Comparative Study to Prevent Low Anterior Resection Syndrome Post TME For Very Low Rectal Cancer

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Disclosure

Non

Introduction

- **LARS specifically refers to the bowel dysfunction following rectal cancer resection.** The majority of post TME patients suffer from defecation dysfunctions, known as low anterior resection syndrome (LARS).

- **In current practice, preoperative radiotherapy followed by TME and straight coloanal anastamosis increase the incidence of LARS up to as 80%, especially in old male patients with narrow pelvis.**

- **LARS includes Common symptoms of bowel dysfunction following rectal resection include urgency, clustering, difficulty in evacuation or incomplete emptying, and fecal incontinence.**

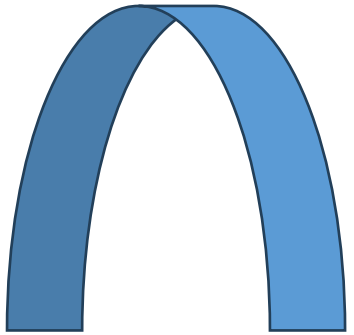
- **No definite protocol exists to deal with such serious sequelae despite its limitation factor post operatively However, it's a crucial limitation in post operative course and less patient satisfaction.**

LAR Syndrome

- Consequence of sphincter-sparing surgery
- Surgery is only curative therapy for rectal cancer
- ***Treatment involves:***
  - Removal of reservoir capacity
  - Post-operative scarring+
  - +/- sphincter dilation
  - Pre-operative radiation
  - Post-operative diversion and atrophy

- ***Pathophysiology***
  - Anal sphincter dysfunction
  - Neorectal reservoir dysfunction
    - Denervation
    - Reduced functional capacity
  - Colonic dysmotility

- ***Research Key Question. Could we prevent LARS?***



- ***Can we "Modify" its etiology?***

LAR Syndrome pathophysiology

- **Anal sphincter dysfunction**
  - Consequence of both surgery and Radiotherapy up to 18% of pts post LAR have sphincter injury
- **Neorectal reservoir dysfunction**
  - Reduced functional capacity
    - Reduced capacity and compliance
    - Smaller fecal load may cause contraction/spasm leading to urgency, soiling and multiple Bowel Movements
    - Benefits of construction of neorectal reservoir (colonic J pouch, coloplasty)
  - Denervation
    - Consequence of surgical dissection + or XRT
    - Denervated neorectum is hyposensitive to mechanical stimuli
- **Colonic dysmotility**

Colonic dysmotility

- Increase proximal colonic motility + lack of distal inhibition
- Denervation of remnant sigmoid/left colon (e.g. ligation of vascular pedicle) can increase motility
- Pts with LARS: dec. colonic transit time and greater increase in neorectal pressure after a meal.
- Removal of rectum and recto-sigmoid junction eliminates the physiologic distal "brake“.
- Lack of distal -ve feedback signals to oppose increase proximal colonic motility further exacerbates LARS

LARS Questionnaires

Memorial Sloan Kettering Cancer Center BoweFunction Instrument (MSKCC BFI)

- First one developed, 2005
- 18 questions
- Complex scoring – recoding
- three subscale scores
- global score, total score

Low Anterior Resection Syndrome Score

- Validated
- 5 Qs (incontinence to flatus, to liquid stool, frequency clustering <1hr, urgency).
- Score:
  - Minor
    - LARS score < 30
  - Major
    - LARS (≧30)
    - Widely used
    - Concise
    - easy scoring

LARS-score - Scoring Instructions

Add the scores from each 5 answers to one final score.

Do you ever have occasions when you cannot control your flatus (wind)?
- ☐ No, never — 0
- ☐ Yes, less than once per week — 4
- ☐ Yes, at least once per week — 7

Do you ever have any accidental leakage of liquid stool?
- ☐ No, never — 0
- ☐ Yes, less than once per week — 3
- ☐ Yes, at least once per week — 3

How often do you open your bowels?
- ☐ More than 7 times per day (24 hours) — 4
- ☐ 4-7 times per day (24 hours) — 2
- ☐ 1-3 times per day (24 hours) — 0
- ☐ Less than once per day (24 hours) — 5

Do you ever have to open your bowels again within one hour of the last bowel opening?
- ☐ No, never — 0
- ☐ Yes, less than once per week — 9
- ☐ Yes, at least once per week — 11

Do you ever have such a strong urge to open your bowels that you have to rush to the toilet?
- ☐ No, never — 0
- ☐ Yes, less than once per week — 11
- ☐ Yes, at least once per week — 16

Total Score: ____

Interpretation:
- 0-20: No LARS
- 21-29: Minor LARS
- 30-42: Major LARS

استبيان لمتلازمة الاستئصال الأمامي المنخفض لسرطان المستقيم LARS

استبيان لمتلازمة الاستئصال الأمامي المنخفض لسرطان المستقيم LARS بالعربي:

الدرجة

حدد المربع المناسب لحالتك لكل سؤال

Minor LARS	Major LARS

• **score <30**
• **Preserved QOL**
  • **Diarrhea**
  • **Gas and Bloating**
  • **Post-prandial urgency/incontinence**
	• **LARS score > 30**
	• **Affects QOL**
	  • **FI or frequency**

Medical management
Multimodal approach better than single therapy
Little high quality data
• **Diarrhea**
  Loperamide (Data extrapolated)
  From IBS-D
  RCT, better than placebo
  From IPAA
  Decrease stool frequency
  modified pouch contraction
  Improved incontinence
• **Gas and Bloating**
  Simethicone
  Testing for SIBO
  Rifaxamin, Neomycin.
• **Post-prandial urgency/incontinence**
  • 5-HT3 receptor antagonist
  • 25 pts, 5 mcg Ramosetron – improved incontinence urgency, #BMS
  • Alsosetron, Cilansetron used in IBS-D
Itagaki R ct al. Clin Ext Gastroenterol 2014;7:47.
Lazaraki G et al. World J Gastroenterol 2014;20:8867.
Cohen LD, Levitt MD. Colorectal Dis 2001;3:95Hallgren T et al. Dig Dis Sci 1994:39:2612.
	Multimodal therapy
	• **Transanal irrigation**
	  Simple, safe, effective, cheap
	  Low volume = mechanical washout
	  >250ml -> functional colonic mass movements
	  Improves transit time and FI
	  Best for low rectal volume, low max rectal capacity
	  Empty fleet enema bottle
	  Water temp
	  Cool – stimulate response
	  Warm – relax and facilitate retention
	  14 pts, number of BM decreased from 8 to 1 (day), 3 to 0 (night)Improved QOL over 29 months.
	• **Pelvic floor rehabilitation**
	• **SNS**
	Rosen H, ct al Colorectal Dis. 201 1;13:c335-8.

Not supported by evidence No harm in trying • **Dietary restriction** • **Fiber** • **Constipating agents**	Stoma

So LARS is a common problem

And

- **Persistent: (toilet dependent)**
  - up to 46% with major LARS at 14 yrs
    - **devastating consequences on patients' physical, social, occupational, and psychological functioning, significantly decreasing their quality of life.**
  - **Stoma when decides.**

Juul T, et al. Low anterior resection syndrome and quality of life: An international multicenter study. Dis Colon Rectum 2014;57:585-91.
Pachler J, Wille-Jorgensen P. Quality of life after rectal resection for cancer, with or without permanent colostomy. Cochrane Database Syst Rev 2004:CD004323
Martellucci J. Low anterior resection syndrome: a treatment algorithm. Dis Colon Rectum 2016;59:79-82.
Keane C, Wells C, Ogrady G, Bissett IP. Defining low anterior resection of the syndrome: A review systematic literature. Colorectal Dis .2017:19:713-22

Research Key Question.

Could we prevent LARS?

Can we “Modify” its etiology?

Aim of study

- **The study aims to evaluate the incidence of low anterior resection syndrome post low anterior resection for very low rectal cancer**

- **And**

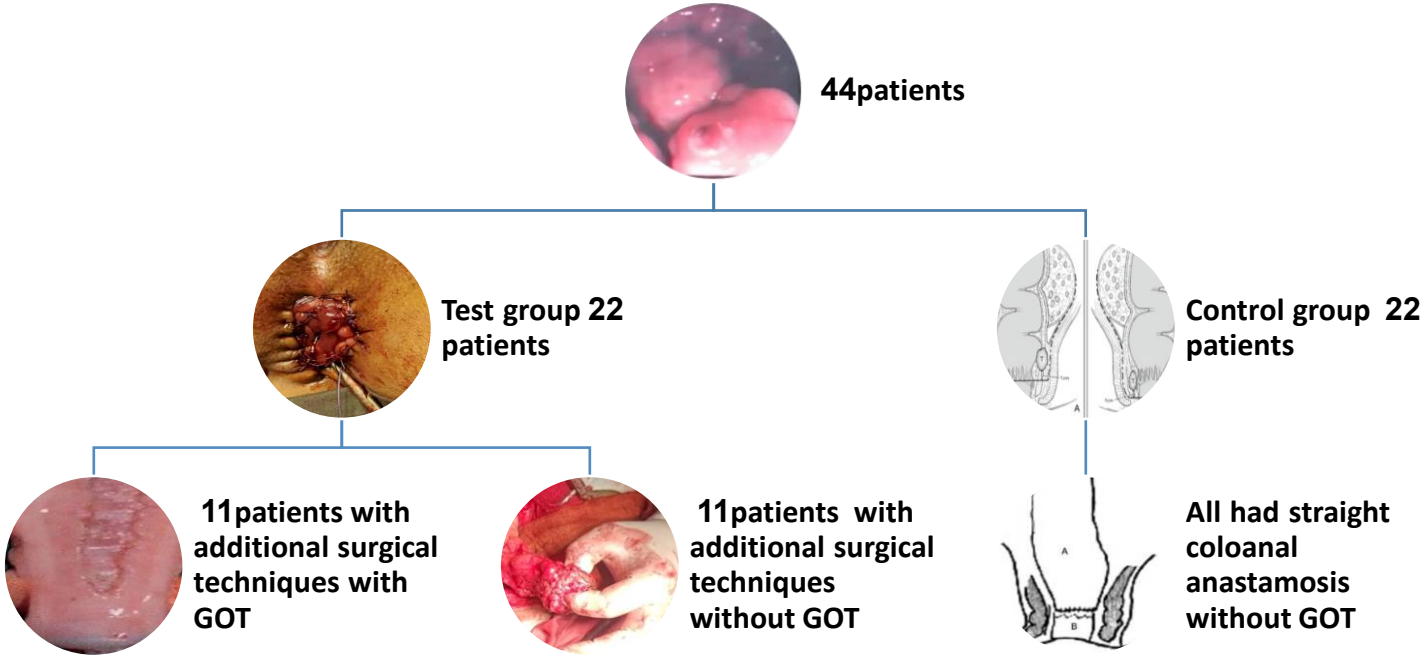
- **To compare the functional outcomes to those with straight coloanal anastamosis and with those having different techniques used to replace resected rectum,internal sphincter and mesorectum.**

- Our study hypothesis is to replace what is lost rectum, internal sphincter, and mesorectum to prevent LARS and to be compared to those with straight coloanal only.
- We adopt taeniectomy pouch (TP), transverse coloplasty and J colon pouch as a neo-rectum, smooth muscle plasty (SMP) to replace internal sphincter, and greater omentum transplantation (GOT) to replace the meso-rectum.

PATIENTS AND METHODS

This study was a prospective study from April 2018 to March 2023, 44 consecutive patients were selected with biopsies of well-differentiated or moderately well differentiated.

- **Distal tumor margin (1-6 cm) from anal verge.**
- **1:1propensity matching of age, sex, body mass index, prior radiation, and surgical approach.**
- **Treated by TME and some sort of inter sphincteric rectal resection were included in our study.**
- **We compare those with additional surgical techniques to their oncologically matched 2nd controlled group with straight coloanal anastamosis without greater omentum transplantation in terms of LARS scores.**



✓ ***Oncological inclusion criteria:***

- **T1–T3 tumor**
- **Well- to moderately differentiated adenocarcinoma.**

✓ ***Oncological exclusion criteria:***

- **T4 tumor**
- **Fixed tumor**
- **Untreatable distant metastasis**
- **FAP and IBD cases.**
- **Involvement of external sphincter.**
- **Less than one year follow up**
- Pre-existing IBD or IBS-D

➢ **Evaluation of Cancer Invasion to The anal Sphincter complex *IS CRUCIAL***

Differential Diagnosis of LARS

- Anastomotic failure
- Anastomotic stricture
- Ischemic colitis
- Radiation proctitis
- Pre-existing sphincter injury
- SI bacterial overgrowth
- Exacerbation of pre-existing IBD, IBS-D and CD

Evaluation for LAR syndrome

- H&E
- DRE
- Imaging
- Pt questionnaire
- Exclude IBD, CD and DD

[1]Holzer B, Urban M, Hölbling N, et al. Magnetic resonance imaging predicts sphincter invasion of low rectal cancer and influences selection of operation. Surgery. 2003;133:656–61.
[2]Orkin BA, Sinykin SB, Lloyd PC. The digital examination scoring system (DRESS). Dis Colon Rectum. 2010;53:1656–60.
[3]Dobben AC, Terra MP, Deutekom M, et al. Anal inspection and digital rectal examination compared to anorectal physiology tests and endoanal ultrasonography in evaluating fecal incontinence. Int J Colorectal Dis. 2007;22:783–90.

- **Diagnosis**
  - Suspect LARS in pts who develop 1 or more bowel symptoms after sphincter-sparing operation
  - Confirm LARS when symptoms persist> 1 m and evaluation rules out other causes

- **Common Symptoms**
  - Constellation of symptoms
  - Fecal incontinence, urgency,
  - Frequent BMs
  - Fragmented BMs, clustering
  - Evacuation difficulty
  - Increased intestinal gas
  - Altered stool consistency

- ***CURRENT PRACTICE IS RESECTION AND STRAIGHT ANASTOMOSIS***

  - **SHORT OPERATIVE TIME.**
  - **COVERING ILEOSTOMY.**

  - ***BUT***

  - **POST ILEOSTOMY CLOSURE ??????**

LOW ANTERIOR RESECTION SYNDROME

- ***Defecation disordered after low rectal cancer surgery***

- **High incidence in**
  - ***Preoperative radiotherapy***
  - ***Post XRT***
  - ***Risk of LARS > after total vs partial mesorectal excision***
  - ***Post ISR***
  - ***Male with narrow pelvis***
  - ***Old ages both sexes.***
  - ***Lateral L N dissection.***
  - ***Preoperative obstruction***
  - ***Anastomotic complications***
  - ***Temporary diverting stoma***

M. R. Weiser, H. M. Quah, and J. Shia, "Sphincter preservation in low rectal cancer is facilitated by preoperative chemoradiation and intersphincteric dissection," Diseases of the Colon and Rectum, vol. 249, no. 2, pp. 236–242, 2009.
Milto, N. Saito, M. Sugito, A. Kobayashi, Y. Nishizawa, and Y. Tsunoda, "Analysis of clinical factors associated with anal function after intersphincteric resection for very low rectal cancer," Diseases of the Colon and Rectum, vol. 52, no. 1, pp. 64–70, 2009.
R. Chamlou, Y. Parc, T. Simon et al., "Long-term results of intersphincteric resection for low rectal cancer," Annals of Surgery, vol. 246, no. 6, pp. 916–921, 2007.

LOW ANTERIOR RESECTION SYNDROME

- **Loss of the rectal anal inhibitory reflex (RAIR).**
- **Damages the pelvic nerve plexus branches, blood vessels, and lymphatic tissues in the mesorectum, resulting in rectal and anal dysfunction.**
- **The nerve conduction function of the middle and inferior plexus of the rectum is impaired, which affects the function of the anal sphincter, resulting in a significant decrease in anal resting pressure.**

Moore HG, Riedel E, Minsky BD, et al. Adequacy of 1-cm distal margin after restorative rectal cancer resection with sharp mesorectal excision and preoperative combined-modality therapy. Ann Surg Oncol. 2003;10:80–5.

Kuvshinoff B, Maghfoor I, Miedema B, et al. Distal margin requirements after preoperative chemoradiotherapy for distal rectal carcinoma: are < or = 1 cm distal margins sufficient? Ann Surg Oncol. 2001;8:163–9.

Guillem JG, Chessin DB, Shia J, et al. A Prospective pathologic analysis using whole-mount sections of rectal cancer following preoperative combined modality therapy: implications for sphincter preservation. Ann Surg. 2007;245:88–93.

Bujko K, Rutkowski A, Chang GJ, Michalski W, Chmielik E, Kusnierz J. Is the 1-cm rule of distal bowel resection margin in rectal cancer based on clinical evidence? A systematic review. Ann Surg Oncol. 2012;19:801–8.

OUR STUDY

- **We provide adjuvant surgical techniques post low rectal cancer to restore:**

  - ***The* resected rectum**
  - **Internal anal sphincter function**
  - **Mesorectum.**

BY

- ✓ **Taeniectomy.**
- ✓ **transverse coloplasty.**
- ✓ **colon J pouch.**
- ✓ **smooth muscle plasty.**

We adopt lastly in 11 patients a GREATER OMENTUM TRANSPLANTATION PEDICLED FLAP to replace the resected mesorectum.

- Our study to replace what is lost; rectum, internal sphincter and mesorectum.
  - By transverse colopasty/ colon j pouch/ taeniectomy as aneo rectum.
  - Smooth m plasty to replace internal sphincter
  - Greater omentum transplantation to replace the mesorectum.

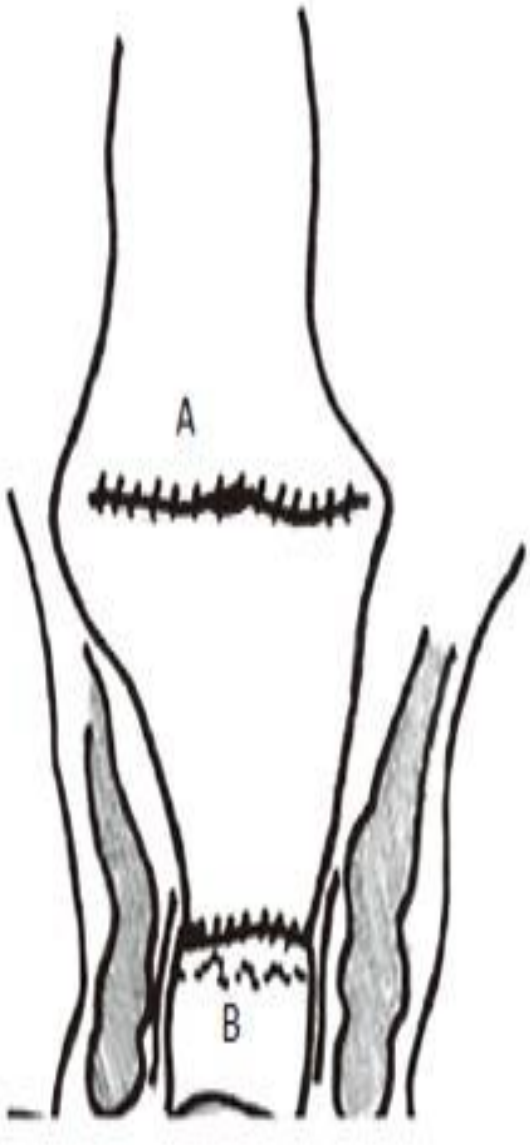
- Pulling the descending colon through anus with good blood Supply after spleenic Flexture mobilization
  -If the length > 5cm beyond anus J pouch reconstruction.
  -If the length < 5 cm >1 cm Transverse coloplasty/Taeniectomy.
  -If the length whiten 1cm either Taeniotomy/Straight anastomosis + greater omentum.

- In case of total ISR,smooth muscle plasty + greater omentum T

Methods Used Post ISR as a Neo-rectum 1

➢ *CONSTRUCTION OF COLOPLASTY*

- **A 7 cm longitudinal incision.**
- **between the taenia along the anti-mesenteric side of the descending colon.**
- **closed transversely.**
- **The coloplasty ‘pouch’ is then anastomosed to stump end.**
- **Designed to ‘interrupt antegrade colonic peristalsis’**



Ho YH, Brown S et al. Comparison of J-pouch and coloplasty pouch for low rectal cancers: a randomized, controlled trial investigating functional results and comparative anastomotic leak rates. Ann Surg 2002; 236: 49-55

- **Experimental surgery construction of a coloplasty may provide a 40% increase in volume.**

- **It is more than likely that in the clinical situation motility factors such as disruption of colonic propulsion as a result of the coloplasty on the antimesenteric surface may be more important.**

- **Coloplasty cannot be recommended except for special circumstances when a bulky J-pouch cannot be brought through a narrow pelvis for anastomosis to the anorectal junction with sufficient length if available.**

Fazio VW, Mantyh CR, Hull TL. Colonic "coloplasty": novel technique to enhance low colorectal or coloanal anastomosis. Dis Colon Rectum 2000; 43: 1448-1450

Z'graggen K, Maurer CA, Mettler D, Stoupis C, Wildi S, Büchler MW. A novel colon pouch and its comparison with a straight coloanal and colon J-pouch--anal anastomosis:
Preliminary results in pigs. Surgery 1999; 125: 105-112.

Maurer CA, Z'graggen K, Zimmermann W, Häni HJ, Mettler D, Büchler MW. Experimental study of neorectal physiology after Formation of a transverse coloplasty pouch. Br J Surg 1999; 86: 1451-1458.

Methods Used Post ISR as a Neo-rectum 2

➢ *Technique of Taeniectomy:*

- **4 cm proximal to the distal cut end of the colon**
- **The submucosal plane of teniae coli was infiltrated with 20 ml of adrenaline in saline solution for 15 to 20 cm.**
- **The antimesenteric tenia was dissected from the submucosal plane.**
- **Check the integrity of the mucosa.**
- **The pouch then anastamosed to distal stump end.**

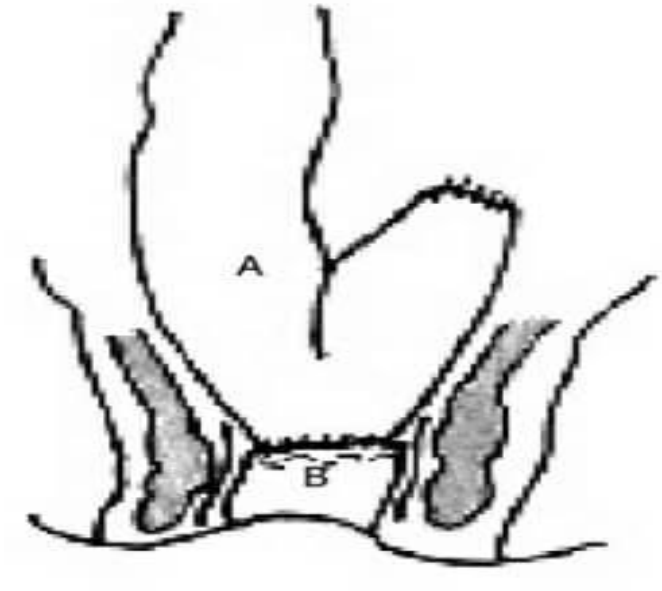
Methods Used Post ISR as a Neo-rectum 3

- ***COLONIC J POUCH TECHEQNUE:***

- **Pulling the descending colon through anus with good blood Supply after splenic Flexure mobilization to construct 6cm colonic J-pouch.**

- **If the length > 5cm beyond anus.**

- **Wide pelvis.**

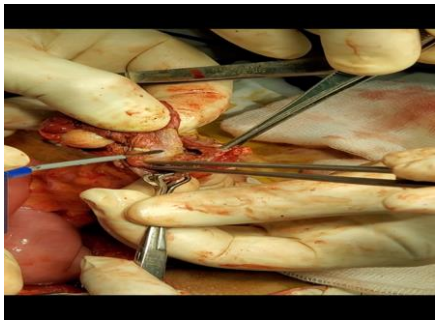


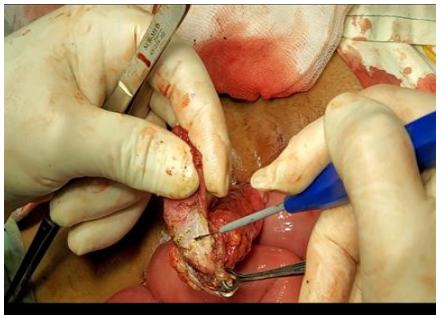
Ho YH, Seow-Choen F, Tan M. Colonic J-pouch function at six months versus straight coloanal anastomosis at two years: randomized controlled trial. World J Surg. 2001;25:876–881.

Methods Used Post ISR as a Neo-internal sphincter

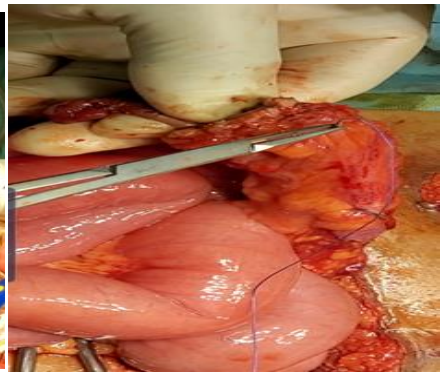
➢ *Smooth muscle plasty:*

1. **Smooth muscle flap development.**

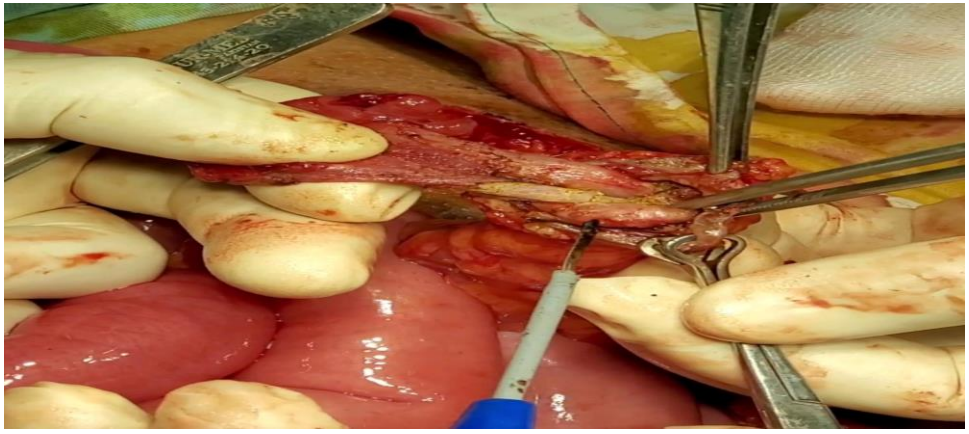




2. **Smooth muscle further freed from proximal colon.**



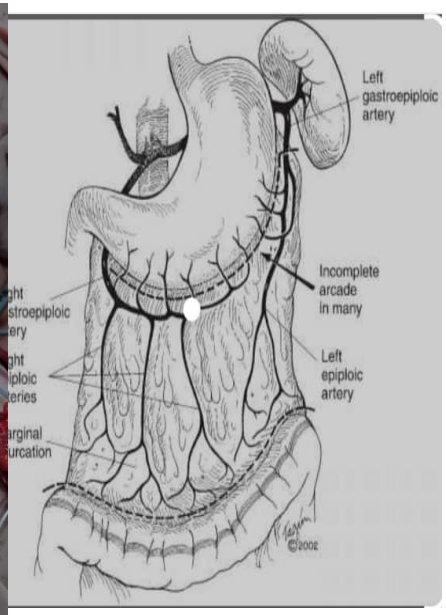
3. **Flaps of smooth muscle is sewn to colonic serosa and overlapped.**

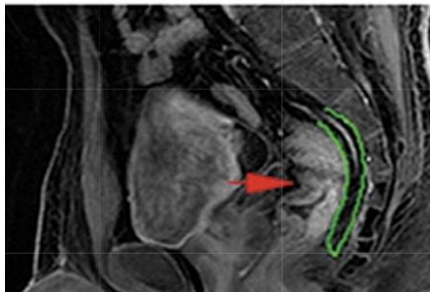


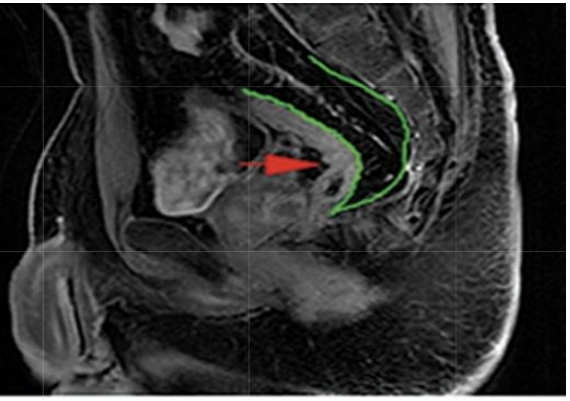
4. **Smooth muscle flap ready for anal anastamosis.**

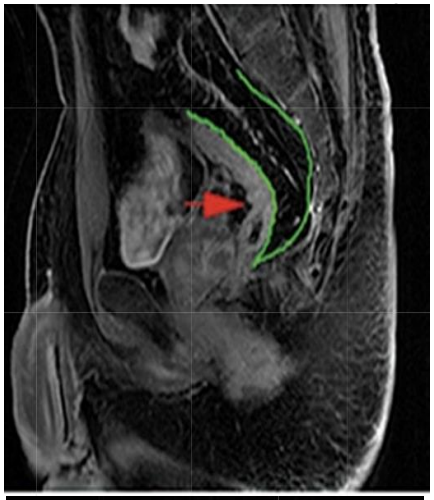
Methods Used Post ISR as a Neo-mesorectum

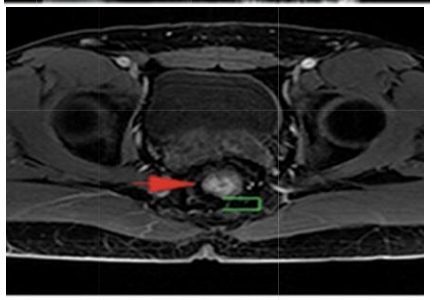
- ***Greater omentum Rt sided dependent pedicled flap***

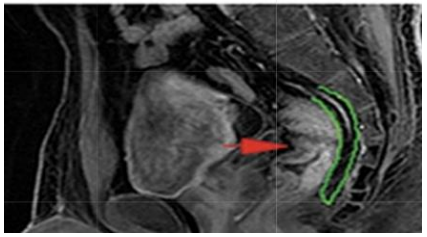






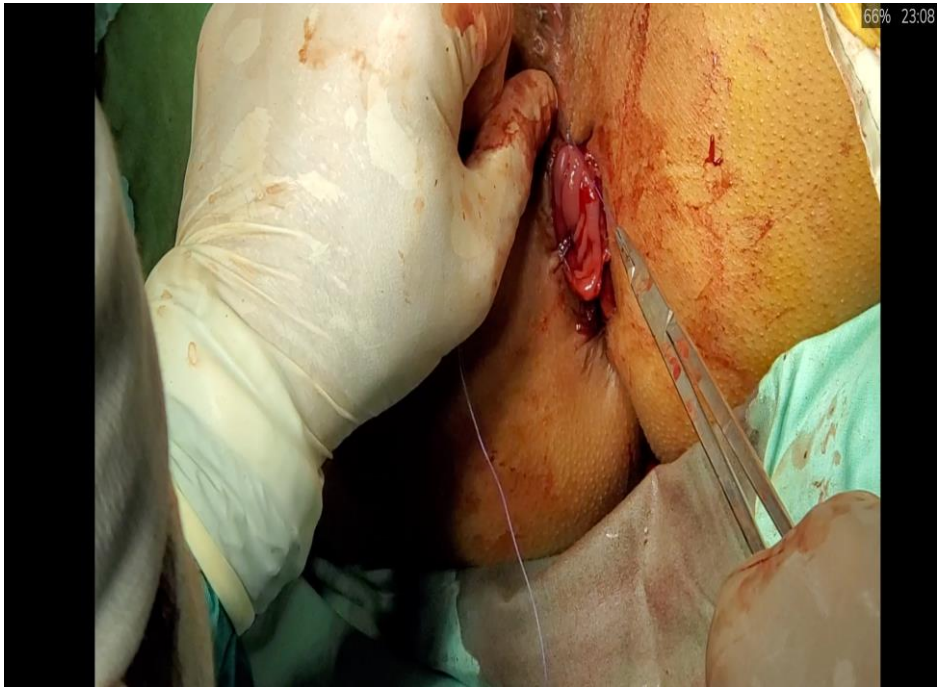






Harvesting the greater omental pedicle. Transplantation in the pelvic cavity of greater omentum padding behind the "new rectum" as a neo-mesorectum. vicryl 2/0 are used to fix the greater omentum to the peritoneum of both pelvic wall.

Regenerative Therapy 18(4):146-151

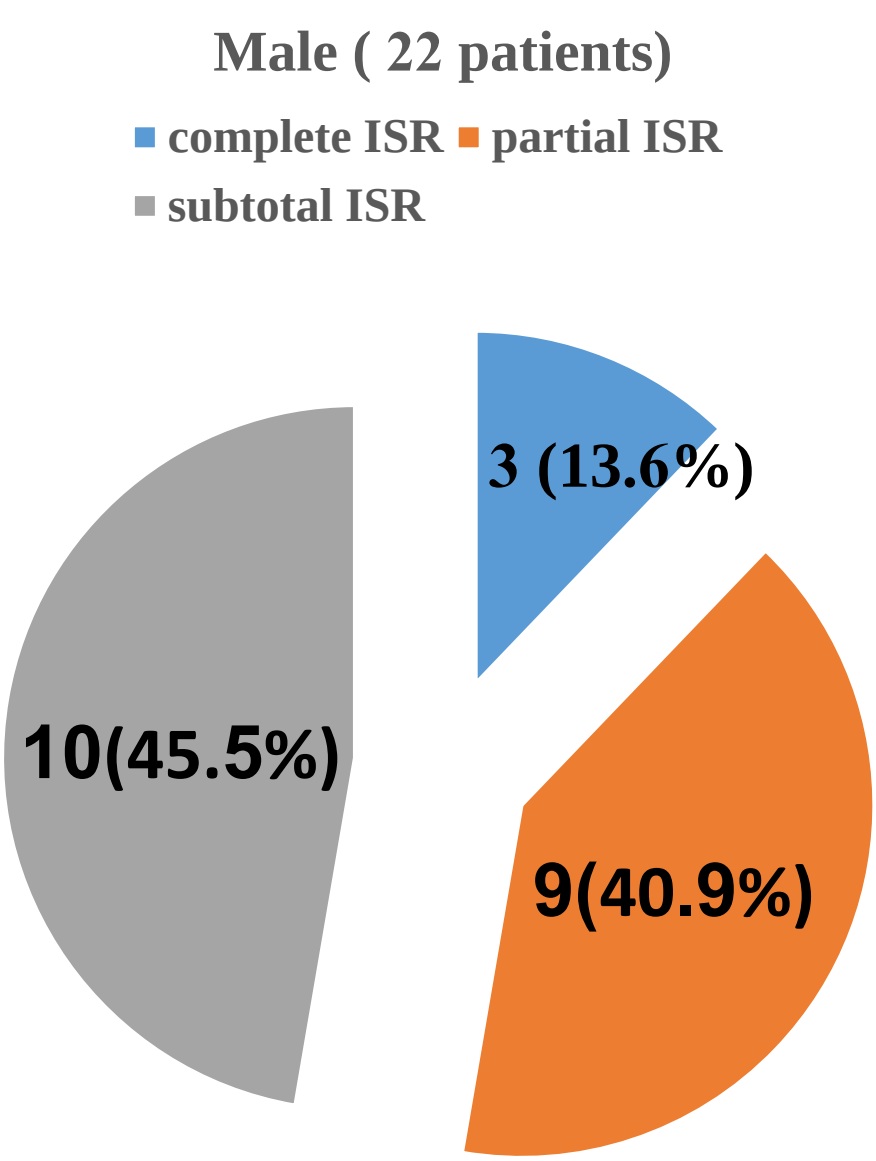


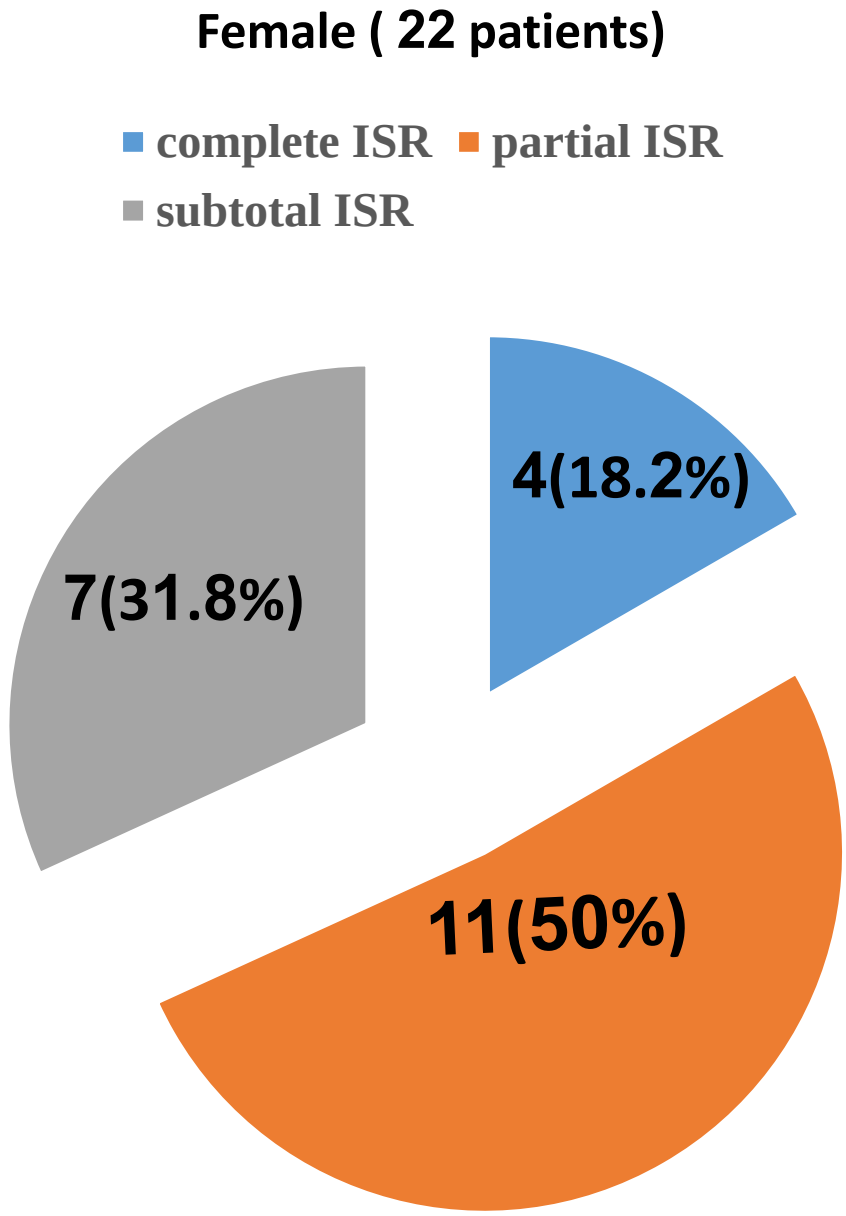
Lastly coloanal anatstamosis to complete the procedure all had diversion by loop ileostomy

Patients and Tumor characteristics in 44 ISR patients

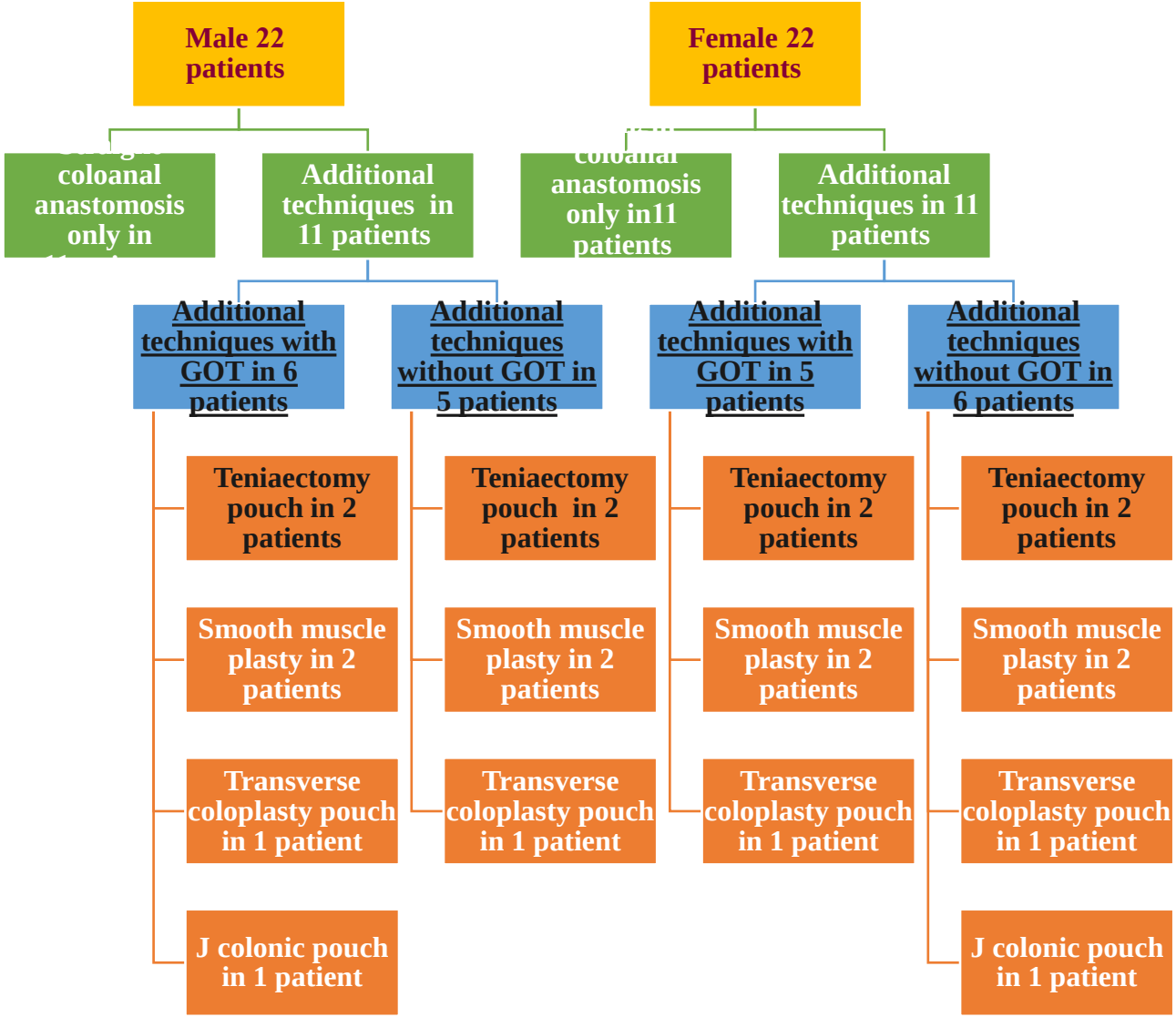
Age (years) mean	**47 (17-78)**
Sex (M/F)	**22/22**
Distance of tumor from anal verge cm	**2.5)cm) 6 -1**
Tumor stage **T2** **T3**	 **22(50%)** **22(50%)**
ISR **Complete** **Partial** **subtotal**	 **7(15.9 %)** **20(%45.5)** **17(% 38.6)**
Neoadjuvant CRT (M/F)	**44 /22 (50%)**
R0	**44**

POST ISR SURGICAL TECHNIQUES USED IN 44 Pts





Types of addional technique/ sex	Male 22 pts	Female 22 pts
Teniaectomy pouch with GOT	2	2
Teniaectomy pouch without GOT	2	2
Smooth muscle plasty with GOT	2	2
Smooth muscle plasty without GOT	2	2
Transverse coloplasty with GOT	1	1
Transverse coloplasty without GOT	1	1
J colonic pouch with GOT	1	0
J colonic pouch without GOT	0	1
Straight coloanal anastomosis only	11	11



- **Major LARS (score > 30) was demonstrated in 10% (test group) versus 80% in control group at 6 weeks.**
- **80% (Majority) in 1st group had no LARS (score < 20), that is, versus 5% in 2nd control group, without GOT.**

Stool frequency In 24 hours in 44 patients stool frequency in 24 hours Without greater omentum T and 11 with.

	Straight anas. 22 (50%)	Transverse coloplasty 4 (18.2%)	Colon J pouch 2 (9.1%)	Taeniectomy 8 (36.4%)	smooth m. Plasty 8 (36.4%)	greater omentum T 11 (25%)
6weeks	4.5	3.4	3.2	3.3	3.1	2.7
3 months	3.6	3.1	3	2.8	2.8	2.5
6 months	3.0	2.8	2.8	2.6	2.6	2.3
9 months	2.7	2.4	2.6	2.6	2.4	2.1
12months	2.7	2.4	2.6	2.6	2.4	2.0

Values are SD. P value <0.005.
time recovery for greater omentum Pts at ~ 5.5 weeks

- **Early recovery of LARS score and anal functions at 6 weeks after closure of ileostomy of patients who had greater omentum transplantation with taeniectomy pouch or smooth muscle plasty. The average time at which anal function began to recover was 6 ± 0.5 weeks after surgery. Those having greater omentum transplantation without additional techniques "straight coloanal anastamosis ", also improved significantly in comparison to those without greater omentum transplantation flap.**

Continence among 44 Patients*

	6 weeks	3 months	6 months	9 months	12months
Striaght anast. 22 pts	40%	65%	70%	80%	86%
Transverse coloplasty with GOT.	78%	84%	90%	92%	94%
Transverse coloplasty pouch without GOT	42%	55%	56%	60%	60%
Colon J pouch with GOT	81%	84%	84%	88%	91%
Colon J pouch without GOT	45%	60%	65%	68%	70%
Taeniotomy pouch with GOT	79%	80%	82%	86%	89%
Taeniectomy pouch without GOT	50%	75%			
Smooth muscle plasty with GOT	82	85%	84%	88%	92%
Smooth muscle plasty without GOT	55%	77%			
Greater omentum transplantation	80%	84%	90%	92%	94%

- **Major incontinence was more frequent in 2nd group (Wexner >11) 80% .**
- **Those with taeniectomy or smooth muscle plasty with GOT, stool fragmentation, nocturnal defecation and use of anti-diarrhoeal medications were significantly the best scores. Major incontinence was more frequent in 2nd group (Wexner >11) 80% .**
- **Those with taeniectomy or smooth muscle plasty with GOT, stool fragmentation, nocturnal defecation and use of anti-diarrhoeal medications were significantly the best scores.**

Conclusions:

- We conclude that colorectal surgeon should consider anatomy and physiology for the three components resected in TME/ ISR and should be reconstructed as a neo rectal reservoirr,neo internal sphincter and neo mesorectum to have good post operative recovery and to prevent LARS.
- Resection of rectal reservoir mandates to be replaced by taeniectomy pouch, J pouch or transverse coloplasty.
- Resection of complete internal sphincter needs a neo sphincter by adding smooth muscle plasty.
- GOT is an effective way to replace resected mesorectum, fast, easy to construct with promising results needs to be an adjuvant surgical technique post TME. Also, it limits inflammation, thereby promoting healing.
- However, due to the small number of cases, long-term observation is still necessary.

- Those with taeniectomy or smooth muscle plasty with greater omentum transplantation have rapid recovery of rectal and anal function, and the quality of life were close to that before surgery.
- Taeniectomy is a good technique easy to construct and can be used as an alternative to the transverse coloplasty pouch and J pouch in short coloin conduit and narrow pelvis.
- Smooth muscle plasty is an option in cases of total ISR to replace the internal sphincter function and should be trained.

Thank you