

Outcome of obstetric anal sphincter injuries (OASIS)—role of structured management

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Abstract

Introduction and hypothesis Prospective studies up to 1 year after repair of obstetric anal sphincter injuries (OASIS) report anal incontinence in 33% of women and up to 92% have a sonographic sphincter defect. The aim of this study is to determine the outcome of repair by doctors who have undergone structured training using a standardized protocol. **Methods** Doctors repaired OASIS after attending a training workshop. The external anal sphincter was repaired by the end-to-end technique when partially divided and the overlap method when completely divided. Endoanal ultrasound was performed prior to suturing and 7 weeks later. A validated bowel symptom questionnaire was completed prior to delivery, at 7 weeks postpartum, and at 1 year postpartum. **Results** Fifty-nine women sustained OASIS. At 7 weeks, six (10%) had a defect on ultrasound. There was no significant deterioration in symptoms of fecal urgency, incontinence, or quality of life at 1 year after delivery. **Conclusions** The 1-year outcome after repair of OASIS appears to be good when repaired by doctors after structured training.

Keywords Third-degree tears · Anal sphincter · Vaginal delivery

Background

Anal incontinence in women is mainly due to childbirth. Previously, such symptoms were attributed largely to

puddental neuropathy [1]. Anal endosonography, however, has confirmed initial suspicions that these symptoms may result from obstetric anal sphincter injuries (OASIS) [2, 3]. Despite recognition and primary repair of acute OASIS, between 19% and 61% of women have symptoms of anal incontinence [4] and between 34% and 92% have persistent anal sphincter defects on ultrasound [4, 5] within 3 months of delivery. This is a potentially devastating complication of vaginal delivery that can be a hygienic, social, and psychological problem. Furthermore, anal incontinence is a vastly underreported problem mainly due to embarrassment; consequently, many women suffer this affliction in silence.

The Royal College of Obstetricians and Gynaecologists (RCOG) have recently updated their guideline [6] and there is a recommended protocol for the management of OASIS [7, 8]. We aimed to determine the outcome for women following acute OASIS if this protocol was strictly adhered to.

Materials and methods

Women having their first vaginal delivery over a 12-month period between February 2003 and January 2004 at Mayday University Hospital were invited to participate in a prospective study [9].

All consenting women had a perineal and rectal examination by the research fellow immediately after delivery. All OASIS were diagnosed clinically and were confirmed by either the on-call specialist registrar or consultant. These tears were classified according to the RCOG classification (Table 1) [10].

Endoanal ultrasound was performed in the left lateral position using a 10-MHz 360° rotating probe (B & K Naerum, Denmark) [3, 11]. All women had the endoanal

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Table 1 Classification of perineal tears

Classification	
Intact perineum	No visible tear
First-degree tear	Injury to perineal skin only
Second-degree tear	Injury to the perineum involving perineal muscles but not involving the anal sphincter
Third-degree tear	Injury to the perineum involving the anal sphincter complex 3a: less than 50% EAS thickness torn 3b: more than 50% EAS thickness torn 3c: both EAS and IAS torn
Fourth-degree tear	Injury to the perineum involving the anal sphincter complex (EAS and IAS) and anal epithelium

ultrasound scans performed at delivery (prior to suturing) and repeated at 7 weeks postpartum in a dedicated perineal clinic. All real-time images along the length of the anal canal were video recorded (Fig. 1) and reviewed independently by two experts in endoanal ultrasonography (AHS and RT).

Women had their OASIS repaired according to a previously recommended protocol [7, 8], the salient points of which are presented in Table 2. All doctors performing repairs underwent structured education on a hands-on training course prior to repairing OASIS [12] (<http://www.perineum.net>).

Women completed a validated Manchester Health Questionnaire (relating to bowel function prior to delivery) within 48 h of giving birth [13]. This questionnaire was repeated at 7 weeks postpartum in the perineal clinic and again 1 year after delivery by a postal questionnaire. Women were sent the postal questionnaire at 1 year with a stamped addressed envelope and those who did not respond were sent a second mailing 4 weeks later.

The study was approved by the Croydon Ethics and Research Committee and all women gave written consent.

Statistics

Data was entered onto a Microsoft® excel database and analyzed with SPSS version 11.0. To investigate the change in ranks, the Friedman test was performed, and to compare proportions between independent groups, the Fisher's exact test was used.

Results

Fifty-nine women sustained OASIS over this time period. All 59 attended follow-up at a median of 7 weeks (range 5–

12 weeks) and 43 (73%) completed a questionnaire 1 year later. Twenty-eight sustained grade 3a tears, 30 sustained grade 3b tears, and one a fourth-degree tear, and all these OASIS were confirmed by endoanal ultrasound prior to repair.

All 28 grade 3a tears were repaired using the end-to-end technique and all 30 grade 3b tears had an overlap repair (Fig. 2).

At follow-up, six women (10%), all of whom had sustained grade 3b tears had a defect on ultrasound (one combined external anal sphincter [EAS] and internal anal sphincter [IAS] defect and five EAS defects only); five of whom were followed up at 1 year. The one woman with a combined external and IAS defect on scan could actually represent a grade 3c tear which was incorrectly diagnosed as a grade 3b tear. There was no disagreement in scan diagnosis between the experts in anal endosonography. No women developed fecal incontinence over the 1-year period. There was no significant difference in symptoms of fecal urgency or flatus incontinence before, at 7 weeks after delivery, or at 1 year after delivery (Table 3). Two women had fecal urgency (one grade 3a tear and one grade 3b tear) and two women had flatus incontinence (one grade 3a tear and one grade 3b tear) at 1 year follow-up. There was no difference in quality of life 1 year after a primary repair when compared to that prior to sustaining OASIS (Table 4).

Discussion

Anal incontinence can have a devastating effect on a woman's social and psychological well-being. This is the

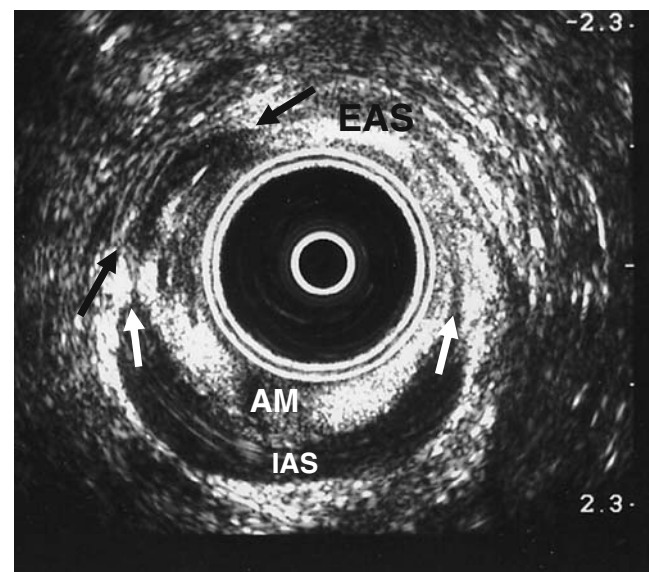


Fig. 1 Endoanal ultrasound image demonstrating a large defect of the EAS between black arrows and a large defect of the IAS between white arrows. AM anal mucosa (anterior is the top of the image)

Table 2 Protocol

Protocol for the repair of OASIS

1. Repair should be conducted in the operating theater by an obstetrician who is experienced in repairing OASIS or by a trainee under direct supervision.
2. Regional or general anesthesia should be used.
3. All obstetricians should have previously attended a hands-on training workshop on management of third and fourth-degree tears.
4. All grade 3a tears should be repaired by the end-to-end technique using 3-0 PDS sutures.
5. Grade 3b tears should be repaired either by the end-to-end technique if partially torn or the overlap technique if completely torn with 3-0 PDS. A true overlap cannot be performed unless the two ends are completely torn and therefore if there are only a few residual strands of muscle, they should be divided before an overlap repair is performed.
6. If the internal anal sphincter is torn (grade 3c or fourth-degree) it should be repaired separately using two or three mattress sutures with 3-0 PDS.
7. The anal mucosa should be repaired with interrupted 3-0 vicryl sutures with the knots being tied in the anal lumen.
8. Intravenous antibiotics should be given at the time of repair and continued orally for 5 days (cefuroxime and metronidazole).
9. Lactulose 15 mL twice daily prescribed for up to 10 days ensuring that bowel motions are soft.
10. Follow-up in a dedicated perineal clinic.

first prospective study in which all women had accurate classification of OASIS confirmed clinically and by endoanal ultrasound prior to repair. We found that compared to before delivery, when a recommended protocol was adhered to by trained doctors, there was no significant change in symptoms of anal incontinence or fecal urgency at 1 year post delivery after a primary repair of an OASIS.

There have been at least 17 previous studies (Table 5) following up women after an OASIS to a maximum of 1 year. These studies have demonstrated anal incontinence

between 7% [14] and 74% [15] of women with a mean of 33% following a primary repair. Of these 17 studies, a protocol for repair was available in ten units [14, 16–24]. We observed that the mean anal incontinence rate was 26% as opposed to 44% in those units where no protocol for repair was mentioned. It, therefore, remains to be established whether the outcome is significantly influenced by the presence of an approved protocol for repair of OASIS in the delivery suite.

Our protocol is based on the best available evidence base. Randomized trials have shown that laxative use is superior to a practice of bowel confinement [25] and that the use of lactulose alone is more beneficial when compared to a combination with a stool bulking agent [26]. Another randomized trial has confirmed that the use of antibiotics significantly reduced the rate of perineal wound infections [27]. There are no randomized trials regarding technique of repair of the torn anal epithelium (fourth-degree tear) and it would appear that either a continuous or interrupted suture technique is appropriate.

Three previous studies mention that doctors were trained prior to repairing OASIS [22–24]. However, only Williams et al. [23] described the details of the training given. In that study, all repairs were performed by trainees or consultants who had been trained on pig anal sphincters in workshops prior to performing repairs independently. In our study, all the doctors had undergone a structured training program in a hands-on training workshop [12] (<http://www.perineum.net>). This consisted of lectures, video demonstrations on OASIS repair, and hands-on training on cadaveric porcine anal sphincters and specially designed training models (Limbs & Things™). This structured workshop has previously been shown to change clinical practice and increase knowledge of the anatomy of the anal sphincter

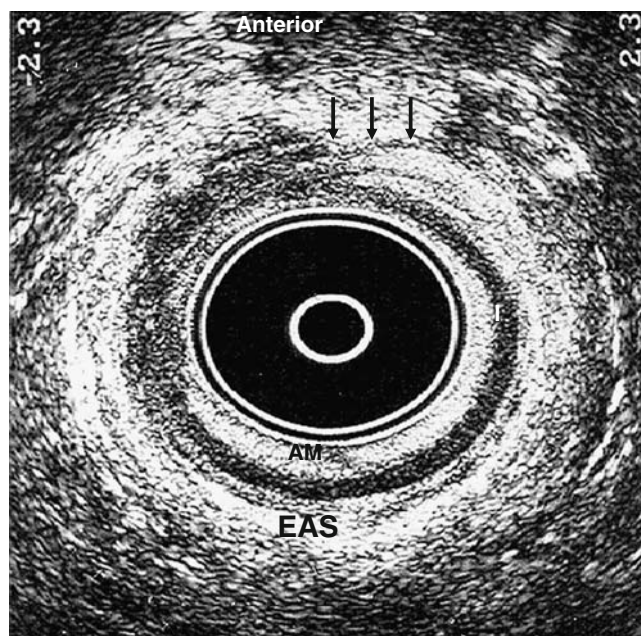


Fig. 2 Endoanal ultrasound image demonstrating an overlap repair (arrows) of the EAS repair following a third-degree tear (grade 3b). I internal anal sphincter, AM anal mucosa

Table 3 Flatus incontinence and fecal urgency

	Before delivery (<i>n</i> =59)	7weeks postpartum (<i>n</i> =59)	1year postpartum (<i>n</i> =43)	<i>p</i> value ^a before delivery compared to 1year	<i>p</i> value ^a 7weeks compared to 1year
Flatus incontinence, <i>n</i> (%)	2 (5)	1 (2)	2 (5)	1.00	0.58
Fecal urgency, <i>n</i> (%)	5(12)	4 (10)	2 (5)	0.46	0.70

^a Fisher's exact test

[12]. Following attendance on the course, all repairs were performed under direct supervision by doctors who were already trained until it was agreed that the trainee could repair OASIS independently.

Different techniques of repair of the EAS have been described [28]. The most frequently used technique in the UK appears to be the end-to-end repair with “figure of eight” sutures [29]. Colorectal surgeons, however, prefer the overlap technique for secondary anal sphincter repair for patients presenting with fecal incontinence. Based on this, Sultan et al. [29] initially described the overlap technique for primary EAS repair but also separate repair of the torn IAS. To date, there have been three randomized trials evaluating the overlapping and end-to-end technique for the repair of OASIS. The first of these studies by Fitzpatrick et al. [30] recruited 112 primiparous women. No significant differences between the two methods of repair were identified although there appeared to be a trend towards more symptoms in the end-to-end group. Compared to our study and the earlier description of Sultan et al. [29], there were methodological differences in that the torn IAS was not identified and repaired separately and they used a constipating agent for 3 days after the repair. It is also unclear as to how an overlap repair could have been performed in women who had partial tears of the EAS. More recently, Williams et al. [23] performed another randomized controlled trial on 112 primiparous and

multiparous women. Only 54% were followed up at 1 year and it appears that <10% had symptoms of anal incontinence although precise details are not given in their paper. Williams et al. also performed overlap EAS repairs on women with both partial and complete OASIS. The original description of the overlap repair in OASIS by Sultan et al. [29] only describes the anal sphincter being overlapped after complete disruption of the EAS. In the randomized controlled trial by Fernando et al. [24], only women with complete disruption of the anal sphincter or women with >50% of the external sphincter was torn (3b tears) were included. In their study, they only repaired partial EAS tears by the overlap technique after completely dividing the residual fibers of the EAS. They found that, compared to women who had an end-to-end repair, none of those who had an overlap repair suffered anal incontinence (0 vs. 6/25 [24%], *p*=0.009) or perineal pain (0 vs. 5/25 (20%) at 12 months. In our study, the overlap technique was only used when the EAS was completely torn), and grade 3a tears were repaired by the end-to-end technique using mattress sutures [7]. It is only possible to perform a true overlap repair if the two ends of muscle are completely divided. Therefore, if there were a few strands of incompletely divided muscle, we divided it before performing an overlap repair. Otherwise, an end-to-end repair was performed. The findings of our study and those of Fernando et al. [24] suggest that the overlap

Table 4 Quality of life of women 1 year after primary repair of OASIS

	Before delivery (<i>n</i> =39)	7weeks postpartum (<i>n</i> =39)	1year postpartum (<i>n</i> =39)	<i>p</i> value ^a
General health perceptions	17 (0–50)	21 (0–50)	17 (0–75)	0.37
Incontinence impact	15 (0–75)	19 (0–100)	11 (0–75)	0.29
Role limitations	2 (0–50)	7 (0–50)	7 (0–50)	0.09
Physical limitations	3 (0–62.5)	4 (0–50)	5 (0–50)	0.19
Social limitations	2 (0–50)	2 (0–25)	3 (0–50)	0.21
Personal relationships	1 (0–25)	4 (0–50)	7 (0–75)	0.05
Emotions	5 (0–58)	10 (0–50)	8 (0–58)	0.25
Sleep/energy	3 (0–37.5)	5 (0–50)	5 (0–37.5)	0.46
Severity measures	10 (0–80)	7 (0–60)	7 (0–65)	0.64

^a Friedman test

Table 5 Outcome after primary repair of OASIS

Authors	<i>n</i>	Parity	Follow-up (months)	Anal incontinence (%)
Sander et al. [14]	48	Primips and multips	12	7
Williams et al. [23]	112	Primips and multips	12	<10
Sorensen et al. [16]	38	Primips and multips	12	13
Walsh et al. [31]	81	Primips and multips	3	19
Crawford et al. [17]	35	Primips	12	23
Fernando et al. [24]	52	Primips and multips	12	>23
Mackenzie et al. [18]	53	Primips and multips	3	25
Nielsen et al. [32]	24	Primips and multips	12	29
Go and Dunselman [19]	20	Primips and multips	6	30
Uustal Fornell et al. [20]	51	?	6	40
Sultan et al. [33]	34	Primips and multips	2	41
Zetterstrom et al. [34]	46	?	9	42
Kammerer-Doak et al. [21]	15	Primips and multips	4	43
Haadem et al. [22]	62	?	3	44
Belmonte et al. [35]	20	Primips	2	50
Fitzpatrick et al. [5]	213	Primips and multips	3	53
Goffeng et al. [15]	27	Primips and multips	12	74

technique should only be used when the EAS is completely divided. The overlap technique should not be undertaken when the EAS is partially torn, as this will place undue tension on the repair. In these circumstances, if a genuine overlap repair is intended, the remaining fibers of the external sphincter need to be divided.

Despite primary repair of OASIS, between 34% [18] and 92% [5] of women in previous studies had a defect on endoanal ultrasound. In our study, only six out of 59 (10%) women had a persistent sonographic defect, suggesting that, when this protocol was adhered to by trained surgeons or under direct supervision, better anatomical results than that previously described can be achieved.

The strengths of our study was the rigorous training and supervision given to doctors in training when repairing OASIS and the formal follow-up of women in a dedicated postnatal one-stop perineal clinic with a validated bowel symptom questionnaire and endoanal ultrasound.

There are four main limitations of our study. Firstly, while all women attended follow-up at 7 weeks, only 73% were available for follow-up at 1 year and we were not able to evaluate the symptom profile of the remaining women. However, given the significant proportion of our population who reside in temporary accommodation in an urban area with a mobile population, our follow-up is still reasonable. Secondly, during the recruitment period of this study, we only had one woman who sustained an IAS injury. Thirdly, there was no control group to compare the outcome for women when managed by doctors who had not undergone intensive training in the management of OASIS. Fourthly, the

duration of follow-up was only 1 year and, as continence may change with time, a longer-term follow-up is being planned.

Anal incontinence is an unexpected complication for women following a vaginal delivery. The outcome, both in terms of symptoms of anal incontinence and restoration of anatomy, has been reported as suboptimal in previous studies. Our study suggests that the outcome of primary repair of OASIS might be improved when an evidence-based protocol is used by trained doctors. Ideally, a randomized multicentre trial should be conducted to determine the best protocol for the management of OASIS including endoanal ultrasound but the ultrasonographer should be blinded to the type of tear, suturing technique, and symptoms. In the absence of a randomized trial of operator experience, however, this study highlights the importance of training, the usefulness of a protocol, and the implementation of the evidence-based practice.

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