontinence did not significantly differ in patients with third degree and fourth degree tear. However, authors, who also include partial ruptures of the EAS in third degree tears report a lower incidence of incontinence in this group compared to patients with a fourth degree tear (1, 8). Notably, out of 45 patients asked to participate in the present study, 18 preferred not to take part. Presumably, these might have had less problems. In that case our figures are not representative for the whole population, but still the problem is significant. However, comparable to our results are those from a study (2) after total sphincter rupture with anal incontinence of 42%.

In accordance with our results Mellerup Sörensen et al. (2) did not find any increase in urinary incontinence. They did not, contrary to us, find any increase in dyspareunia compared to controls.

Patients and controls were comparable in characteristics and obstetric data, except for a significantly ($p<0.01$) longer second stage of labor. This is in accordance with some studies (10, 11) whereas others have not found this difference (12). It might be that the cause of a sphincter rupture is either a long second stage of labor with pressure on pelvic structures leading to more vulnerable tissues or an extremely short second stage of labor without the possibility for the pelvic floor to expand slowly.

As in other studies (1, 2), vacuum extractions were performed in an increased rate among patients, 26% compared to controls 13%. In our practice forceps are not used. However, an increased frequency of ruptures with forceps but not with vacuum extraction is also reported (4).

Compared to controls, maximum squeeze pressure was significantly ($p<0.01$) lower in women with a history of sphincter rupture. As expected, there was no difference in maximum squeeze pressure between women with third and fourth degree tears. Anal resting pressure reflecting IAS tone did not differ comparing women without rupture to those with rupture. This is in accordance with some (2) but differs from the results of others (3, 4).

Increased fiber density as evidence of reinnervation by collateral axonal sprouting caused by damage was found in 81% of the patients and in 36% controls. Snooks et al. (3) reported increased fiber density and pudendal nerve damage in 60% of patients with third degree rupture as a co-existing factor in anal incontinence. A recently published study (12) confirms the association between anal incontinence and damage to the pudendal nerve.

In the present study 91% of the patients were identified to have sphincter defects on endosonography compared to 85% identified by Sultan et al. (4). In controls, one woman (7%) had an EAS defect. Previously, occult EAS defects have been demonstrated by anal endosonography in 6% and IAS defects in 16% after non-traumatic vaginal delivery of primiparous women (16).

In women with gas incontinence no significant difference could be demonstrated with objective methods compared to women without gas incontinence. Both groups showed injury to the sphincteric muscles and/or damage to their motor innervation. Loss of anal sensation is associated with the development of anal incontinence (17). Anal sensation may play a critical role in discrimination as indicated by Cornes et al. (18), who have studied women after childbirth and found a persisting change of sensation in the upper anal canal after rupture of the EAS.

In our opinion, third degree tear with total rupture of the EAS is as serious an injury as a fourth degree tear. It is an important medical issue with further studies needed on how to manage anal sphincter ruptures. First of all, the surgical technique must be evaluated as well as the postoperative nursing. Moreover, in further pregnancies women with prior sphincter rupture should be counseled on route of delivery, vaginal or abdominal.

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References

1. Haadem K, Ohrlander 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: 27–32.
2. Mellerup Sörensen S, Bondesen H, Istre O, Vilmann P. Perineal rupture following vaginal delivery. Long term consequences. Acta Obstet Gynecol Scand 1988; 67: 315–18.
3. Snooks SJ, Henry MM, Swash M. Faecal incontinence due to external anal sphincter division in childbirth is associated with damage to the innervation of the pelvic floor musculature: a double pathology. Br J Obstet Gynaecol 1985; 92: 824–8.
4. Sultan AH, Kamm MA, Hudson CN, Bartram CI. Third degree obstetric anal sphincter tears; risk factors and outcome of primary repair. BMJ 1994; 308: 887–91.
5. Smith ARB, Hosker GL, Warrel DW. The role of partial denervation of the pelvic floor in the aetiology of genitourinary prolapse and stress incontinence of urine, A neurophysiological study. Br J Obstet Gynaecol 1989; 96: 24–8.
6. Åkervall S. Rectoanal function in man. Thesis. University of Göteborg, Göteborg 1989.
7. Neill ME, Swash M. Increased motor unit fibre density in the external anal sphincter muscle in ano-rectal incontinence: a single fibre EMG study. J Neurol Neurosurg Psychiatry 1980; 43: 343–7.
8. Crawford LA, Quint EH, Pearl ML, DeLancey JOL. Incontinence following rupture of the anal sphincter during delivery. Obstet Gynecol 1993; 82: 527–31.
9. Bek KM, Laurberg S. Risks of anal incontinence from subsequent vaginal delivery after a complete obstetric anal sphincter tear. Br J Obstet Gynaecol 1992; 99: 724–6.
10. Bek KM, Laurberg S. Intervention during labor: risk factors associated with complete tear of the anal sphincter. Acta Obstet Gynecol Scand 1992; 71: 520–4.
11. Combs CA, Robertson PA, Laros RK. Risk factors for third-degree and fourth-degree perineal lacerations in forceps and vacuum deliveries. Am J Obstet Gynecol 1990; 163: 100–4.
12. Tetzschner T, Sörensen M, Rasmussen O, Lose G, Christiansen J. Pudendal nerve damage increases the risk of fecal incontinence in women with anal sphincter rupture after childbirth. Acta Obstet Gynecol Scand 1995; 74: 434–40.
13. Snooks SJ, Swash MM, Mathers SE, Henry MM. Effect of vaginal delivery on the pelvic floor; a five year follow-up. Br J Surg 1990; 32: 737–42.
14. Laurberg S, Swash M. Effects of aging on the anorectal sphincters and their innervation. Dis Colon Rectum 1989; 32: 737–42.
15. McHugh SM, Diamant NE. Effect of age, gender and parity on anal sphincter function to fecal incontinence. Digest Dis Sci 1987; 32: 726–36.
16. Sultan AH, Kamm MA, Hudson CN, Thomas JM, Bartram CI. Anal sphincter disruption during vaginal delivery. N Engl J Med 1993; 329: 1905–11.
17. Miller R, Bartolo DCC, Cervero F, Mortensen NJMcC. Differences in anal sensation in continent and incontinent patients with perineal descent. Int J Colorect Dis 1989; 4: 45–9.
18. Cornes H, Bartolo DCC, Stirrat GM. Changes in anal canal sensation after childbirth. Br J Surg 1991; 78: 74–7.

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