Low Anterior Resection Syndrome. Nightmare of the Patients and Surgeons. Is it Preventable or Treatable?

Emre Balik, Dursun Bugra
Koç University, School of Medicine, Department of General Surgery, Istanbul-Turkey

Oncologic outcomes for rectal cancer have improved secondary to increased surveillance, improved chemotherapy/radiotherapy, surgical techniques. Low anterior resection (LAR) with total mesorectal excision (TME) for rectal cancer has allowed the patients to avoid the permanent colostomy associated with abdomino-perineal resection. As a result, an increasing number of patients are being managed with sphincter sparing surgery. However up to 90% of patients who have surgery will have some abnormalities in bowel habit. All these abnormalities were universally known as low anterior resection syndrome. It is important to remember LAR syndrome is a complex multifaceted syndrome that involves more than just fecal incontinence and frequency. As has been suggested in the literature, long term follow up with standardized questionnaires for bowel, bladder, and sexual function and quality of life would define the problem. The best surgical reconstruction option seems to be CJPAA if it is feasible. Nowadays SNS and tibial nerve stimulation therapies give hope to solve this complex problem and LAR syndrome needs further studies to find the exact solution.

Keywords: Proctectomy, function, outcomes, total mesorectal excision, low anterior resection syndrome, treatment, reconstruction

INTRODUCTION

In 2012, 40290 new rectal cancer cases were diagnosed in the USA and the 50-80% of these patients were had sphincter preserving surgery. Oncologic outcomes for rectal cancer have improved secondary to increased surveillance, improved chemotherapy/radiotherapy, surgical techniques. Low anterior resection (LAR) with total mesorectal excision (TME) for rectal cancer has allowed the patients to avoid the permanent colostomy associated with abdominoperineal resection. As a result, an increasing number of patients are being managed with sphincter sparing surgery. In general, surgeons assume that patient in preserving their sphincter, their bowel function will not change significantly following rectal resection, or effects will be short term. However up to 90% of patients who have surgery will have some abnormalities in bowel habit. All these abnormalities were universally known as low anterior resection syndrome.

Recently published data from European consortium collected information on patients’ symptoms and quality of life following LAR. They showed a correlation between decreasing quality of life and high LAR scores. There are many heterogeneous aspects of the clinical, pathophysiological, and therapeutic areas surrounding this issue. Patients should be evaluated with multidisciplinary team and also, evaluation should be done by standard scoring tables. Danish LAR syndrome scoring questionnaire is the most effective scoring system. In this questionnaire there are 5 easy questions to answering and scoring (Table 1).

As a result, definition of LAR syndrome is disordered bowel function after rectal resection leading to loss of quality of life.

INCIDENCE AND PREVALENCE

The symptoms of anterior resection were previously thought tone transient, mainly resolving by 12 months after surgery. Long term studies are now reporting the presence of adverse symptoms up to 15 years after resection, with prevalence of fecal incontinence varying from 0-71% and rectal evacuation disabilities from 12-74%. These data suggest that this syndrome is permanent changes rather than short term neorectal irritability.
PATHOPHYSIOLOGY OF LAR SYNDROME

LAR syndrome is difficult to define. Patients may have combination of symptoms including frequency, urgency, incontinence, and constipation which may last longer than initial adaptive period. Patients typically fall into two categories: with incontinence, frequency and urgency and with constipation and feeling of inadequate evacuation. There may also third group with incontinence and constipation symptoms 

LAR syndrome is likely multifactorial. Many potential pathophysiologic mechanisms for LAR syndrome was defined such as internal anal sphincter (IAS) dysfunction, decrease in anal canal sensation, disappearance of the recto anal inhibitor reflex (RAIR), disruption in local reflexes between anus and the neorectum, and reduction in rectal reservoir capacity and compliance. The etiology of LAR is very complex also according to with the potential sphincter injury during anastomosis, alterations in anorectal physiology, the development of a pudendal neuropathy, and a lumbar plexopathy and also presence of anastomotic leak or the use of adjuvant and neoadjuvant radiotherapies.

INTERNAL ANAL SPHINCTER DYSFUNCTION

Pelvic surgery caries a risk of injury to many structures, including the IAS. Anatomic studies have shown that sympathetic nerves supplying the IAS course intersphincterically, and as a result of are likely to be injured in
LAR for rectal cancer, affecting function. Differences in IAS pressure before and after the surgery are likely to be a reason for LAR syndrome. Williamson et al. measured IAS pressures preoperatively and postoperatively in 21 patients who underwent LAR and those with low resting pressures frequently exhibited with incontinence. In addition, this study also showed a correlation between the length of the remaining rectum and the ratio of the decrease in maximum resting pressure. IAS injury has been demonstrated radiologically with rectal ultrasound following stapled LAR for rectal cancer. In a study 39 patients with rectal cancer were examined, endoscopically for IAS injury both before and after LAR, total 7 patients were found to have IAS defects after a 2 year-follow-up. These studies suggest that parasympathetic nerve damage and/or surgical IAS damage is associated with reduced IAS function and LAR syndrome.

DECREASED ANAL CANAL SENSATION

Like IAS dysfunction decreased anal sensation may be related to nervous damage during LAR. Karanjia et al. reported in a 232-patient series, the ability to differentiate flatus from feces has been associated with increased anal verge – anastomotic distance. Studies have sought to quantitatively examine anal mucosal electro sensitivity in preoperative and postoperative LAR patients. One such study demonstrated difference in preoperative sensitivity thresholds between patients with and without postoperative fecal incontinence, but the results were not statistically significant. Tomito R, et al., showed statistically difference between two groups who had underwent LAR with and without incontinence regarding to lower anal sensitivity at the dentate line. In this study patients with fecal incontinence demonstrated lower anal canal sensitivity.

RECTOANAL INHIBITORY REFLEX AND DISINTEGRATION BETWEEN ANUS AND THE NEORECTUM

The RAIR is described as transient relaxation of the IAS in response to rectal dilatation. The RAIR has been studied in preoperative and postoperative patients with symptoms of LAR syndrome by using anal manometry. Kakodkar et al. concluded that RAIR, maximum threshold volume on balloon proctometry, and length of the high pressure zone on manometry were independent predictors of poor 12-month function after LAR. Furthermore, research on RAIR in patients undergoing ileal pouch-anal anastomosis (IPAA) after proctocolectomy for ulcerative colitis has shown correlation between preservation of the RAIR and decreases in the incidence of incontinence. The disintegration between the anus and neorectum is one of the main causes of the bowel related quality of life impairment.

REDUCTION OF RECTAL RESERVOIR CAPACITY AND COMPLIANCE

The rectum has an inherent reservoir capacity and compliance that allows for proper storage of stool before evacuation. During the TME, only a few centimeters of rectum will remain that causes little reserve and compliance function. As a result, the little rectum left after TME likely does not contribute significantly to capacity and compliance. At the beginning of 1980s, a critics come from an USA institution that a large amount of data on the capacity and compliance were originated from Europe.
Hypocompliant rectum might be associated with bowel urgency, frequency, and urge fecal incontinence. Many studies showed association between decreased rectal compliance and poor incontinence scores.

Data in LAR patients also shows via balloon proctometry a reduction in rectal capacity and compliance which slowly recovered to close to preoperative levels, but only after a year following surgery.

Radiation therapy (RT) may affect the functional outcomes of the TME also. In a recent study radiation therapy and tumor height were found as risk factors for impaired bowel quality of life.

**ANASTOMOTIC TECHNIQUE AND NEORECTAL CONFIGURATION**

The rectum has a reservoir function for stool and after resection of rectum causes this reservoir function. Varying amounts of the rectum are removed during anterior resection and the contribution of the remnant rectum is unclear. Reduced neorectal reservoir volume, resulting from rectal excision and construction of a conventional end to end colorectal or coloanal anastomosis, considered for urgency and incontinence. This conclusion led to surgeons find solutions regarding to construction techniques.

The alternative to straight colorectal–anal anastomosis (SCAA), (Fig 1), some configurations are reported such as side to end anastomosis (SEA), (Fig 2), colonic J pouch anal anastomosis (CJPAA) (Fig 3), and transvers coloplasty pouch (TCP), (Fig 4).

The most popular alternative anastomotic technique is CJPAA. Lazorthes et al. described this technique in 1986. Original CJPAA were performed with 10 to 12 cm and up to 15 cm in length. Their case series described 65 patients with rectal cancer, 20 of whom had construction of a CJPAA. During first year 60% of patients described one or two bowel movements /day, compared with 33% in SCAA. In addition, maximum tolerated volume of the noerectum was greater with the pouch. Also 60% of the patients with pouch described themselves to have normal continence vs 42% with SCAA.

Long term results of different anastomosis techniques were also reviewed by Ho et al with 42 consecutive patients randomized to either CJPAA or SCAA. Ho et al showed no difference in defecatory function, including no difference in soiling with flatus or frequency at 2 years.

The SEA was originally described in 1950 by Baker, it was a hand sewn pouch construction and anastomosis, but nowadays it is mostly created by double stapling technique. Some surgeons leave a several centimeters blind end during anastomosis, but no clear benefit or effectiveness of this technique has been shown in the literature.

In 1990’s initial recognition of LAR syndrome and the research for the best anastomotic technique resulted in several trials SEA as an easy and quick resolution option regarding to improve long term bowel functions after LAR. Huber et al performed the first prospective randomized study to compare SEA and CJPAA. Patients underwent preoperative and 3th and 6th-month postoperative follow up evaluations. During the followup period SEA patients had higher stool frequency at 3 months but at 6 months, frequency was nearly same. Machado et al. and Jiang et al both examined CJPAA vs SEA. Both studies showed similar functional outcomes at the end of 2 years but CJPAA patients appeared to recover bowel functions faster at 6 and 12 months compared with SEA.

The TCP technique was first described in 1999 by a Swiss colorectal group as an alternative to previous two techniques. Short term follow up of patients undergoing TCP by Swiss group demonstrated the safety of TCP with a 7% anastomotic leak rate and similar 6-8-month
follow up bowel dysfunctions. First randomized study came from Singapore comparing TCP vs CJPAA in 2002. Patients were followed for early postoperative complications and 4-and 12-month bowel functions. TCP patients had a higher rate of anastomotic leak (15.9 vs 0%), requiring several reinsertions. During the follow-up period TCP patients had better results of bowel movements and less nocturnal leakage but had more stool fragmentation at 4 months but no differences was found at the end of the first year. The success of TCP may be related by decreasing the colonic motility.

Fazio et al. compared both three techniques in a multicenter trial of 364 patients over 4 years period in two study group: CJPAA eligible and not eligible groups. The functional results were evaluated at 4, 12 and 24 months post-operatively. No difference was found in terms of early postoperative complications according to early postoperative results there were no differences between the groups. In the CJPAA not eligible group the study did not find any significant differences in bowel movements, urgency, pad usage and medication usage for bowel function between SCAA and TCP. However, the authors found significant differences in total daily bowel movements, fecal incontinence severity index in favor of CJPAA over TCP but quality of life measures did not show any differences between the groups.

The straight anastomosis is still most commonly used technique of colorectal or coloanal anastomosis due to reach problems of the proximal bowel, or to the narrow pelvis limiting the insertion of a bulky colonic pouch, coloplasty or side to end anastomosis or to time consuming reasons.

In conclusion CJPAA seems particularly superior to other techniques, however there is no clear evidence to support superiority in terms of compliance of any particular technique also the effect of neorectal volume on function remains unclear, and there is no clear data of long term benefits of any particular reconstruction technique.

NEUROLOGIC AND HORMONAL ALTERATIONS

Researches showed that pathophysiology of LAR syndrome seems to be related to neorectal compliance and capacity according to particular success and results of CJPAA. However, there is something missing according to autonomic nerve innervation of the colon and rectum. During the TME both the sympathetic and parasympathetic fibers of the distal colon, which will become the neorectum are transected. This leaves the neorectum only under the control of the enteric nervous system. Therefore, the neorectum whether constructed SCAA, SEA, TCP or CJPAA will have denervated distal segment and this will affect the bowel functions also. As a result; extensive mobilization of colon may cause denervation of distal colon and neorectum.

Serotonin is also important neurotransmitter for enteric nervous system. About 95% of the serotonin in the body are found in the GI tract. It has a very important role regarding to peristaltic movements and secretory functions. In rat models following to the parasympathetic denervation, serotonin receptors upregulated and in an effort to maintain normal colonic activation. According to this data serotonin receptor antagonist can be helpful the treatment of the LAR.

TREATMENT

Trying to prevent the LAR by using the appropriate mobilization of colon and choosing the favorable anastomotic technique should be the first step. The next step should be awareness and information of the patient before the surgery in terms of the LAR syndrome. If the patient has a knowledge about this outcomes patient will ready to face up to the problems.

Conservative therapies such as pelvic floor rehabilitation or colonic irrigation or minimally invasive therapies such as posterior tibial nerve stimulation or sacral nerve stimulation are the basis and future treatment of LAR syndrome. Dietary regiments, fibers, constipating agents and enemas may be considered a first line conservative therapy. These therapies may control symptoms and may cause impact on patient satisfaction and quality of life.

Loperamide or antibiotics such as neomycin or rifaximin should be used for selected patients in the short term management of bacterial overgrowth symptoms and signs. The other medical treatment options are serotonin receptor antagonists and bile acid sequestrants have shown interesting preliminary results but still need further data in LAR syndrome patients.

Transanal irrigation has been reported to be a cheap and effective treatment for the incontinence and high frequency of defecation associated to LAR syndrome. The effect of irrigation is not a simple wash out effect and there is regular management of bowel function through irrigation can have rehabilitative effect on colonic motility.

When excessive stool frequency and incontinence are resistant to medical therapy, pelvic floor rehabilitations can be considered. The majority of studies reported significant improvement in stool frequency, incontinence episodes, severity of fecal incontinence and health related quality of life after either biofeedback or pelvic floor muscle training. Nowadays multimodality treatments; biofeedback, pelvic floor muscle training, electrostimulation are popular and more effective than individual techniques alone.

Sacral nerve stimulation (SNS) has shown effectiveness of treatment of the fecal incontinence and improving the ability of evacuation with normal or injured sphincters and also LAR syndrome. The mechanism of the SNS was initially thought to be direct effect on the anal sphincters to increase resting and squeeze pressures.

If there is no response to all medical and the other therapies surgical intervention can be considered. A stoma may be considered when other treatments are failed. Other complex procedures such as sphincter substitutions should be limited to highly selective patients.
If soiling or mild passive fecal incontinence are persistent symptoms anal bulking agent can be considered for treatment of symptoms.

CONCLUSION

It is important to remember LAR syndrome is a complex multifaceted syndrome that involves more than just fecal incontinence and frequency. As has been suggested in the literature, long term follow up with standardized questionnaires for bowel, bladder, and sexual function and quality of life would define the problem. The best surgical reconstruction option seems CJPAA if it is feasible. Nowadays SNS and tibal nerve stimulation therapies give hope to solve this complex problem and LAR syndrome needs further studies to find the exact solution.

SUMMARY


Ključne reći: Protektomija, funkcija, rezultati, totalna mezorektalna ekscizija, sindrom prednje niske resekcije, tretman, rekonstrukcija

REFERENCES


Acknowledgment: The authors thanks to Suat Erus, MD, for the drawings of the figures.