# Outcome of obstetric anal sphincter injuries repair techniques

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**Objective**
The objective was to compare outcomes of primary end-to-end repair versus overlap repair of the external anal sphincter following obstetric anal sphincter injuries.
**Materials and methods**
This study was carried on 30 patients with obstetric anal sphincter injuries in the Department of General Surgery, Zagazig University Hospitals, during the period from May 2015 to June 2017. The patients divided into two groups: group A was managed primarily with end-to-end repair technique of external anal sphincter and group B was managed using overlap repair technique.
**Results**
The age of the studied patients in group A ranged from 25 to 56 years, with mean of 30.8±9.9 years, and in group B, it ranged from 23 to 59 years, with mean of 31.5±8.2 years. Group A has shorter operative time and less intraoperative bleeding, with no difference between both the groups regarding fecal incontinence, flatus incontinence, dyspareunia, and perineal pain.
**Conclusion**
Obstetric anal sphincter damage and related fecal incontinence are common and can cause long-term sequelae if not detected and corrected. End-to-end repair is a simple operation that has shorter operative time and less intraoperative bleeding; however, there was no significant difference between both the groups regarding fecal incontinence, flatus incontinence, perineal pain, and dyspareunia. Early sphincter repair by a skilled surgeon minimizes the associated morbidity.

**Keywords:**
end-to-end repair, fecal incontinence, overlap repair

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## Introduction

The most common cause of sphincter lesions is obstetric trauma. Overall, 1–4% of deliveries result in lesions of the sphincter complex or of the pelvic floor [1–4].

The main risk factors include fetus weight, surgical median incision of the perineum performed to ease childbirth (episiotomy), the use of forceps, and breech presentation [5–7].

Perineal tears are classified into four grades depending on severity of extension. First-degree and second-degree tears involve the vaginal epithelium and perineal muscles, respectively, whereas third-degree and fourth-degree tears involve obstetric anal sphincter injuries (OASIS). Third-degree perineal tears involve injury to the anal sphincter and are subdivided into grade 3a, less than 50% of external anal sphincter (EAS) thickness torn; grade 3b, more than 50% of EAS thickness torn; and grade 3c, both EAS and IAS torn. Fourth-degree tears involve the anal sphincter as well as the anorectal epithelium [8]. Furthermore, anal incontinence caused by sphincter injury has been reported to be associated with very high cumulative costs for health services [9].

Optimal timing for the repair is within 3–4 months following the trauma. However, the surgical procedures are often performed years later (even if the results are less effective) [1].

The most frequently performed surgical procedure for the treatment of obstetric lesions is direct anterior sphincter suture repair [10,11].

Anal sphincter repair can be performed using end-to-end technique, thereby facing the two flaps after resecting scar tissue, as well as through overlap technique, which is performed by overlaying the residual functional extremities [12].

In this study, we compare the outcome of primary end-to-end repair versus overlap repair in the EAS injuries.

## Materials and methods

This was a prospective randomized study, and patients were simply randomized by closed envelop method. Between May 2015 and June 2017, of all surgically treated patients, 30 patients were selected with third-degree and fourth-degree anal sphincter injuries either early or late and were divided into two groups. The study was approved by the ZUH Institutional Review Board. In patients, we registered neither first degree, second degree, nor previously managed anal sphincter injury.

Group A contained 15 patients, and they were managed by primary end-to-end repair technique of EAS. Group B also contained 15 patients, and they were managed by overlap repair technique. The age of the patients in group A ranged from 25 to 56 years and in group B from 23 to 59 years. All patients were subjected to full clinical assessment for anal incontinence that includes flatus incontinence, passive soiling, and incontinence of liquid or solid stool.

Every patient was inspected for perineal body, vaginal epithelium tear, and episiotomy scar. Digital rectal examination was performed. Endoanal ultra sonography was done to identify anal sphincter complex and occult anal sphincter tear (an injury, which is clinically undetectable and recognizable just on endoanal ultrasonography). Anorectal manometry was performed to assess anal sphincter pressures, rectal sensation, rectoanal reflexes, and rectal compliance.

The techniques and possible complications were explained to the patient, and informed consent was obtained. Preoperative full bowel preparation and insertion of a Foley's catheter were applied. The analysis was conducted in June 2017, with follow-up period of 1 year (at 3, 6, and 12 months after operation) at surgery outpatient department to assess perineal pain, dyspareunia, flatus incontinence, and fecal incontinence.

### Operative techniques

The surgery was performed under either spinal or general anesthesia. The patient is placed in a lithotomy position. The incision is made at the inferior margin level of the vagina. The rectovaginal cleavage that leads to the peritoneal floor leaves the EAS of the anus posteriorly and the vaginal flap anteriorly. The levator ani muscles are now visible laterally. Therefore, preanal sutures of the levator ani are obtained with two–three polypropylene sutures 2/0 located far behind on the muscles, to avoid tightening of the vagina and potential dyspareunia.

The anterior quadrant of the EAS, often sclerotic, is then dissected and detached from the internal sphincter. The scar is followed laterally until the identification of the residual muscles/extremities is performed, on which two traction sutures can be made.

When using end-to-end technique, to restore the anatomical continuity and functional EAS as well as to restore its tension, a few approximation interrupted sutures are needed (two or three polypropylene sutures 2/0 or 0/0, depending on the muscle fiber volume, which needs to be attached).

When using overlap technique, the sphincter extremities are dissected by ~3 cm, while carefully maintaining the neurovascular bundle intact. By crossing the two traction sutures, the sphincter extremities are exposed to ensure that they are sufficiently mobilized and to obtain an overlapping of at least 2 cm without tension.

After repairing the anal sphincter, the perineal body is reconstructed by suturing the perineal muscles. The vaginal mucosa and perineal skin are repaired in the usual fashion.

## Results

In this study, age of the patients in group A ranged from 25 to 56 years, with a mean of 30.8±9.9 years, and in group B from 23 to 59 years, with a mean of 31.5± 8.2; no significant difference was found between both the groups regarding age ($P$=0.61).

In group A (end-to-end repair), 11 (73.3%) patients had 3b-degree tear, three (20%) 3c degree, and one (6.7%) fourth degree. In group B (overlap repair), 12 (80%) patients had 3b-degree tear, two (13.3%) 3c degree, and one (6.7%) fourth degree. It is obvious that 3b-degree anal sphincter injury is the most common in both groups (Table 1).

The mean operative time in the end-to-end group was 33.66±4.6 min (range: 20–60 min), and it was 45.4± 8.8 min (range: 30–80 min) in the overlap group, with the overlap technique indicating longer operative time.

Blood loss during end-to-end repair was ~100–300 ml, with mean of 200±20, and in overlap group, it was

~150–600 ml, with mean of 370±30. The overlap technique had more intraoperative bleeding (Table 2).

After 3 months, in group A, four patients of 15 experienced perineal pain, whereas in group B, three of 15 experienced perineal pain. After 6 months, two patients of 14 experienced perianal pain in group A whereas in group B, one of 14 experienced that pain. One patient was lost to follow-up in both groups. After 12 months, one patient of 13 experienced perineal pain in group A and one of 14 experienced perineal pain in group B. Another patient was lost to follow-up after 12 months in group A. No significant difference was found between both groups regarding perineal pain during follow-up (Table 3).

Regarding dyspareunia during follow-up, at 3 months, four patients in group A and five in group B experienced dyspareunia. At 6 months of follow-up, one patient in each group showed improvement of dyspareunia. At 12 months, two patients in group A and three patients in group B experienced no more dyspareunia. No significant difference was found between both groups regarding dyspareunia during follow-up (Table 4).

Of the 15 patients in group A, five experienced flatus incontinence after 3 months, and in group B, three patients of 15 experienced flatus incontinence. At 6 months of follow-up, four of 14 patients experienced flatus incontinence in group A, whereas in group B, three of 14 experienced flatus incontinence. One patient in each group experienced improvement of flatus incontinence. One patient in each group was lost to follow-up at 6 months. At 12 months of follow-up, three patients of 13 patients experienced flatus incontinence, whereas in group B, two of 14 patients experienced flatus incontinence. One patient in each group showed improvement of flatus incontinence, and one patient in group A was lost to follow-up. No significant difference was found between both groups regarding flatus incontinence at 3, 6, and 12 months of follow-up (Table 5).

**Table 1 Degree of anal sphincter injury distribution in both groups**

| Degree of anal sphincter injury | Groups | | Total | $\chi^2$ | *P* |
|---|---|---|---|---|---|
| | Group A: end to end | Group B: overlap | | | |
| 3b degree | 11 (73.3) | 12 (80.0) | 23 (76.6) | 0.24 | 0.9 |
| 3c degree | 3 (20.2) | 2 (13.3) | 5 (16.7) | | |
| Fourth degree | 1 (6.7) | 1 (6.7) | 2 (6.7) | | |
| Total | 15 (100.0) | 15 (100.0) | 30 (100.0) | | |

This table shows 3b-degree anal sphincter injury is the most common in both groups.

**Table 2 Intraoperative bleeding in both groups**

| Bleeding | Groups | | Total | $\chi^2$ | *P* |
|---|---|---|---|---|---|
| | Group A: end to end | Group B: overlap | | | |
| Yes | | | | | |
| Amount (ml) | 100–300 | 150–600 | 1 | 1.03 | 0.3 |
| Mean±SD | 200±20 | 370±30 | 3.3% | | |

This table shows that overlap technique has more intraoperative bleeding.

**Table 3 Perineal pain distribution in both groups at 3, 6, and 12 months**

| Perineal pain | Groups [*n*/*N* (%)] | | Total [*n*/*N* (%)] | $\chi^2$ | *P* |
|---|---|---|---|---|---|
| | Group A: end to end | Group B: overlap | | | |
| 3 months | 4/15 (26.6) | 3/15 (20.0) | 6/30 (20.0) | 0.14 | 0.9 |
| 6 months | 2/14 (14.2) | 1/14 (7.1) | 3/28 (10.7) | | |
| 12 months | 1/13 (7.7) | 1/14 (7.1) | 1/27 (3.7) | | |

This table shows no difference between both the groups regarding perineal pain.

**Table 4 Dyspareunia distribution in both groups at 3, 6, and 12 months**

| Dyspareunia | Groups [*n*/*N* (%)] | | Total [*n*/*N* (%)] | $\chi^2$ | *P* |
|---|---|---|---|---|---|
| | Group A: end to end | Group B: overlap | | | |
| 3 months | 4/15 (26.6) | 5/15 (33.3) | 9/30 (30.0) | 0.03 | 0.9 |
| 6 months | 3/14 (21.4) | 4/14 (28.5) | 7/28 (25.0) | | |
| 12 months | 1/13 (7.7) | 1/14 (7.1) | 2/27 (7.4) | | |

This table shows no difference between both the groups regarding dyspareunia.

In group A, three of 15 patients experienced fecal incontinence after 3 months, and in group B, two of 15 patients experienced fecal incontinence. At 6 months of follow-up, one of 14 patients experienced fecal incontinence in group B. One patient in group B experienced improvement of fecal incontinence. One patient in each group was lost to follow-up at 6 months. At 12 months of follow-up, two out of 13 patients experienced fecal incontinence in group A. One patient in group A showed improvement of fecal incontinence, and one was lost to follow-up. No significant difference was found between both the groups regarding fecal incontinence (Table 6).

## Discussion

Obstetric sphincter lesions can be detected immediately postpartum and are caused by third-degree laceration [13]. In ~40% of cases, continence disorders are detected as early as 6 months after delivery [5]. The compensation of the pelvic muscles frequently disguises sphincter function deficit; however, with time, abnormalities deviously evolve along with muscle weakening, most frequently during menopause, and are discovered years later [14,15].

OASIS can be associated with significant short-term and long-term consequences like pain, infection, and sexual dysfunction; they vary in severity and affect the quality of life of the patient. This may in turn result in considerable economic burden to healthcare providers and patients. It also has an implication on future deliveries. Although it can never be eliminated, it can be reduced by improving practice, training, and provision of high-quality multidisciplinary care to reduce long-term morbidity [16].

OASIS is the primary cause of fecal incontinence in women. These injuries may be clinically recognized as third-degree or fourth-degree tears or may be occult and diagnosed using ultrasound. Repair of injuries recognized at delivery by an experienced operator using a standard protocol, and either end-to-end approximation or overlap techniques of the external sphincter, has been proven to greatly improve the outcome for women by reducing symptoms of fecal incontinence and the persistence of sphincter defects seen on follow-up ultrasound [17].

In the present study, the age of the studied patients in group A ranged from 25 to 56 years old, with mean of 30.8±9.9 years, and in group B ranged from 23 to 59 years, with mean of 31.5±8.2 years. There was no significant difference regarding age in both groups.

Regarding the degree of anal sphincter injury distribution among groups, there was no significant difference between both groups as the 3b-degree anal sphincter injury is most common injury noticed in both groups (80.0% in overlap technique vs. 73.3% in the end-to-end technique).

Fernando found that 3b-degree anal sphincter injury is most common injury noticed in both groups (78.1% in overlap technique vs. 75% in the end-to-end technique) [18].

Moreover, in our study, there was a statistically significant difference regarding the operative time as cases managed using the end-to-end technique have shorter operative time, with mean of 33.66±4.6 min, than cases managed using the overlap technique, with mean of 45.4±8.8 min

Our result goes with the study by Fernando *et al.* [18] that found that there was a significant difference between both the groups regarding operative time,

**Table 5 Flatus incontinence distribution in both groups at 3, 6, and 12 months**

| Flatus incontinence | Groups [*n*/*N* (%)] | | Total [*n*/*N* (%)] | $\chi^2$ | *P* |
|---|---|---|---|---|---|
| | Group A: end to end | Group B: overlap | | | |
| 3 months | 5/15 (33.3) | 3/15 (20.0) | 8/30 (26.6) | 0.04 | 1 |
| 6 months | 4/14 (28.5) | 3/14 (21.4) | 7/28 (25) | | |
| 12 months | 3/13 (23) | 2/14 (14.2) | 5/27 (18.5) | | |

This table shows no difference between both groups regarding flatus incontinence distribution at 3, 6, and 12 months.

**Table 6 Fecal incontinence distribution in both groups at 3, 6, and 12 months**

| Fecal incontinence | Groups [*n*/*N* (%)] | | Total [*n*/*N* (%)] | $\chi^2$ | *P* |
|---|---|---|---|---|---|
| | Group A: end to end | Group B: overlap | | | |
| 3 months | 3/15 (20.0) | 2/15 (13.3) | 7/30 (23.3) | 0.23 | 0.9 |
| 6 months | 3/14 (21.4) | 1/14 (7.1) | 4/28 (14.2) | | |
| 12 months | 2/13 (15.3) | 1/14 (7.1) | 3/27 (11.1) | | |

This table shows no difference between both the groups regarding fecal incontinence.

with median 28 min (range: 15–55 min) in the end-to-end technique versus 38 min (range: 15–70 min) in the overlap technique.

Regarding intraoperative bleeding, the end-to-end technique has less intraoperative bleeding, with mean of 200±20 ml, than cases managed using the overlap technique, with mean of 370±30 ml (6.75%).

Fernando *et al*. [18] recorded that the median estimated blood loss in the overlap group was 260 ml (range: 100–600) compared with 100 ml (range: 100–450) in the end-to-end group.

Regarding perineal pain distribution among groups (Table 3), no difference between both the groups was observed at 3, 6, and 12 months.

Williams *et al*. [19] found that there was no statistically significant difference in the perineal pain between the two repair techniques. Fernando *et al*. [18] found that there was no significant difference in perineal pain from 6 weeks up to 6 months. However, at 12 months, a significant proportion of women in the end-to-end group reported perineal pain.

In our study, there was no difference between both the groups regarding dyspareunia distribution at 3, 6, and 12 months.Fernando *et al*. [18] and Rygh and Korner [20] found that there was no statistically significant difference in dyspareunia between the overlap and end-to-end groups.

In our study, that there was no difference between both the groups regarding flatus incontinence distribution at 3, 6, and 12 months.

Fernando *et al*. [18], Farrell *et al*. [21], and Rygh and Korner [20] found that at 6 months, there was a statistically significant difference in flatus incontinence, favoring the end-to-end group, but there were no differences in flatus incontinence between the two groups at any of the other time points.

Regarding fecal incontinence, no difference was found between both the groups in our study, and this was in agreement with Farrell *et al*. [21] and Rygh and Korner [20] who did not show a statistically significant difference the incidence of fecal incontinence between the two repair techniques.

Fernando *et al*. [18] found that a significant proportion of women in the overlap group reported an improvement in symptoms of fecal incontinence from 6 weeks to 12 months.

Considering the aspects evaluated in this study, there was no statistically significant difference between end-to-end repair and overlap repair techniques. However, a larger sample size may result in projection of more detailed comparison between the two techniques.

## Conclusion

Obstetric anal sphincter damage and related fecal incontinence are common and can cause long-term sequelae if not detected and corrected. End-to-end repair is a simple operation that has shorter operative time and less intraoperative bleeding; however, no significant difference was observed between both the groups regarding fecal incontinence, flatus incontinence, perineal pain, and dyspareunia.

Early repair of injuries recognized at delivery by an experienced operator using a standard protocol minimizes the associated morbidity.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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