

Traumatic Sphincter Injury : When to repair and how to improve long term outcome ?

**BY,**

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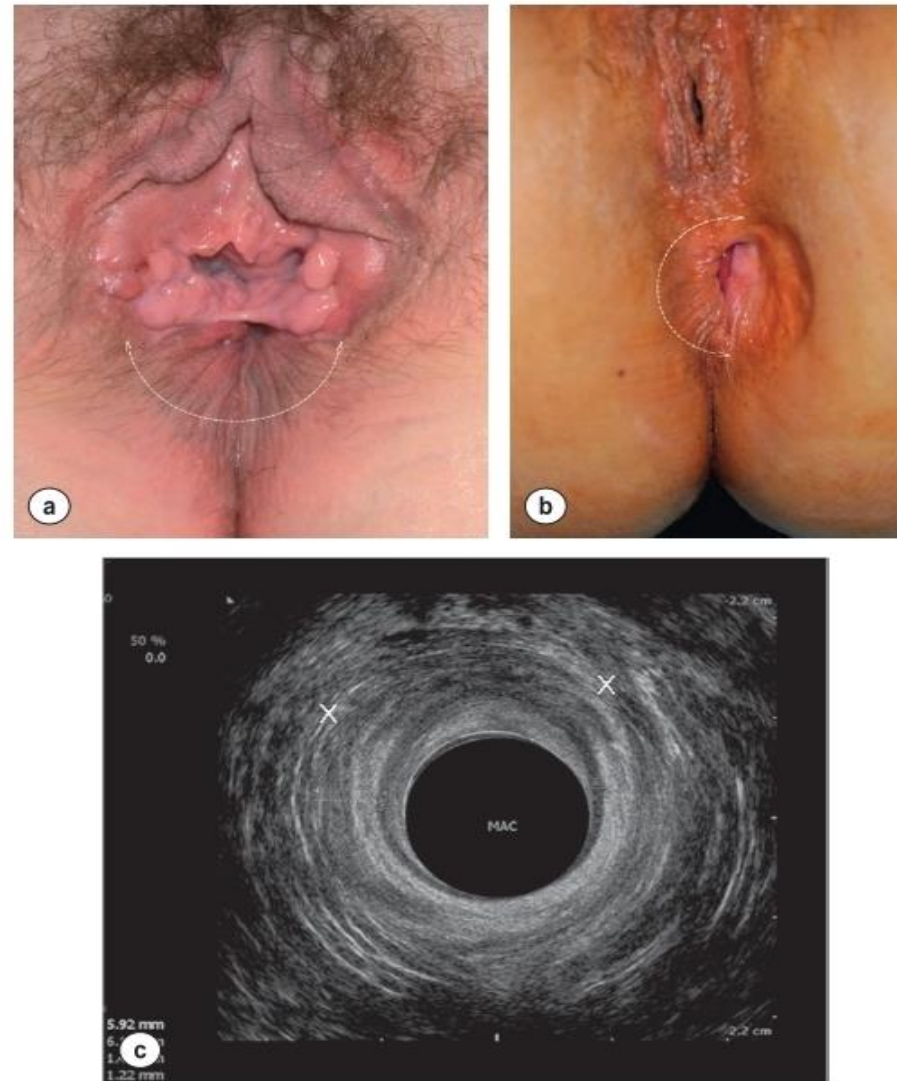
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## ❖ SPHINCTER INJURY.

- In adult females, the most common cause of sphincter injury is obstetric trauma.
- After Vaginal delivery up to 10% of primiparous women have a clinically recognized sphincter disruption and the incidence of occult injuries diagnosed sonographically can be as high as 30 % after normal delivery.
- More complicated delivery such as using instruments, large birth weight, prolonged 2<sup>nd</sup> stage of labor are shown to increase risk.

- Anorectal surgical procedures responsible for direct trauma to anal sphincter include hemorrhoidectomy and fistulotomy.
- Trauma to perineum or pelvis such as pelvic fractures can be associated with significant damage to sphincter or its nerve supply.




**Figure 11.2 • (a)** Examination in lithotomy (gynaecological) position: anterior anal sphincter defect, a sequela of fourth degree tear following vaginal delivery. (Obstetric injury) of the perineum is classified as a first-degree tear if confined to vaginal mucosa and perineal skin, second degree if the perineal muscles are torn, third degree if the anal sphincter is torn, and fourth degree if both sphincter and anorectal mucosa is torn. In the illustrated situation, the anal sphincter muscles and perineal body have separated, leaving a large anterior hemi-circumferential defect splaying open the anal sphincters in a horseshoe-type configuration (arrows). Here the defect was such that the anal and vaginal mucosa have healed to form a cloacal defect. **(b)** Examination in lithotomy (gynaecological) position: left lateral anal sphincter defect, sequela of an extensive fistulotomy for complex anal fistula, resulting in a gaping anus (arrows). **(c)** Endoanal ultrasonography (EAUS). Anterior defect of internal and external sphincters (marks) visualised on two-dimensional image of the anal canal.

- Sphincter injuries can result in immediate incontinence or can present many years later in the setting of worsening pudendal neuropathy or age related degeneration of muscle fibers.
- So, sphincteroplasty is gold standard for young women with obvious sphincter defect and this due to the fact that older women have other factors that contribute to their incontinence such as pudendal neuropathy or other medical condition.



# ❖ SPHINCTER REPAIR.

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- Anal sphincteroplasty describes a secondary (delayed) repair and is distinct from Anal sphincter repair ,a term used to describe primary (immediate repair) following trauma.
  - Anterior sphincteroplasty following an obstetric injury is the most common type of reconstruction performed.

# Primary (immediate) repair:

## ► Acute perineal injury :

- Patients presented with acute injury caused by direct trauma may be fecal contamination of injured field .Management will involve a decision whether or not to perform a defunctioning stoma along with debridement of the wound ,removing nonviable tissue and foreign material . After recovery ,any pelvic floor damage can be repaired and it is recommended that repair should not be performed for at least 3 months to allow the acute inflammation to settle.



► Acute obstetric Injury :

- In third or fourth perineal tear ,Immediate repair of an injury of the perineum or the sphincter muscle has the best chance to obtain an optimal functional result , although there is high incidence of ultrasound evidence of the development of a subsequent defect occurring over months and patients would come under the care of colorectal surgeons complaining of fecal incontinence months to years later.

# Anal sphincteroplasty (delayed repair) :

- ▶ Before 2000, There were many publications that demonstrated improvement in continence after delayed sphincter repair in up to 80%, But the report of **Malouf ,et al** as well as others subsequently showed that in many cases an initially good result was followed by deterioration about 50 % after 5 years later.
- ▶ So, Anal sphincteroplasty usually preserved for patients with fecal incontinence who do not respond to initial management and have evidence of anatomic sphincter injury on ERUS or MRI shortly after vaginal delivery.

IN recent retrospective study **Berkesoglu et al 2020** assessed the long term results in patients underwent sphincteroplasty between 2006 to 2018 .fifty patients were assessed in details with median follow up 62 months.

Good or excellent result obtained surgically especially among patient younger than 50 years and among patients who underwent surgery within the first five years after trauma.

Although improvement impaired by time ,the postoperative Wexner score remain better than preoperative.

**Table 1.** Results from the patients and surgery

	n (%)	Mean ± standard deviation (SD)
<b>Sex</b>		
Women	36 (72)	
Men	14 (28)	
<b>Etiology</b>		
Vaginal delivery	27 (54)	
Anorectal surgery	12 (24)	
Nonsurgical trauma (any other trauma or abuse)	11 (22)	
<b>Surgery</b>		
Overlapping sphincteroplasty	41 (82)	
End-to-end sphincteroplasty	9 (18)	
<b>Surgery</b>		
Early reconstruction (within 14 days)	16 (32)	
Elective surgery	34 (68)	
<b>Mean age</b>		44.6 ± 15.1 years
<b>Interval between injury and surgery</b>		5.6 ± 8.2 years
<b>Mean Wexner score</b>		
Preoperative		15.5 ± 3.2
First postoperative month		1.92 ± 3.15
At the time of this report		3.9 ± 5.3

A systematic review by Sean Glasgow in DCR journal 2012

.Data from 16 studies (nearly 900 repairs).

In general, most series reported an initial subjectively (good ) outcome in the majority of patients ,With declines in this proportion over longer follow up.

Despite worsening results over time ,most patients remain satisfied with their surgical outcome after sphincteroplasty.

**TABLE 3.** Long-term results following anterior sphincter repair for fecal incontinence

<i>Authors (No. at follow-up)</i>	<i>Excellent</i>	<i>Good</i>	<i>Fair</i>	<i>Poor</i>
Londono-Schimmer et al <sup>5</sup> (94)	15	45	18.3	21.6
Malouf et al <sup>6</sup> (38)		50		50
Halverson and Hull <sup>14</sup> (49)	12.2	36.7	54	
Vaizey et al <sup>24</sup> (19)	4.8	47.6	28.5	19
Bravo-Gutierrez et al <sup>16</sup> (182)	6	6	19	57
Zorcolo et al <sup>25</sup> (62)	10	44	21.5	15
Trowbridge et al <sup>23</sup> (59)	10	14	69	
Barisic et al <sup>15</sup> (56)	26.8	21.4	12.5	39.3
Maslekar et al <sup>19</sup> (64)	22	40	24	15
Oom et al <sup>21</sup> (120)	6	31	23	40
Riss et al <sup>22</sup> (21)	28.6	38.1	14.3	19
Mevik et al <sup>20</sup> (25)	20	16	20	44
Johnson et al <sup>18</sup> (33)	9	55	27	9
Ratto et al <sup>8</sup> (14)	85.7		14.3	

Fair outcomes include minimal improvement or no change, whereas poor outcomes include worse fecal incontinence; when possible, original authors' definitions of outcome were used. Values expressed as percentage of patients at follow-up.

The most recent systematic review by **Lakmal et al published in T of coloproctology 2021**

A total of 22 studies describing the outcomes of overlap sphincter repair were selected .

However, 14 studies used other surgical techniques in addition to overlap repair; therefore, they were excluded from the analysis. Data from 8 studies including 429 repairs were used in the final analysis; there were 4 prospective studies, 3 retrospective studies and one randomized control trial. The majority of the patients were female (n:407; 94.87%), and the mean age of the included individuals was 44.6 years. The most common etiology for sphincter damage was obstetric injuries (89.51%).

All included studies described long-term outcomes, and seven of them described statistical significant improvements in the continence. However, one study described a poor outcome in terms of overall continence. Two studies mentioned both short- and long-term outcomes.

The long-term scores were significantly better compared with the preoperative scores. However, compared with the short term scores, a statistically significant deterioration was noted in the long-term.

**Table 1** Summary of the findings of studies included in the systematic review

	Author	Location	Study design	N	Demographics	Injury pattern	Timing of the surgery	Preoperative investigations	Type of surgery	Short-term outcome (less than 1 year)	Long-term outcome (more than 1 year)
1	Maldonado et al., <sup>12</sup> 2019	United States	Retrospective study	29	All-female sample (mean age: 31.8 years)	fourth-degree lacerations (cloacal-like deformities)	Mean: 68.1 months	Presenting symptoms and physical examination	EAS OLR	NA	53.8% reported complete continence at a mean follow-up of 7.0 ± 3.6 years
2	Khafagy et al., <sup>9</sup> 2017	Egypt	Case-control study	Total -40 ORLs in 20 patients	M = 11 (55%); F = 9 (45%); mean age: 30.6 ± 17.5 years	anal fistula ( <i>n</i> = 19; 47.5%); perineal trauma ( <i>n</i> = 6; 15%); obstetric trauma – third degree perineal tear ( <i>n</i> = 5; 12.5%); perianal necrotizing fasciitis ( <i>n</i> = 5; 12.5%); hemorrhoidectomy ( <i>n</i> = 3; 7.5%); stricturotomy for anal stenosis ( <i>n</i> = 2; 5%)	1.01 ± 0.35 years	Wexner continence score, anorectal manometry, Endoanal US	EAS OLR +/-BMAC	6 months to 12 months; mean Wexner score changes from 7.7 to 7.4	NA
3	El-Gazzaz et al., <sup>11</sup> 2012	United States	Retrospective study	197	All-female sample; 146 (74.1%) patients in group A (< 60 years old); 51 (25.9%) patients in group B (> 60 years old); overall mean age at surgery: 50.4 years	obstetric injuries	NA	FIQL; FISl	EAS OLR	NA	The mean FISl score changed from 27.2 to 29.8 over an average of 7.7 years of follow-up
4	Zutshi et al., <sup>10</sup> 2009	United States	Prospective	N = 44 at the 5-year follow-up, and <i>n</i> = 31 at the 10-year follow-up	Median age at surgery: 5-year follow-up group -38.5 years; 10-year follow-up group - 44 years	Obstetric trauma: 70.4%; iatrogenic: 15.9%; trauma: 6.8%; not reported: 6.8%	NA	FIQL; FISl; Bristol Stool Form Scale	EAS OLR	NA	Changes in scores from 5 years to 10 years of follow-up: a) mean patient-related FISl – from 21 to 39.39; b) mean surgeon-related FISl – from 20 to 39.97; c) mean FIQL – from 12 to 10.82
5	Dobben et al., <sup>8</sup> 2007	Netherlands	Prospective	30	97% of females; mean age: 50 Years (± 12 years)	Obstetric trauma: 97%	Median: 6.5years (0.5–22 years)	Vaizey incontinence score and Endoanal US, and MRI	EAS ORL	After surgery, the mean Vaizey score improved from 18 to 13 ( <i>p</i> < 0.001)	NA
6	Barisic et al., <sup>7</sup> 2006	Serbia	Prospective	65	Females: 55 (84.61%); males: 10 (15.38%); mean age: 35.9 years (range: 18–64 years).	Obstetric trauma: 72.3%; fistulotomy: 13.8%; non-specific Trauma: 9.2%; war injury: 4.6%.	Range: 0.5 to 20 years	Wexner score; Browning–Parks scale; anal Manometry; electromyography; defecography	EAS OLR	Wexner score improved from 17.8 preoperatively to 3.6 three months after the operation	Wexner deteriorated over time to 6.3 after an average of 80.1 months of follow-up
7	Tjandra et al., <sup>14</sup> 2003	Australia	Randomized controlled trial	Total -23; OLR -11 direct end-to-end repair -12	all female; DR 47y (32–71), OLR 45y (31–68);	Obstetric trauma	1 year	Endoanal US; anorectal manometry; neurophysiologic; Cleveland Clinic Continence Score	DR ; OLR	Mean Cleveland score changed from 17 to 3 postoperatively; maximum squeeze pressure changed from 80 mm Hg to 130 mm Hg postoperatively	Median follow-up of 18 months - improvement in continence scores ( <i>p</i> < 0.05).
8	Malouf et al., <sup>13</sup> 2000	United Kingdom	Retrospective	38	All-female sample; mean age: 43 years (26–67 yeaus)	Obstetric-related trauma	NA	Modified Park's continence Scores; resting anal pressure; maximum squeeze anal pressure; sphincter length; pudendal nerve latencies; Endoanal US	OLR	NA	Outcome assessed at a median of 15 and 77 months; at 15 months, median Modified Park's score preoperatively: 4; 15 months post operatively: 2; and 77 months postoperatively: 3

**Abbreviations:** BMAC, bone marrow aspirate concentrate; DR, direct repair; EAS OLR, external anal sphincter overlap repair; F, female; FIQL, Fecal Incontinence Quality of Life Scale; FISl, Fecal Incontinence Severity Index; M, male; MRI, magnetic resonance imaging; NA, not available; ORL, overlap repair; US, ultrasound.

❖ Predictors of worse outcome are :

older age >50 ys.

defect >180 degrees.

Wound infection.

At present ,no single preoperative manometric variable can predict outcome after sphincter repair.

***Efforts should directed at identifying patients who may do poorly after sphincteroplasty to assist in in patient seletion for overlap repair.***



# ❖ HOW TO IMPROVE LONG TERM OUTCOME

1-There is evidence that a primary repair should be carried out when possible because long term quality of life appears to be better than delayed repair.

Tan and coworkers reviewed studies reporting the results of 103 primary repair and 777 delayed repair . At 10 years ,there was respective gains in QALYs of 5.72 and 3.73,making primary repair about twice as cost effective. **(Tan, et al colorectal disease 2008)**

2-Proper selection of cases (as mentioned before )improve long term outcome.

3-proper surgical technique theoretically (discussed later )improve long term outcome.

4-some recent studies emphasize the value of biofeedback and pelvic exercise in improving long term functional outcome but must be done after complete healing (several weeks to months).

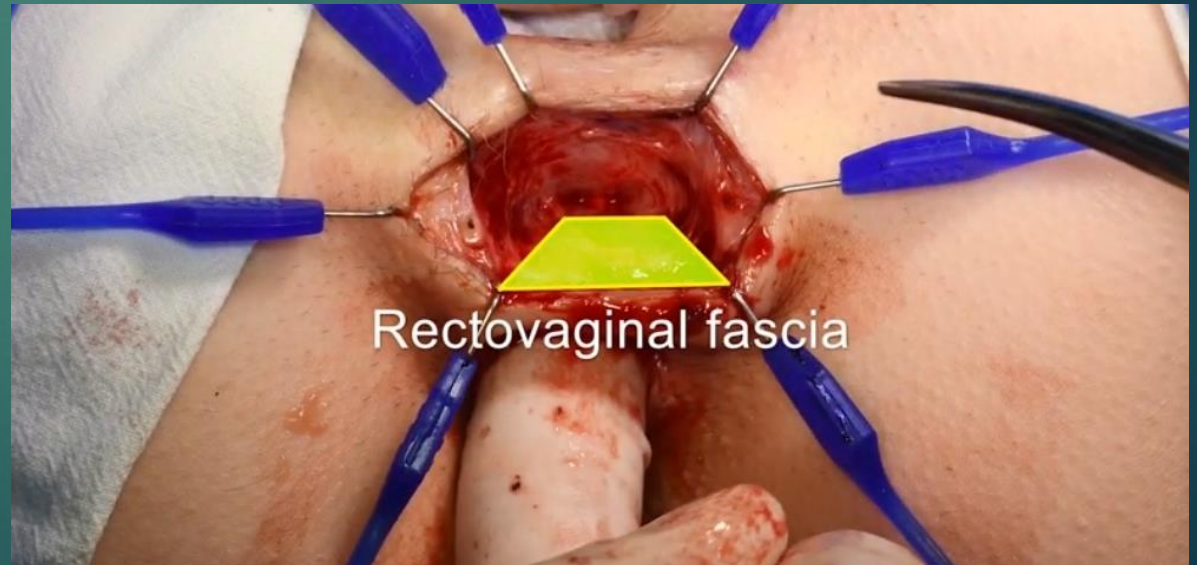
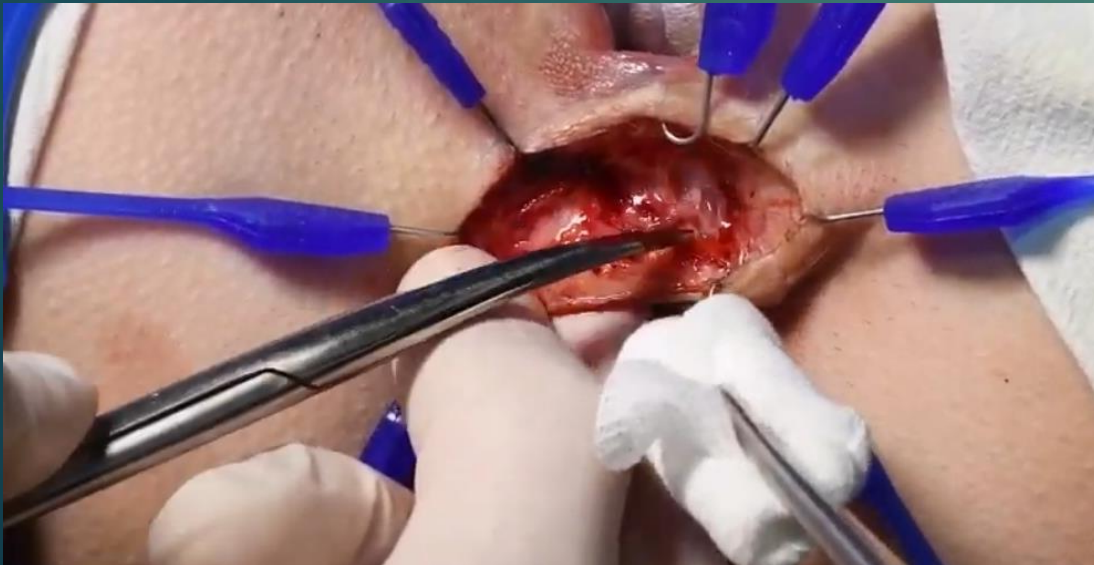
Leila et al 2016, assessed functional outcome in 27 women with fecal incontinence because of delivery trauma . patients underwent anterior sphincteroplasty and randomized divided to 3 groups postoperative . group 1 biofeedback therapy was performed 3months before and 6 months after surgery. Group 2 biofeedback was performed 6 months after surgery. Group 3 only surgical management was performed.

The result revealed that the reduction in Wexner score was less in group 3.

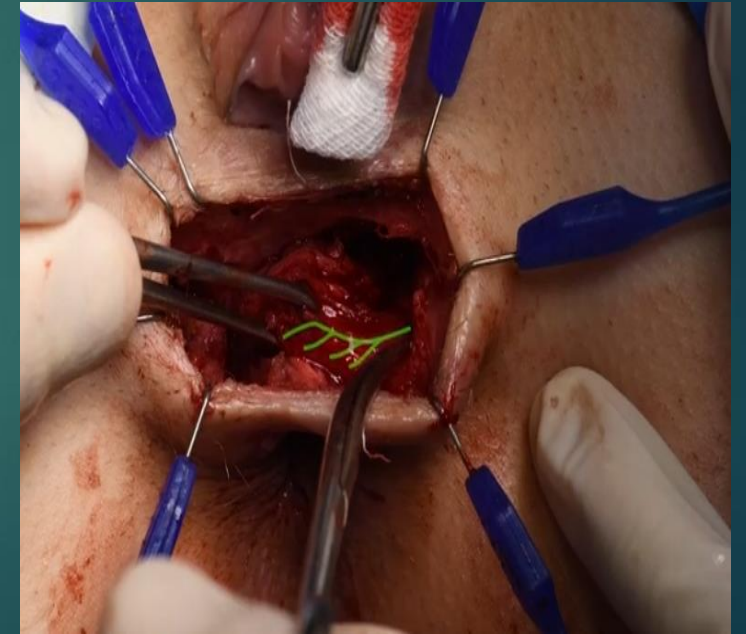
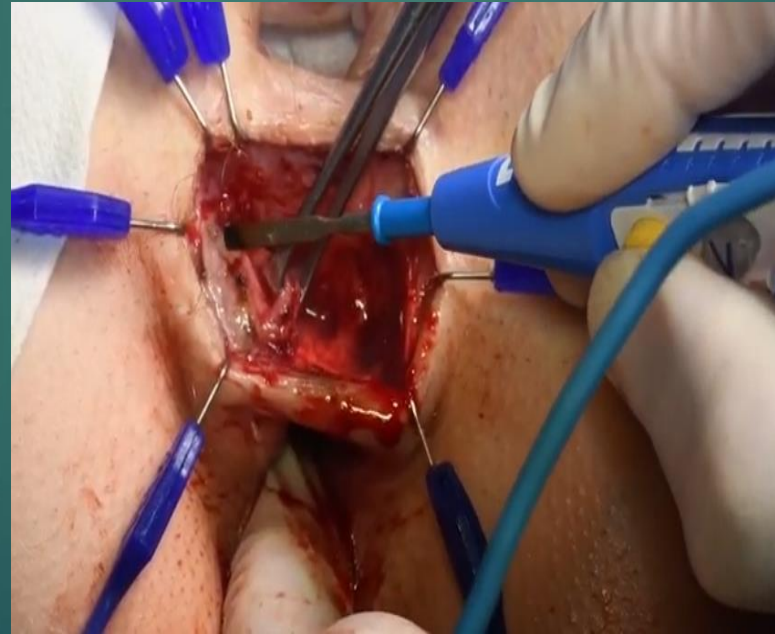
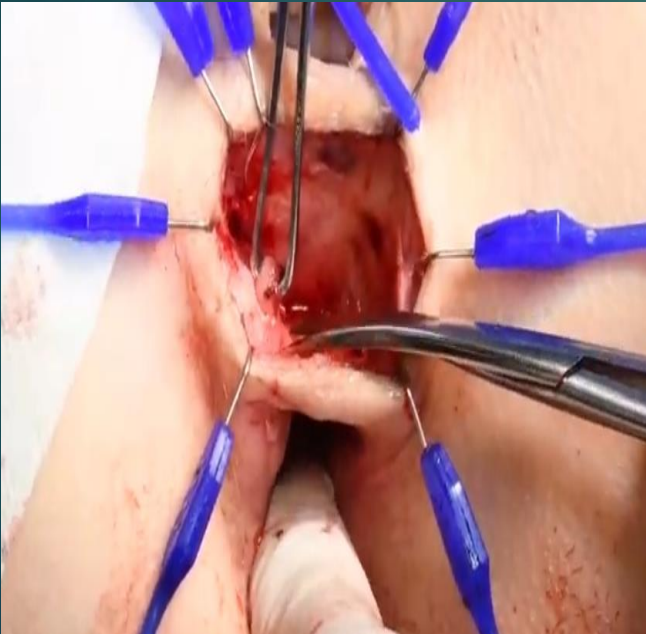
# Proper surgical technique :

- ▶ **Anesthesia** — General anesthesia without paralysis (eg, laryngeal mask anesthesia) facilitates identification of the sphincter muscles.
- ▶ **Foley catheter** — A Foley catheter is placed before the procedure. The Foley catheter is typically left in overnight and removed the morning after surgery because pain from the anal surgery often inhibits spontaneous voiding.
- ▶ **Positioning** — Patients may be positioned in either the dorsal lithotomy or a jack knife prone position for the repair.
- ▶ **Surgical goals** — The goal of sphincter repair is reconstruction of a cylindrical anal canal utilizing both external sphincter muscle and perineal body scar to allow circumferential contraction of the anal musculature when the patient attempts to defer defecation.

- **Incision** — The perineal body is incised transversely in the plane that separates the rectum from the vagina.
- **Dissection** —
  - The vaginal and rectal walls are separated from each other by dissection to the levator ani complex, with care to avoid injuring the rectum, which could lead to a rectovaginal fistula postoperatively.
  - The scar and the external sphincter muscles are carefully freed from the internal sphincter to allow the left and right external sphincter and scar complexes to overlap anteriorly. The scar connection to the muscle should not be trimmed off, as it is utilized in the repair.

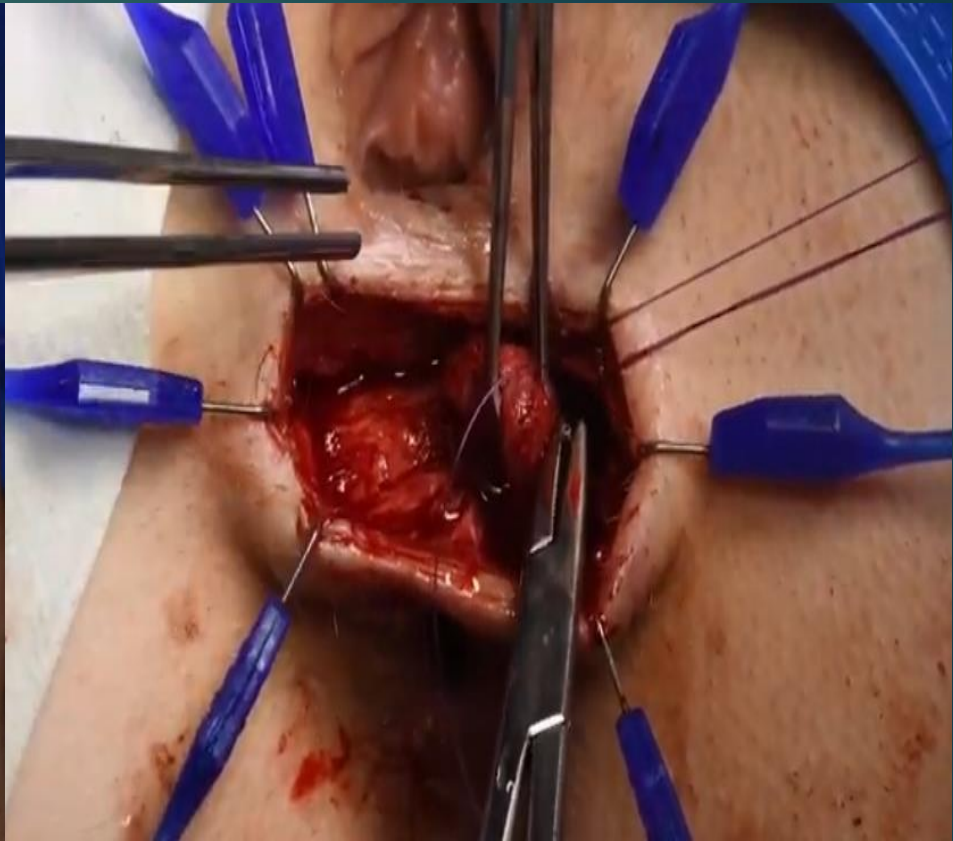
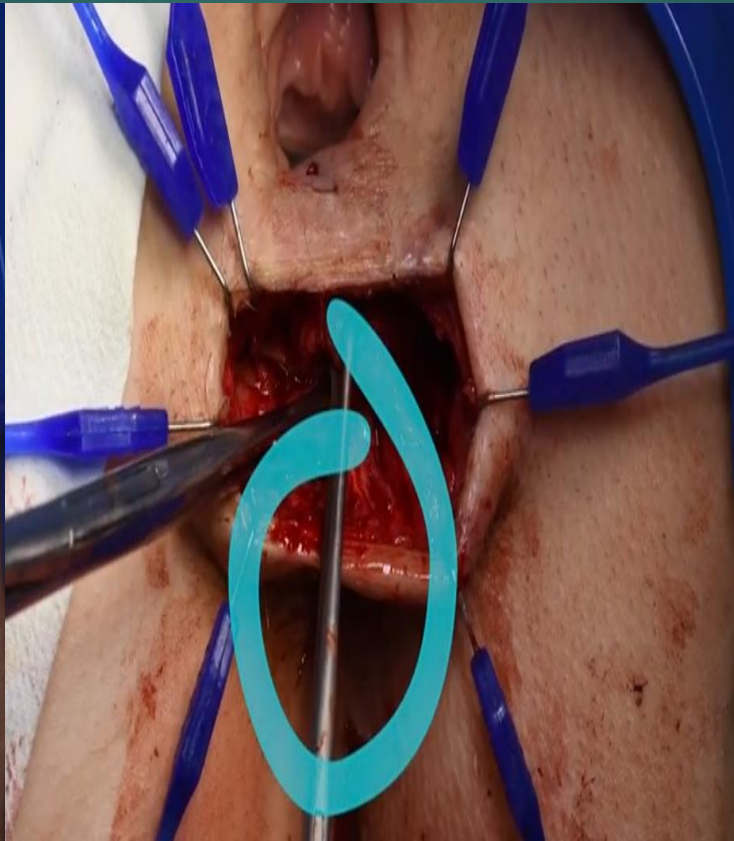
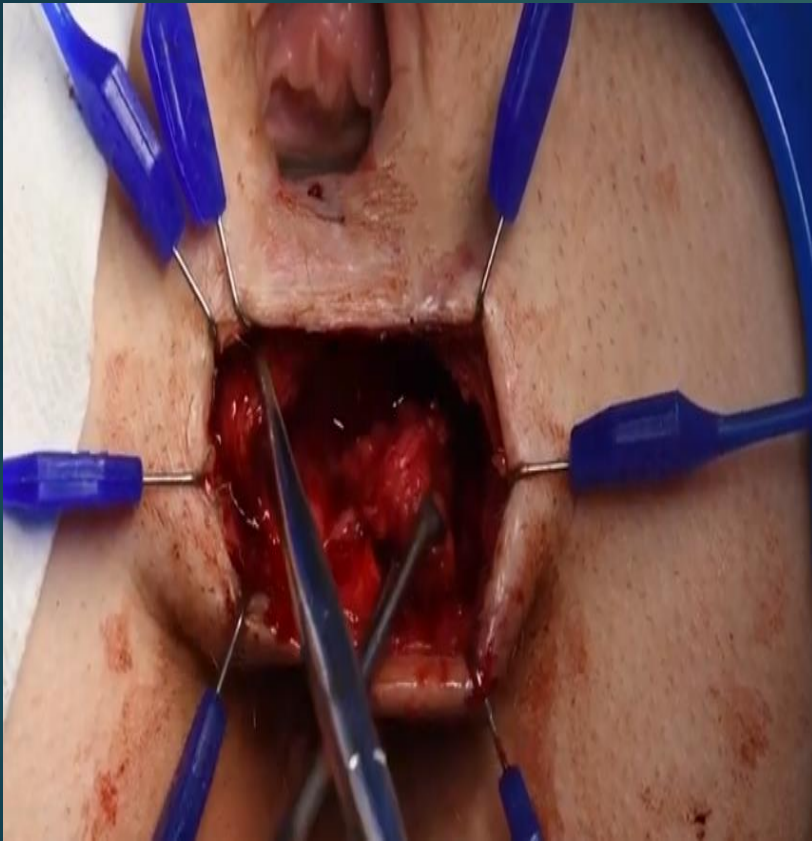


- During this dissection, care should be taken not to extend the original incision and the final dissection laterally beyond the 180 degree circumference of the anus, as this may injure the pudendal nerves and thus compromise functional outcomes.
- In situations where the internal anal sphincter is also injured anteriorly, both internal and external sphincters are mobilized en block to create the overlapping repair. Although some surgeons advocate separate dissection of the internal and external sphincters, we and others believe that this extra step is difficult to perform and does not necessarily translate in better function postoperatively

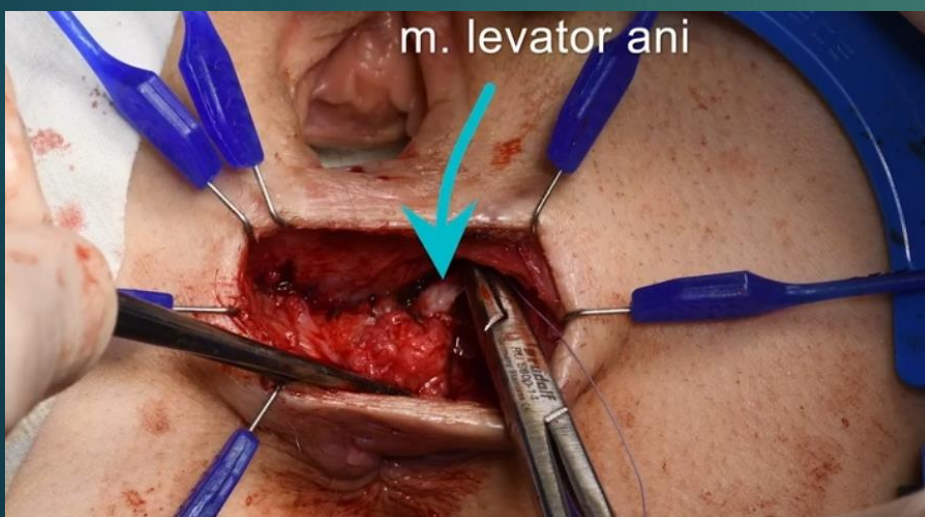


## ➤ Repair :

- We use an overlap technique to attach the snapped ends of the external anal sphincter and the perineal body scar, which are sutured to each other with absorbable horizontal mattress stitch as non absorbable sutures may lead to abscess formation or persistent sinus.
- These sutures should be placed in the scar, since the sutures are more likely to hold if placed in fibrous tissue.
- The goal is to create an overlap that forms a circumferential functioning muscular tunnel that surrounds the anal canal.
- Preservation of scar minimizes the lateral dissection necessary to create this tunnel and thus decreases the risk of injury to the pudendal nerves, which run laterally to the anal sphincter.
- Retrospective data suggest that preservation and utilization of scar in the overlap repair may improve short-term and long-term functional outcomes . However, no data from randomized trials are available to support this recommendation.



- some surgeons, including myself, perform a levatorplasty to lengthen the anal canal, believing that this added maneuver may improve functional outcomes .But care should be taken to avoid narrowing of anal canal.
- Lastly, the subcutaneous tissue and the skin are loosely closed with interrupted absorbable sutures. This allows drainage, which is important given the high risk of postoperative wound infections in these patients.
- Diverting colostomy does not improve functional results or healing following repair . We typically reserve colostomy for selected patients who present particularly challenging cases, such as some patients with Crohn's disease or recurrent sphincter repair.



ANAL SPHINCTER REPAIR:  
HOW I DO IT  
Prof.Waleed Omar.MD



▶ THANK YOU.