The “Terminal Line”: A Novel Sign for the Identification of Distal Mesorectum End During TME for Rectal Cancer

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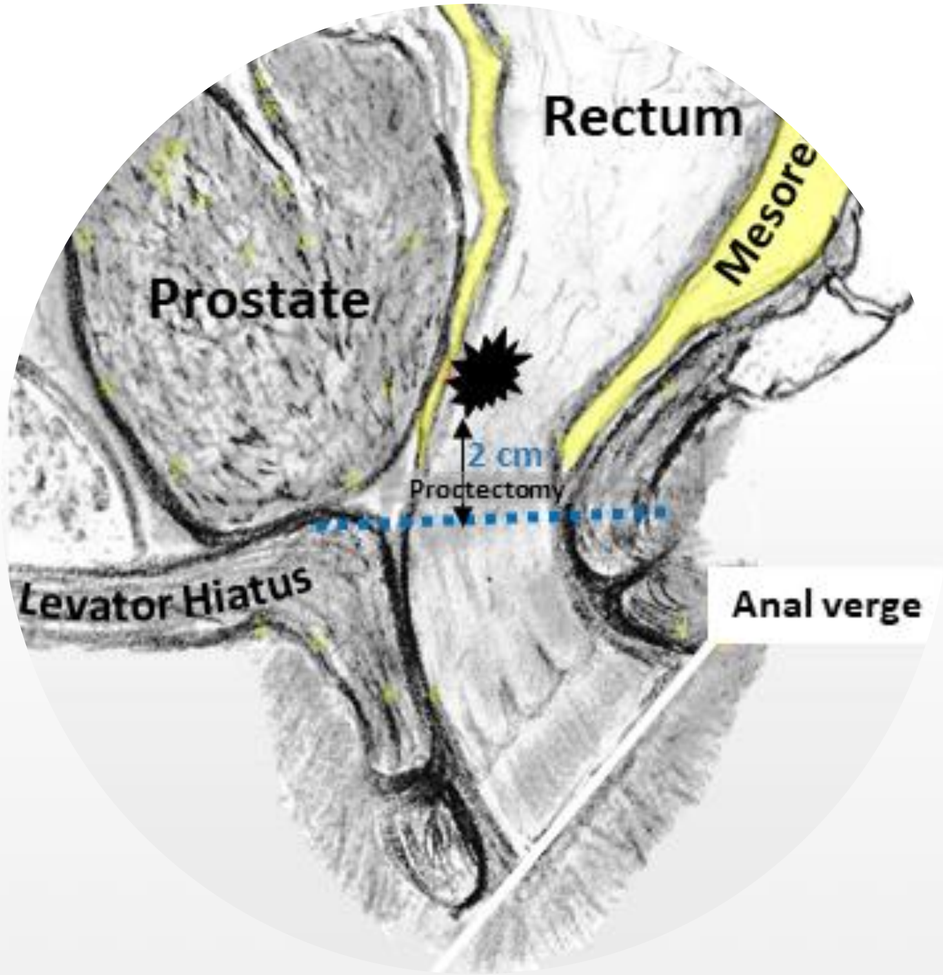


Disclosure

No disclosure to be declared

TME Terminal line??

Since Prof. Heald proposed the application of total mesorectal excision (TME) in the treatment of middle and low rectal cancer in 1982, the recurrence rate of rectal cancer after surgery has been greatly reduced

Kapiteijn, British Journal of Surgery, 2002;89(9):1142-9

TME Terminal line??

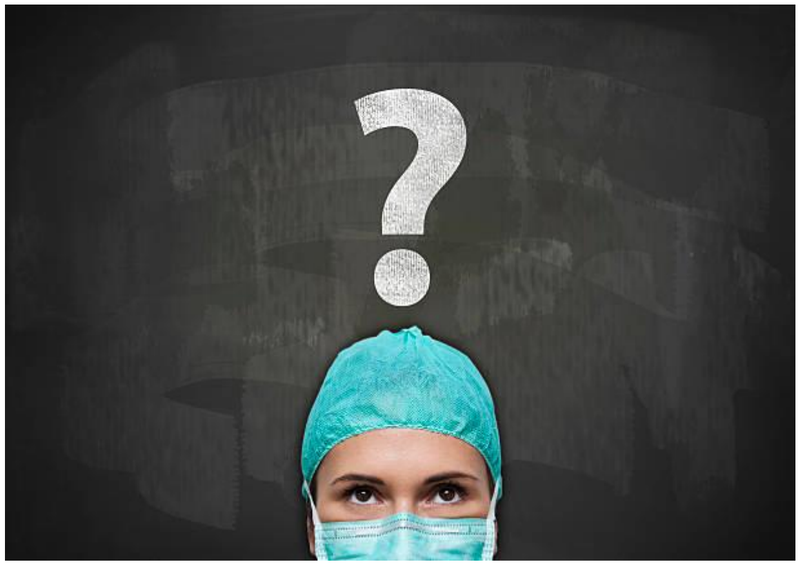
Various studies have described the TME technique. However, residual mesorectum still represents a significant component of resection margin involvement

Bondeven, British Journal of Surgery, 2013;100(10):1357-67.

Kapiteijn, British Journal of Surgery, 2002;89(9):1142-9

TME Terminal line??

Thus, we aimed to define the distal end of the mesorectum within the far distal pelvic cone through a *visible* landmark.



Where should the rectal surgeon be satisfied with the distal dissection?

Study was conducted between 2018 to 2020

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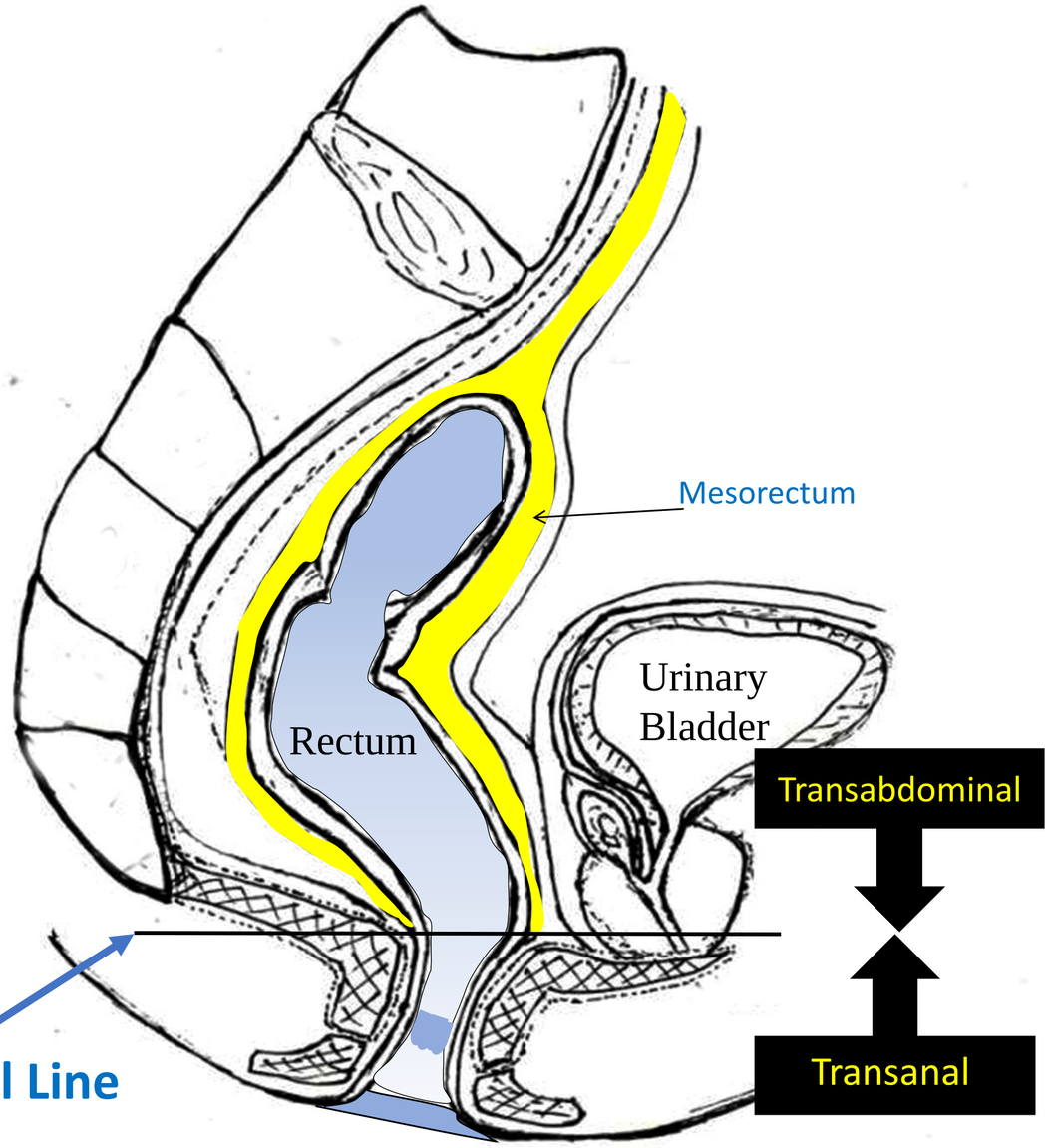
1860

Definition of the Terminal line

"Terminal line" is, a term given by us, to the sign that identifies the distal end of the mesorectum during the transabdominal or transanal TME.



- Ghareeb W.M. et al., Gastroenterology reports, in press

Investigating the Terminal line

The distal mesorectal end (Terminal Line) was examined in 4 ways

Retrospective part

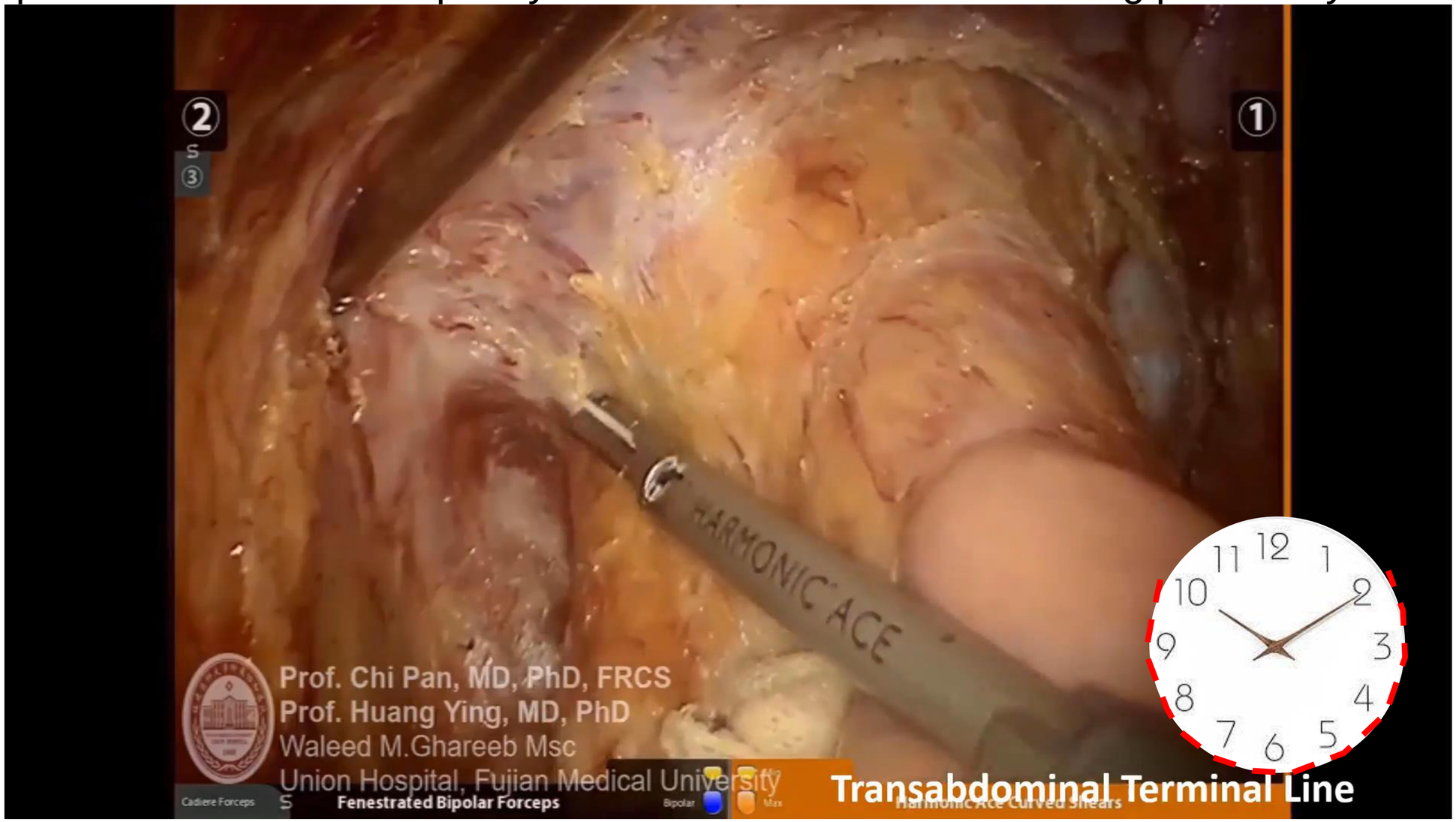
- Trans-abdominal (n=99)
- Trans-anal (n=25)

Prospective confirmatory part

- Cadavers (n=28)
- Histopathological examination of ELAPE (n=44)
  - *(H&E) stain
  - *Masson's stain

Intraoperative observation

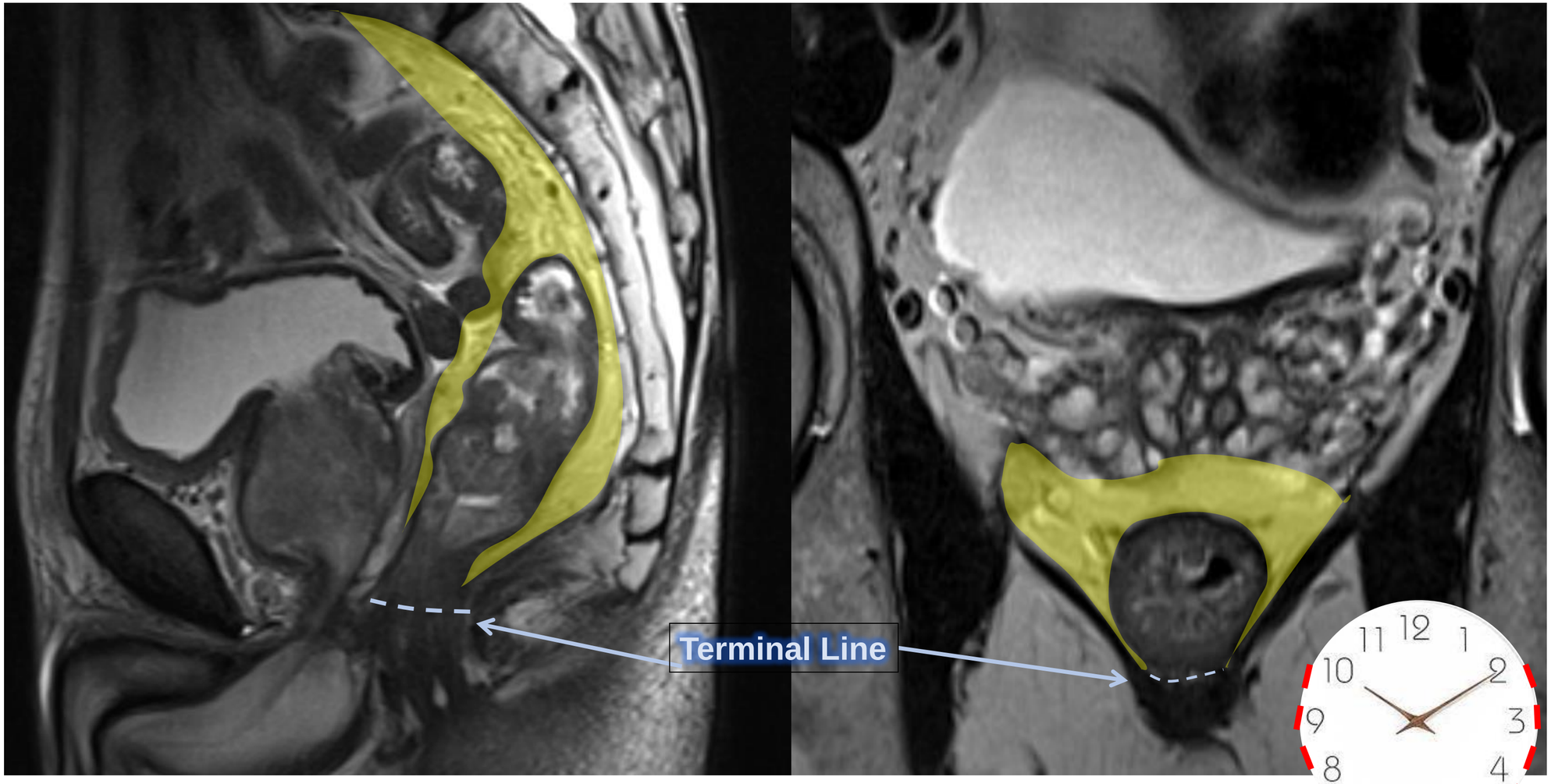
appears as a remarkable pearly white fascial structure extending posteriorly from 2 to 10 o'clock.



Waleed M. Ghareeb. et al., Gastroenterology reports, in press

Gastroenterology Report

Intraoperative observation



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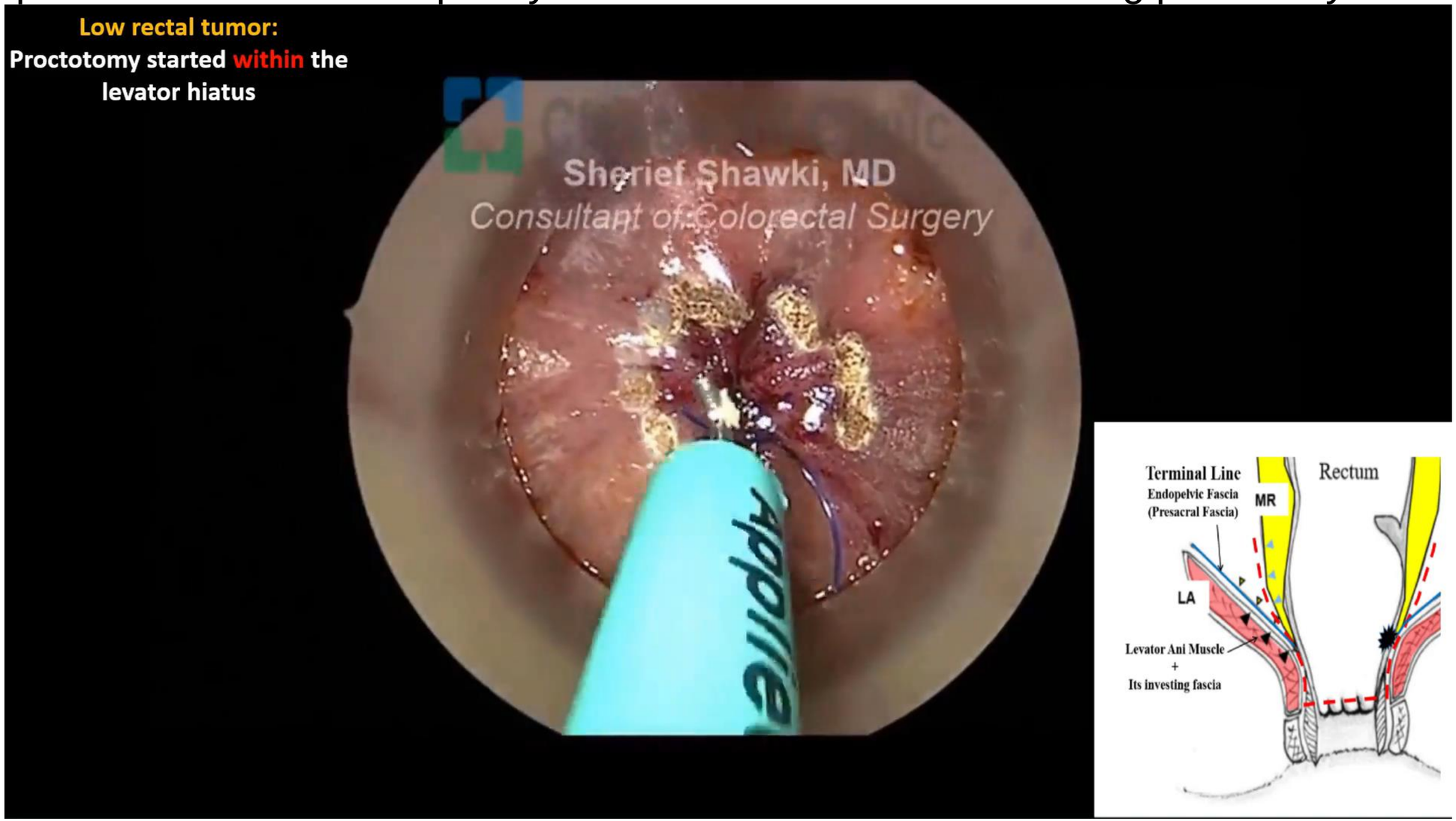

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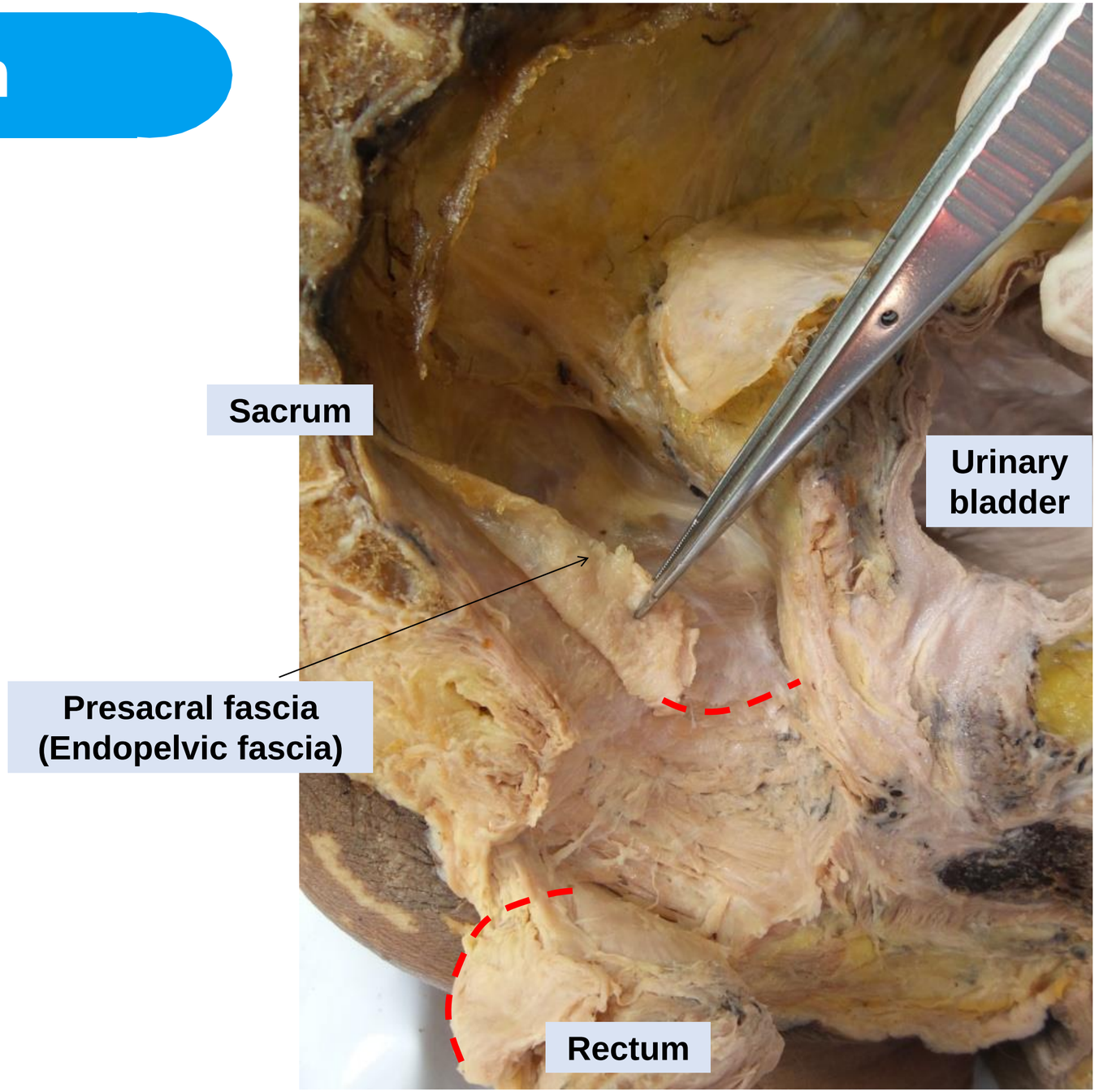
Cadaveric observation

It lies precisely at the upper border of the levator hiatus

It is formed by the semi circumferential attachment of the presacral fascia (endopelvic fascia) to the fascia propria of the rectum between 2 and 10 o'clock posteriorly.



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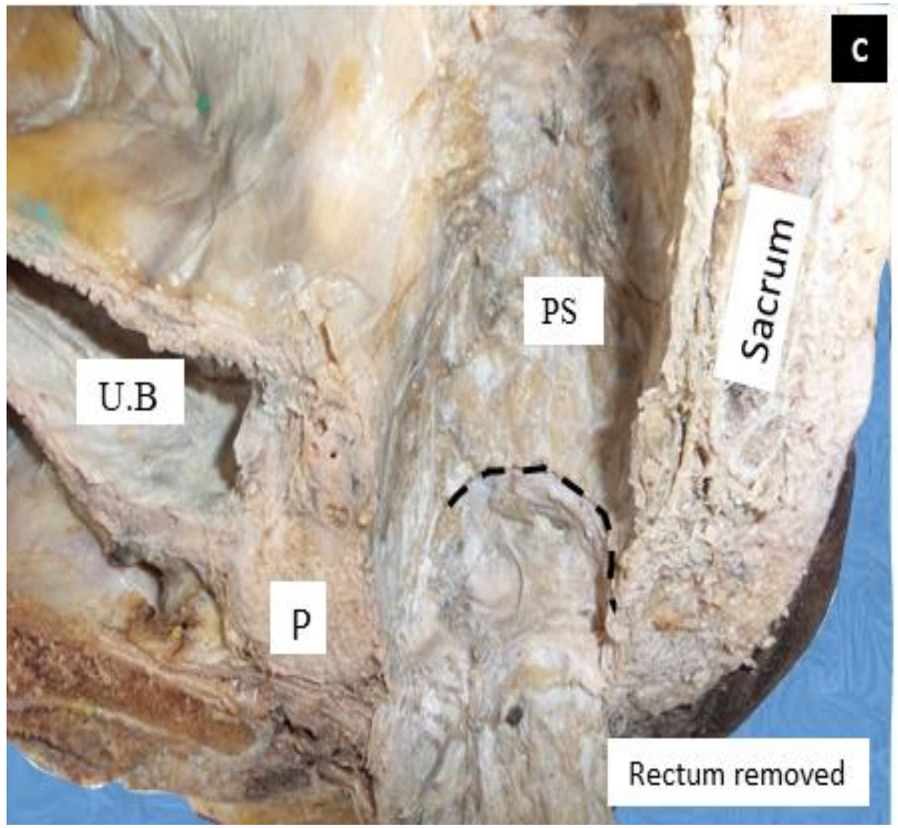
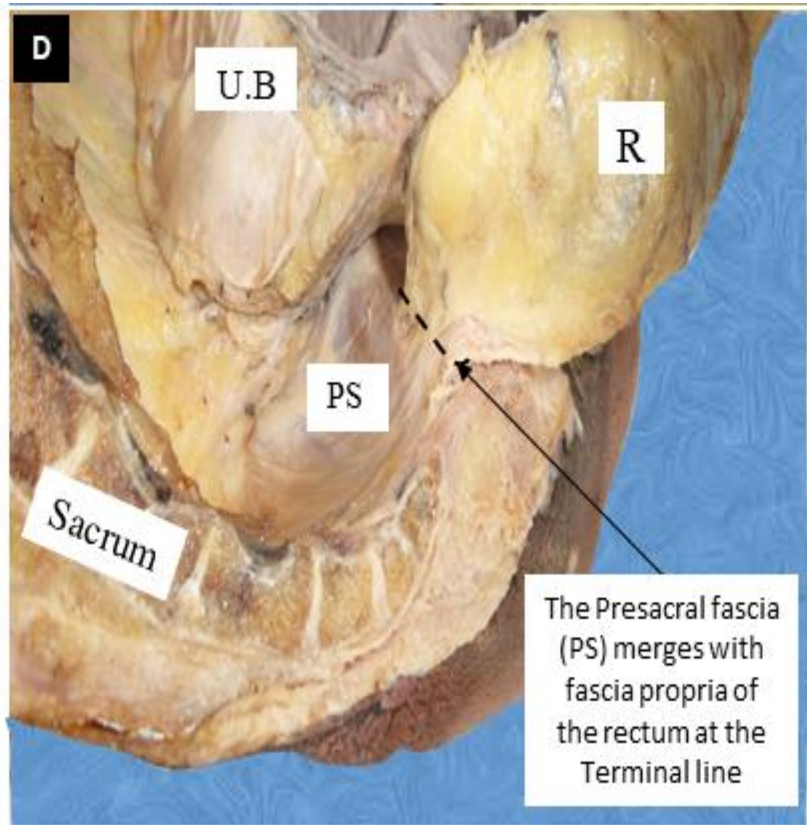
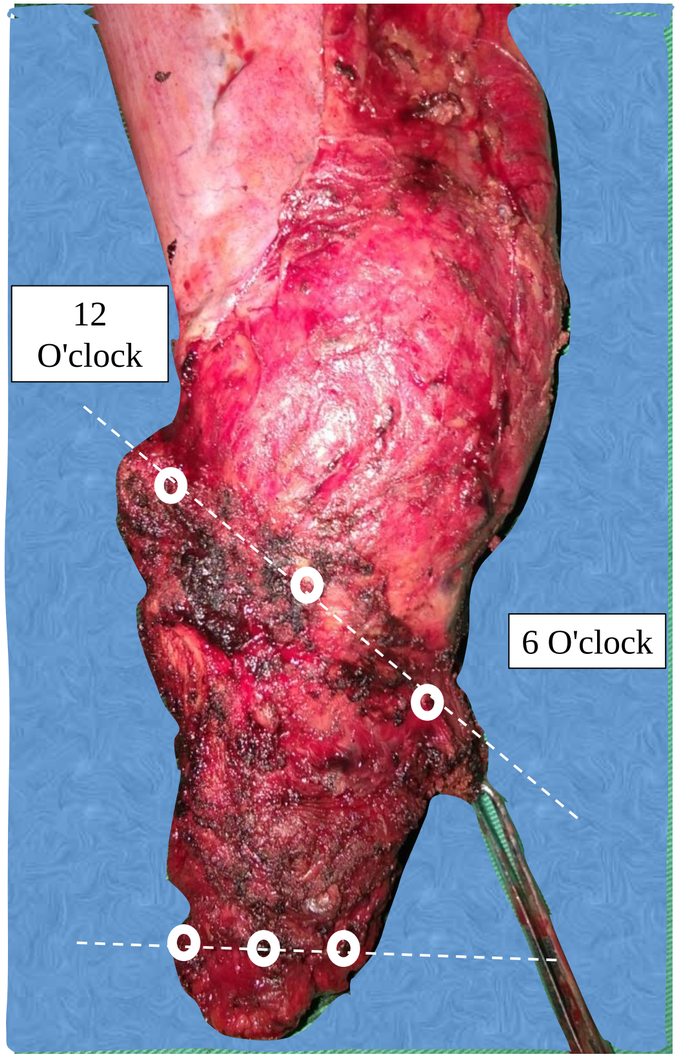
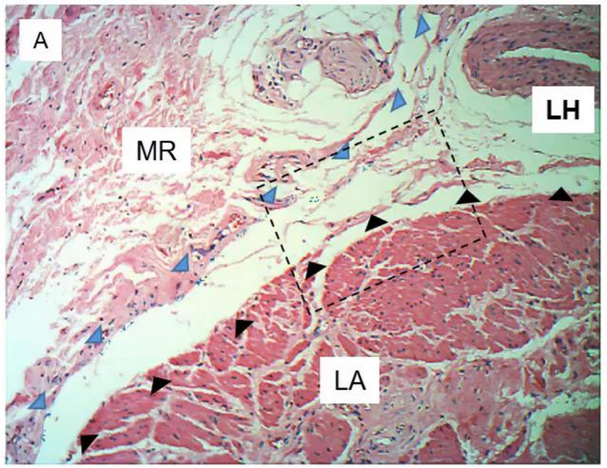


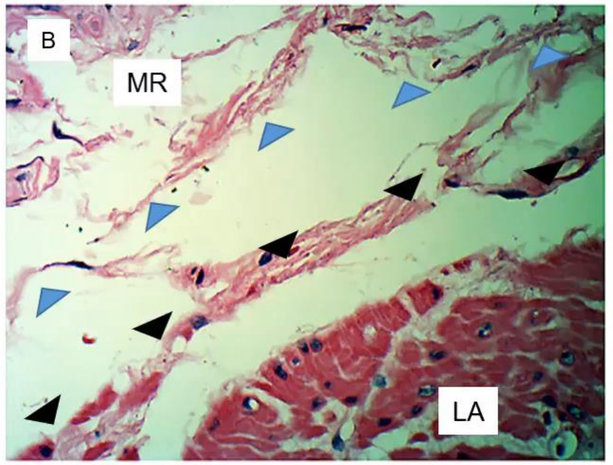


Histopathological examination of the ELAPE specimens

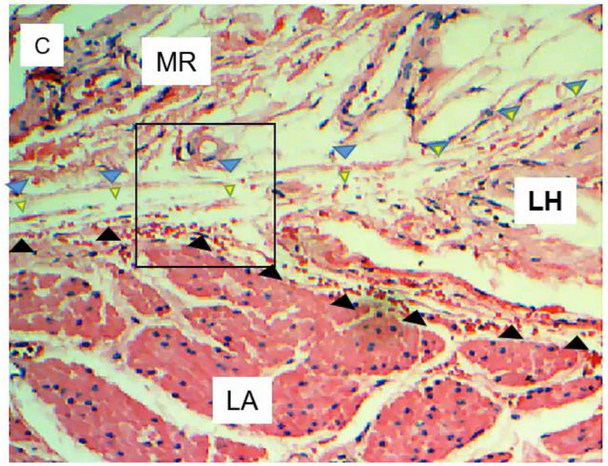


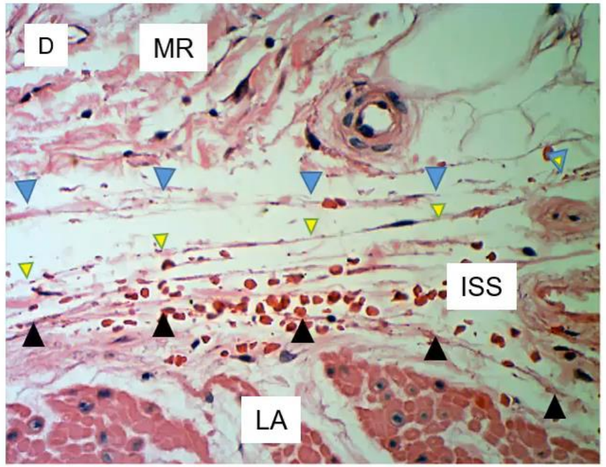
No Terminal line anteriorly





Terminal line was found posteriorly and laterally





Factors affecting visualization of Terminal line

Univariate and multivariate analysis of preoperative data

Variable	"Visualized" terminal line ($n = 56$)	"Non-visualized" terminal line ($n = 43$)	*P* value of univariate analysis*	Multivariate analysis	
				Odds ratio (95% CI)	*P* value
Age, years, mean ± SD	58.34 ± 12.1	58.23 ± 11.8	0.96		
BMI, kg/m², mean ± SD	22.26 ± 2.44	22.54 ± 2.58	0.57		
Gender, *n* (%)			0.07		
Male	29 (51.8)	30 (69.8)		2.4 (0.99–5.70)	0.07
Female	27 (48.2)	13 (30.2)		Reference	-
Neoadjuvant CRT, *n* (%)			0.21		
Yes	31 (55.4)	26 (60.5)			
No	19 (33.9)	9 (20.9)			
Missing data	6 (10.7)	8 (18.6)			
Type of operation, *n* (%)			0.84		
Laparoscopic	38 (67.9)	30 (69.8)			
Robotic	18 (32.1)	13 (30.2)			
Surgical approach, *n* (%)			0.08		
Surgical approach, *n* (%)					
LAR	4 (7.1)	8 (18.6)		Reference	-
ULAR	36 (64.3)	29 (67.4)		2.48 (0.68–9.07)	0.17
ISR	16 (28.6)	6 (14.0)		5.33 (1.17–24.47)	0.03
Surgical instruments, *n* (%)			0.59		
Ultrasonic knife	38 (67.9)	27 (62.8)			
Electrocautery hook	18 (32.1)	16 (37.2)			
Tumor height, cm, mean ± SD	5.76 ± 1.01	6.64 ± 2.24	0.01	0.71 (0.53–0.95)[b]	0.01

BMI, body mass index; CRT, chemoradiotherapy; LAR, low anterior resection; ULAR; ultra-low anterior resection; ISR, intersphincteric resection; SD, standard deviation; CI, confidence interval.

[a] Variables with *P* value < 0.1 by univariate analysis were recommended to multivariate analysis.

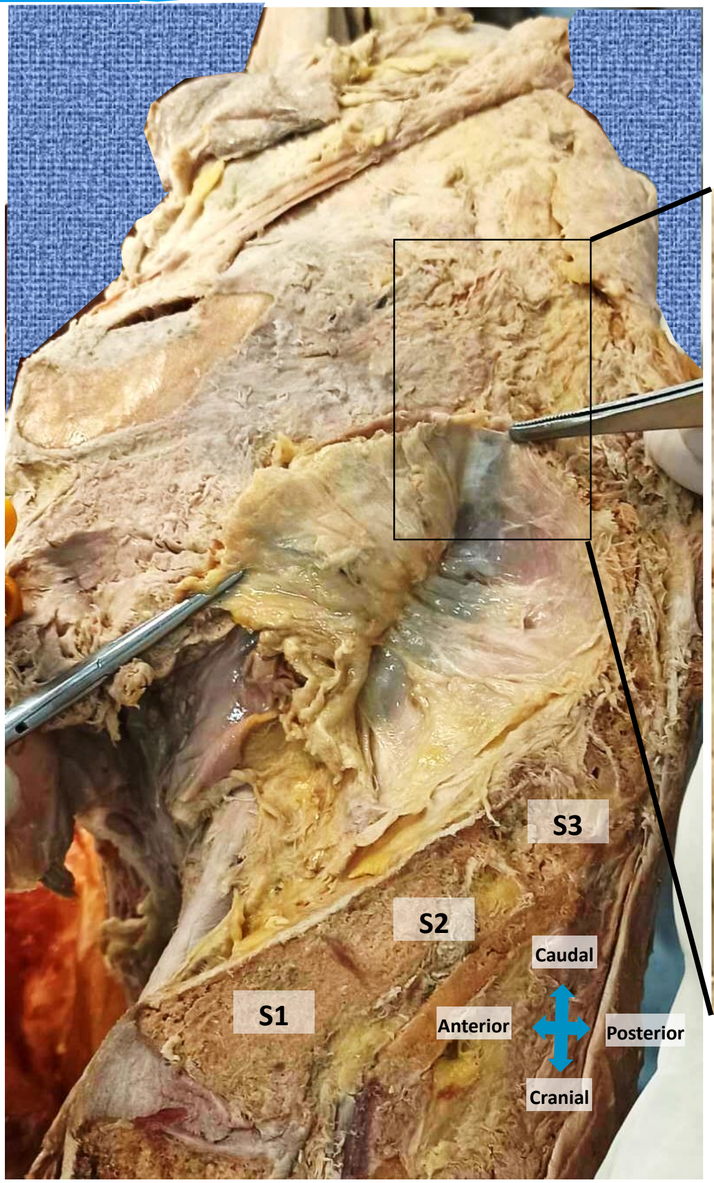
[b] Tumor distance from the anal verge increase by 1 cm.

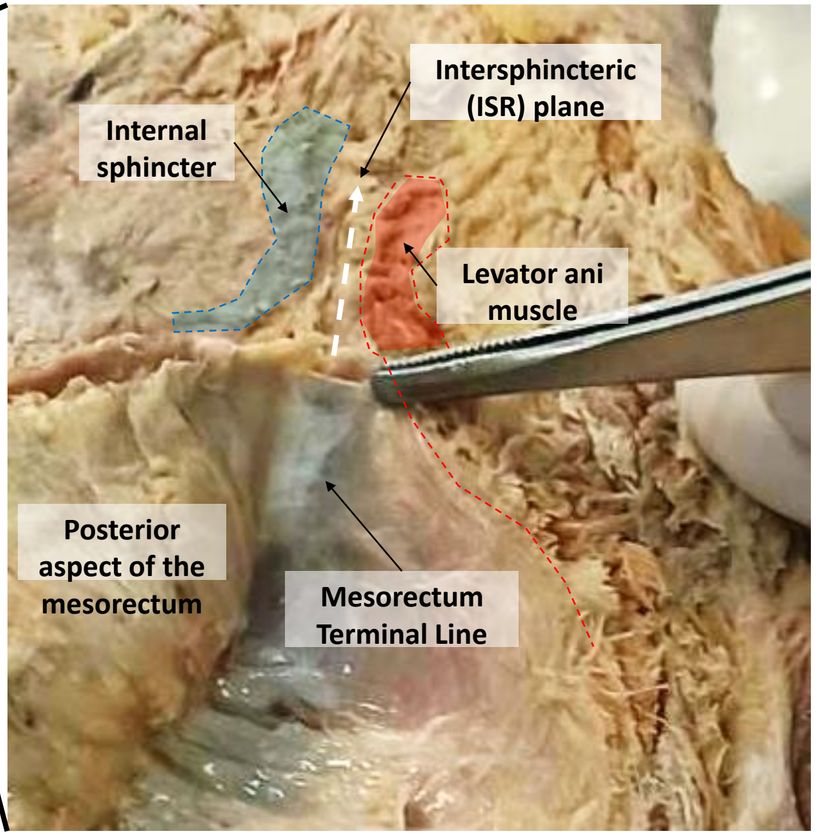
The surgical approach and tumor distance from the anal verge can affect the recognition of the terminal line

Clinical value of Terminal line

Identification of our distal limits of dissection may avoid:

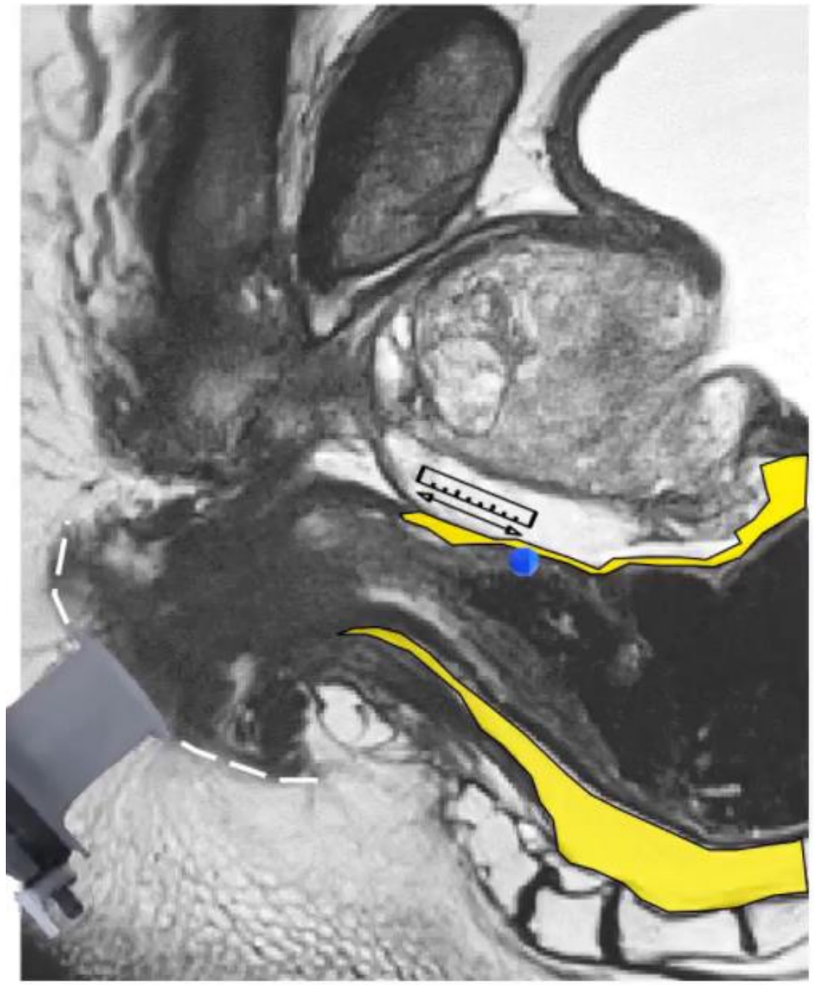
- Inadequate TME: to enhance oncological outcomes
- Over dissection distal that may have functional impact
- Easily identify ISR plane





Clinical value of Terminal line

Since the termination of the mesorectum is encountered earlier in the transanal approach, it is of paramount importance to be appropriately identified to avoid mesorectal residue



Take home message

- Terminal line is a remarkable pearly white fascial structure extending posteriorly from 2 to 10 o'clock.
- No Terminal line seen anteriorly neither intraoperative nor histopathological observations
- Terminal line may avoid inadequate TME in either transabdominal or transanal approach
- Terminal line may help to map the road for proper ISR
- *Further clinical multi institutional studies are needed*

Welcome to collaborate with us

Thanks for attention

Artificial intelligence (AI) in colorectal surgery

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Our AI- related publications:

JACS Journal of the American College of Surgeons

ASCRS American Society of Colon and Rectal Surgeons

OBESITY SURGERY
The Journal of Metabolic Surgery and Allied Care

Gastrointestinal Surgery