

Transanal Repair of Rectocele and Rectal Mucosectomy with a Single Circular Stapler (TRREMS) - Why is it Worth Rehearse?

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Abstract

Background The aim of this literature review was to make future guidelines for clinical treatment and next study about preoperative and postoperative clinical and functional evaluation of symptoms after transanal repair of rectocele and rectal mucosectomy with a single circular stapler (TRREMS procedure), used for treatment of obstructed defecation syndrome (ODS) caused by rectocele and rectal mucosal prolapse (RMP). Since anorectocele is usually associated with mucosa prolapse and/or rectal intussusceptions, it was developed a stapled surgical technique using one circular stapler.

Methods An organized search of Medline/PubMed and medical Database of Clinical Trials was performed, from 1996 to 2016 using the key words „rectal prolapse”, „rectocele”, „ODS”, „Defecography”, „STARR”, „TRREMS”.

Results The results of clinical studies are good for improving the quality of life of patients who underwent transanal repair of rectocele and rectal mucosectomy with a single circular stapler (TRREMS). The method can be considered as safe. Clearly to be implemented in our practice, for specific indications.

Keywords: constipation; obstructed defecation syndrome; rectocele; defecography; rectal mucosal prolapse; transanal repair; TRREMS

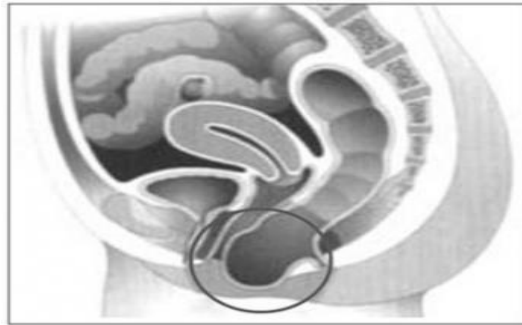
Introduction

Chronic constipation is a common problem in today's population in Latvia and Europe. Chronic constipation is about 17% of people, but after 70 years - 20.6% of men and 25% of women^(1, 14, 30). About 50% of patients with chronic constipation have obstructive defecation syndrome (ODS)^(3,9,11,31).

The abdominal outflow from three times in a day to one time in a three days is considered the norm. The diagnosis of chronic constipation is determined if the patient complies for at least 6 months, including the last three months, and criteria of constipation conform to the Rome III diagnostic system.⁽²⁷⁾.

- Two or more of the following :
 - Less than three defecation per week
 - Straining in time of defecation
 - Anorectal obstruction/block feeling 25% cases
 - Incomplete evacuation
 - Need for manual maneuvers to defecate
- Defecation rare without laxatives
- Insufficient criteria for diagnosis of irritable bowel syndrome

Chronic constipation is divided into slow transit constipation, normal transit constipation and defecation disorder ⁽²⁶⁾. In case of slow transit, the motility of the entire colon is disturbed. In case of normal intestinal transit constipation, intestinal motility is not disturbed. Patients feel bloating as constipation. Such patients are more likely to experience depression than other types of constipation patients. ⁽²⁵⁾. In case of defecation disorders, patients have functional and / or anatomical changes in the rectum resulting in rectal evacuation disorders and constipation. Functional changes result in a disinfecting defecation when one or more symptoms occur: non-relaxation of the anal sphincter, paradoxical anal sphincter contraction, lack of rectal filling, too narrow anorectal angle, inadequate intra-abdominal pressure, uncoordinated abdominal muscle, pelvic diaphragm and anorectal muscle function ⁽³²⁾. In the case of functional disorders, conservative therapy with medications and physiotherapy is the main opportunity ⁽³⁴⁾. The anatomical causes of defecation disorders- constipation or obstructive defecation syndrome are rectal prolapse, rectal mucosal invagination, solitary rectal ulcer, rectal prolapse, mucosal prolapse, rectocele, enterocele, pelvic floor dyssynergia. The most common clinical finding of ODS is a rectocele, which is formed as a vaginal bulge of the rectum front wall (see Fig. 1) and rectoanal invagination.



Up to 93% of women can see a rectocele within 2.5 cm ⁽³⁴⁾. However, very often rectocele is asymptomatic and patients do not have any complaints, in such cases there is no need for any therapy - either conservative or surgical. Treatment should be initiated when complaints about defecation disorders appear. In the case of ODS, solid / residual faecal masses accumulate in the rectocele pocket and their evacuation is impaired.

The rectocele is observed in 20.0-80.0% of women who are being sent for treatment related to pelvic floor disorders and its disorder. The rectocele is a forward curvature of more than 2 cm from the front / back gut diameter ⁽²²⁾. Usually found for women because of the loose of strength of rectovaginal wall.

Of course, the pathogenesis of rectocele has been discussed for a long time, but nowadays the available radiological methods - 3D-TRUSG proves that the anal canal is asymmetric for women and the inner sphincter is shorter ⁽¹⁾.

Obviously, precisely for women, there is a predisposition to the prolapse of small pelvic organs: white race, age 40, increased BMI, connective tissue disease, family history of prolapse, chronic lung disease, cough, constipation, severe physical work - weight lifting, pregnancy, vaginal or surgical childbirth (with or without perineal damage - due to neuromuscular damage (n.pudendi)) - rectovaginal fascia is traumatized in about 2/3 cases of vaginal birth, surgical manipulation of small pelvic organs and anatomical difference, amuscularity of rectal ampoule ^(2.4.5).

Unpredictable pathologies of collagen formation, musculoskeletal disorders. Over the past decade, women have become more educated about the fact that small pelvic organ prolapse can result from any defect in the vaginal wall strengthening structures. For example, a patient may find a rectocele as a vaginal dislocation- bulge, with obstructive defecation, which is true for rectal wall moveing through the back wall of the vagina ⁽³⁾. However, rectoceles are often not recognized, and they can only have a minor effect on a woman's daily activities.

Definition: Rectovaginal partition protrusion in vaginal lumen. Symptoms of rectocele are varied, which can manifest itself with various complaints: obstructive defecation syndrome, constipation, incomplete evacuation, mass / foreign body sensation that increases at the end of the day, especially when daily activities are "on the feet".

Rectal bleeding (20-60% of patients), anal pain (12-70% of patients), defect promoted by anal, vaginal, perianal or perineal digitization, faecal incontinence, urgency and tenezms.

In addition, some patients complain of gynecological conditions such as dysphoria, painful mass in the vagina and sexual dysfunction. Individual variations do not always correlate with the degree of prolapse and are not a classic single symptom ^(4.5).

What is important?

Anamnesis - it is important to find out previous operations in the abdominal cavity and small pelvis, co-morbidities (diabetes mellitus, hypothyroidism, system illnesses, etc.), everyday medications. Specificity - frequency of abdominal output during the week, time required for evacuation, presence of tenezms, incomplete evacuation, specific pose during defecation, special techniques (digitization), use of preparations (laxatives, enema). Using the Longo ODS (Tab.1) scale during the first visit, you can already understand whether a patient should start a conservative therapy, as only 20% of patients do not have this treatment (diet, medication, physiotherapy and procedures, etc.) effective.

Longo scale

Questions, answers

Points

Medication needed for defecationI (laxatives, enamas etc.)	0	1	2	3
Evacuation difficulties	0	1	2	3
Digitization	0	1	2	3
Repeated WC visit for evacuation	0	1	2	3
Incomplete evacuation	0	1	2	3
Straining	0	1	2	3
Time needed for evacuation	0	1	2	3
Changes in life style	0	1	2	3

1.-6.question: 0- never,1- less than one time per week,2.- one to six times in week, 3.- daily. 7.question: 0- less than 5 minutes, 1- 6-10 minutes, 2.- 11- 20 minutes, 3.- longer than 20 minutes. 8.question: 0.- no changes, 1.- mild changes, 2.- moderate changes, 3.- significant changes in quality of life and style.

Clinical-physical examination lets to plan a surgeon a surgical technique. Typically, a patient with symptomatic enterocele, rectocele or perineocele will be identified clinically by examination of the curvature of the posterior wall of the vagina ^(7.9). The enterocele usually manifests itself as an obstruction, the back wall of the vagina between the vaginal end and the lifting muscles. In the case of rectocele,

the curvature arises from the edges of the lifting muscles due to the loss of weakness and elasticity^(9,10). Specifically-perineal muscle weakness leads to loss of support to the rectum front wall. Existing isolated rectocele can propagate the perineal diaphragm identified digitally by examination - the fibromucular tissue is absent in the perineum^(7,10). During the examination are important: the thickness of the vaginal mucosa, the defect of the estrogen-depleted pelvic firmness of the pelvis - the prolapse of the vaginal arch, the cystocele, the neuromuscular function of the pelvis^(4,6,10). The strength and tone of M. levator contractions is a very important factor in evaluating the long-term success of pelvic reconstructive surgery⁽¹¹⁾. After reconstructive operations Kegel exercises should be recommended^(10,11,12). Biofeedback therapy may be required for patients to instruct how to adequately isolate and sprinkle pelvic floor muscles⁽¹³⁾. Important- local, topical estrogen preparations if the vaginal mucosa has hormonal deficiency^(13,14). Prior to surgery, a series of specific tests should be performed and well defined indication for operation. Patients should always undergo a conservative course before surgery. Incorrect assessment of indications for surgery often fails to achieve a positive postoperative result, although anatomical changes are eliminated^(3,28).

Radiologically, 80% of colorectal surgeons use defecography and only 6% of gynecologists consider it necessary preoperatively^(5,15). However, it should be kept in mind that only anatomical changes in defecography are not indications for surgical treatment. Defecography - evacuation proctography, a very useful test for patients with defecation difficulties, as it allows for a real-time functional investigation in the physiological environment⁽¹⁶⁾. Principle - patient preparation with laxatives or enema is not required by standards, however, in some centers it is recommended to use hyperosmolar candles a few hours before the examination. It is very important for the patient to tell the course of the procedure. To diagnose enterocele, the small intestines should be filled with the same water-soluble barium solution, so that 400-600 ml barium is given about 45 to 60 minutes before the X-ray examination. Sometimes it takes up to three hours until the oral contrast reaches the ileum loop at the pelvic level^(15,16). The study is carried out on the left side, when a thick (similar to the abdominal consistency) barium paste is injected into the rectum in the range of 250 to 300mL. When a patient feels the need for defecation, it is stopped. The table is positioned vertically, the X-ray machine is centered on the pelvis, asking for rest, pressing, tension, and defecation are carried out by pictures. The condition that the patient's rectum is emptied completely is followed by a control picture, the physiological process takes about 30 seconds. Parameters- ARA-anorectal angle, measured between the longitudinal axis of the anal canal and the backline of the rectum, parallel to the longitudinal axis of the rectum (Fig.2). It can sometimes be difficult to measure because the back wall of the rectum is often not clearly marked, and angle becomes subjective⁽¹⁸⁾. During rest, ARA values range from 95 to 96° (physiological value 65 to 100°), with no significant gender differences^(17,19,20). ARA implicitly refers to puborectal muscle activity. During muscle contraction, ARA becomes an sharp, it becomes wide during the relaxation phase. Measurement of the anorectal angle (yellow, curved arrow) between the longitudinal axis AB of the anal canal and the right-angled longitudinal axis of the rectilinear parallel line CD. Double narrow lines show the position of the anorectal connection. Another important parameter is the movement of the anorectal junction ARJ during tension. ARJ is the highest point in the anal canal. The line drawn between the buttocks is used as a landmark and the tip of the tail bone itself. Craniocaudal ARJ migration implicitly shows the pelvic floor movement.

In the resting phase (Fig. 3A), the puborectal impression can be seen on the caudal part of the rectum back wall, ARA is about 90°. Puborectal printing becomes more noticeable due to contraction. By knowingly straining the pelvic base, ARA decreases to about 75° and ARJ migrates cranially (Fig. 3B). Puborectal printing becomes more noticeable due to m. levator ani contraction.

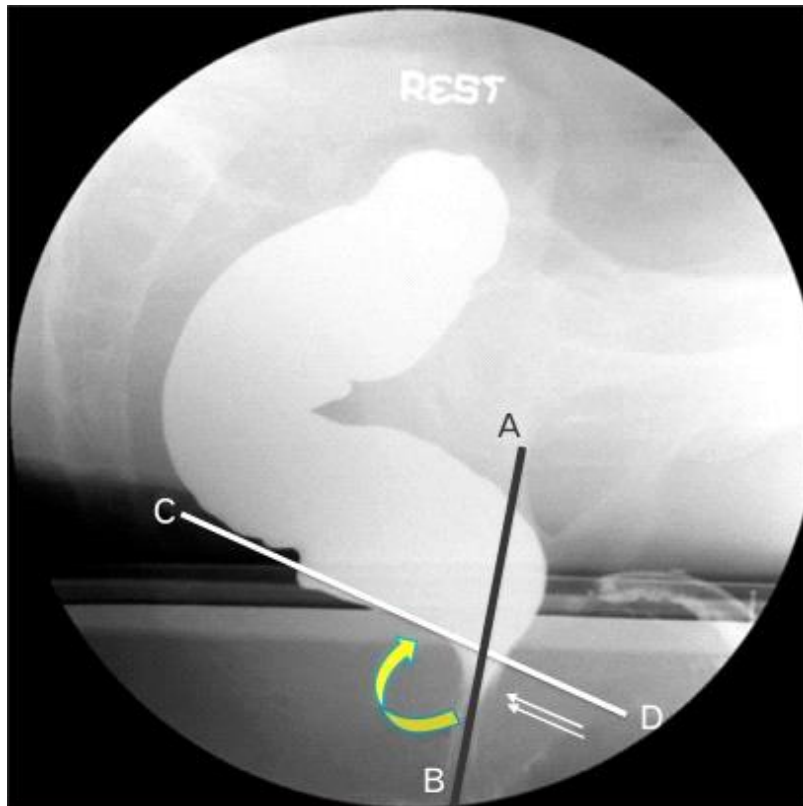
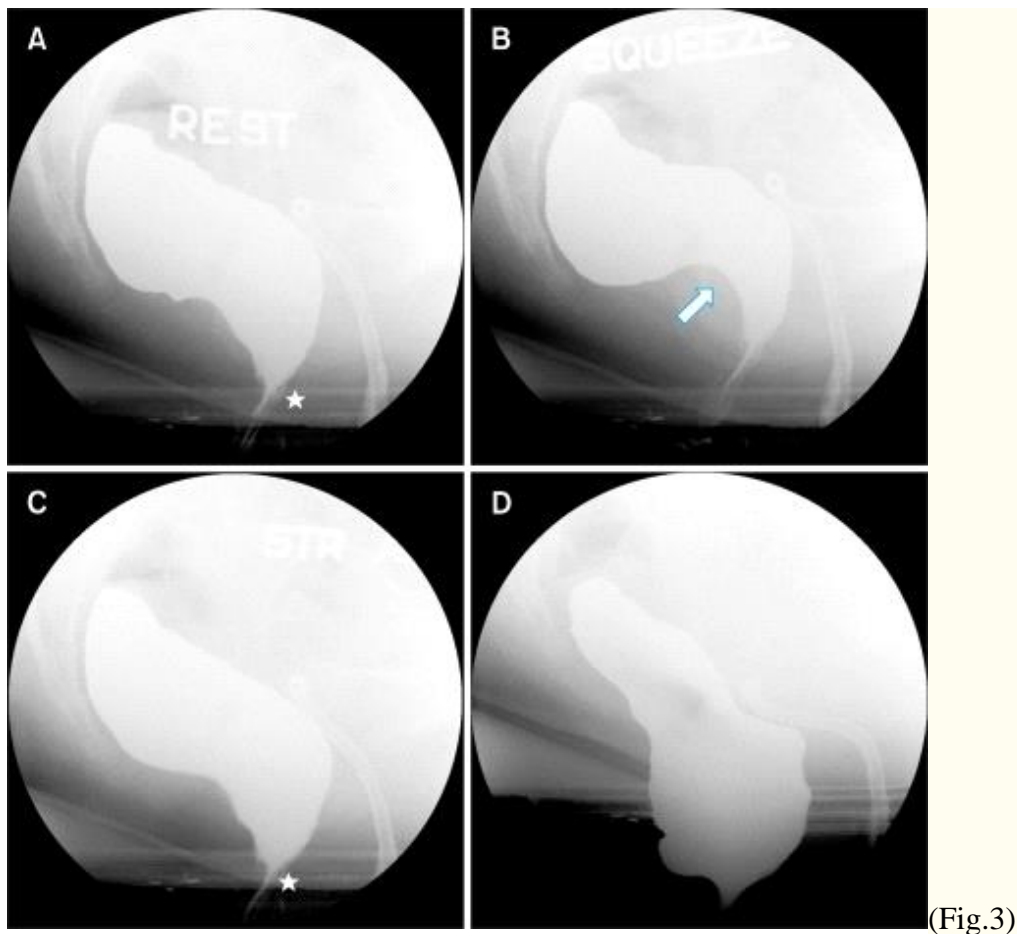


Fig.2

Normal defecography - at rest (A) puborectal impression deep (white arrow) and cranial migration to distal rectum during contraction (B). Pressing with closed sphincter (C) ARJ stack migration (star). During evacuation (D), the anal canal opens with the disappearance of puborectal impression. By subjecting the patient to pressure (Fig. 3C), ARA increases with partial or complete disappearance of puborectal embedding and lowering of the pelvic floor. ARJ stump migration is considered to be normal if it is less than 3.5 cm compared to the rest position.⁽²¹⁾ During the evacuation (Fig. 3D), the broad opening of the anal canal and the anorectal junction almost completely align the puborectal impression. ARA increases due to relaxation of anal sphincter and puborectal muscle. At the end of the evacuation, the rectum is empty and its wall collapses, the rectum should be at rest. Rectal prolapse is a concentrated invasion of the entire rectum wall thickness during compression or defecation. It can be classified as intra-rectal, intra-anal, or complete rectal prolapse (when the rectum is prolapse outside the anal canal). Usually it starts at a depth of about 6-8 cm in the anal canal as one of the two Houston valve invasions⁽²¹⁾. The defecography shows a funnel with a rectal wall thinner than 3mm. In the case of complete prolapse, the dilation of the anal canal is evident during the evacuation, the circular lane-funnel from the wall in the lumen. Falling may be dramatic. In defecography, the rectum front wall lobe-rectocele, pulls out and dislocates impervious vaginal lumen during compression and evacuation. The rectocele does not always prevent evacuation, but retention of the faeces together with the rectocele creates a feeling of incomplete emptying and the need for digitization. Rectoanal invagination: It is treated as the initial stage of rectal prolapse. Often associated with

solitaire ulcers in the rectum or "solitaire cystic colitis". May be a precursor to malignancy. Clinically practically not diagnosed.



(Fig.3)

According to the classification of Beahrs et al. (Table 2), it is important to separate the 1st incomplete (mucosal prolapse) from complete prolapse (wall full thickness prolapse). First degree - high or early, disguised, invisible. Second degree: Externally visible during tension, visible groove between rectal wall and anal canal. Third Degree: always externally visible⁽⁶⁾.

Mucosal prolapse	Full thickness prolapse
Protrusion of mucosa and submucosa outside of the anus	Protrusion of the all layer of the rectum
Protrusion length till 4cm	Protrusion more than 4 cm (as much as 10-15 cm)
Palpation between finger and thumb- no more than double layer mucous membrane	Much thicker, consist of double thickness of entire wall
Common in children	Common in adult (M:F=1:6)
More common	Less common

Tab 2.

Mucosal prolapse occurs with rectocele, prolapse of the full thickness rectal wall- less frequently⁽⁷⁾.

Mucosal prolapse classifications are different, there are also variations on radiological classification⁽⁸⁾ (Tab.3).

<u>Internal rectal prolapse</u>		
Low- grade	Grade I	Descends to proximal limit of rectocele
	Grade II	Descends into level of rectocele, but not onto anal canal
High- grade	Grade III	Descends onto anal canal
	Grade IV	Descends into anal canal
<u>External rectal prolapse</u>		
	Grade V	Descends through anal canal, protrudes from anus

It is very important not to confuse mucosal prolapse with rectal prolapse.

Rectal prolapse grades/ types(tab. 4):

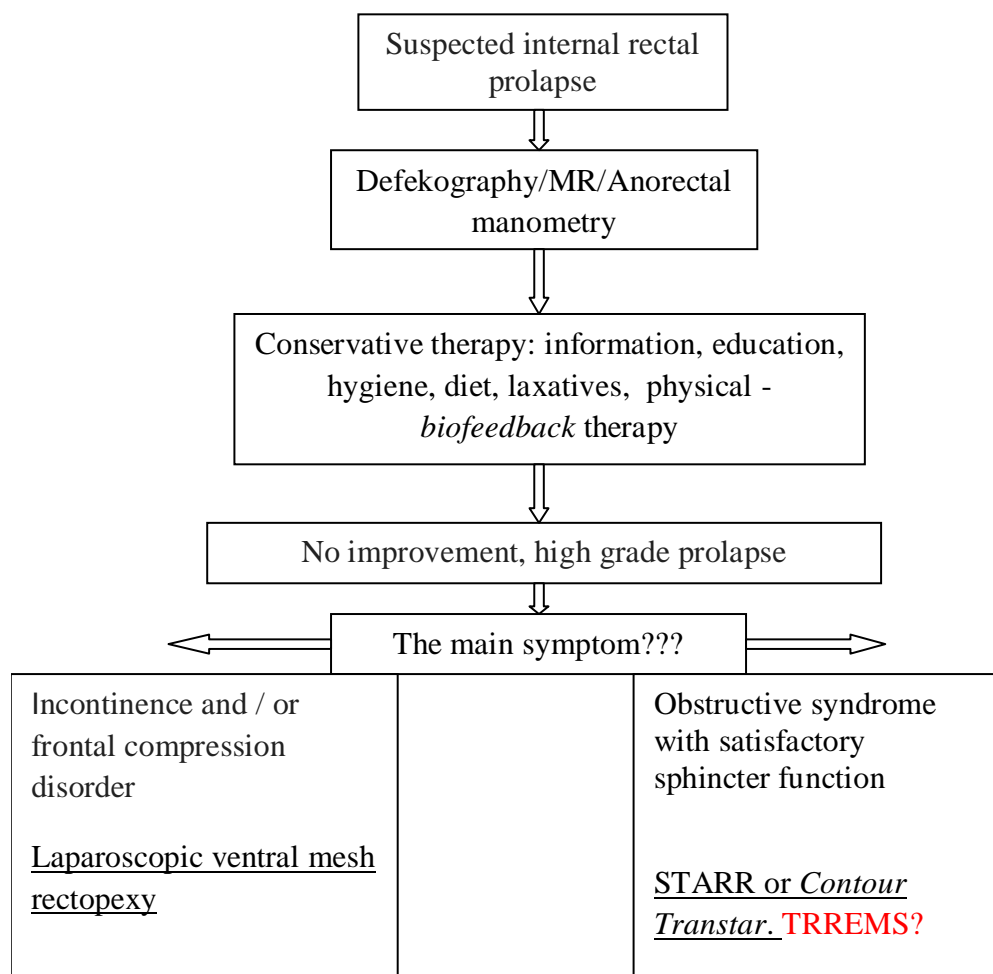
Type	Description	Important
I	Small, circular amount of submucosal swelling protrudes through anus, probing reveals a pocket or fornix just inside anus	Good prognosis if there is no damage to mucosa- purse- string suture, submucosal resection
II	Slightly more circular submucosal and mucosal swelling, possibly containing retroperitoneal rectal tissue from anus; probing reveals a pocket just inside anus	Good prognosis if treated quickly and there is no damage to mucosa- string suture, submucosal resection, rectal amputation
III	Complete prolapse containing part of the retroperitoneal structures of the rectum and the descending colon; probing reveals a fornix just inside anus; the affected portion of the descending colon does not prolapse through the anus	If there is vascular injury to the descending colon, prognosis is guarded to poor, submucosal resection or rectal amputation are the methods of choice
IV	The descending colon appears as a tube, and has intussuscepted through the rectum and anus; unlike the previous types, in the case a probe or finger can be inserted into the prolapse through the anal sphincter for a distance of 5 to 10 cm	If there is vascular injury to the descending colon, prognosis is poor, abdominal exploration may be required to determine the extent of damage to the descending colon

All syndromes (rectocele, rectal invagination, rectal prolapse) should be treated as manifestations of obstructive defecation syndrome. The syndrome is based on amuscularity and dilatation of the ampullar part of the rectum.

What to do?

Indication for symptomatic rectocele treatment is: ODS, residual containing after defecation, small pelvic diaphragm weight and pressure, vaginal back wall prolapse / fall, small pelvic relaxation with vaginal passage extension^(3,15). We can pretend that this is a variant of the norm - digitization, incontinence, foreign body feeling, etc. However, for decades, colorectal surgeons and 6% of gynecologists around the world are improving treatment options for such symptomatic patients⁽²⁾.

It is known that ODS surgical treatment methods are many and varied, which can be divided into approach and methodology. From access- abdominal (laparotomic, laparoscopic), transperineal, transanal and transvaginal. During these operations, rectal resection, altered segment plastics, biological and synthetic materials implantation are performed. With the appearing of circular staplers the treatment of rectal mucosa prolapse and hemorrhoidal disease, new possibilities have arisen to treat frontal and posterior pelvic floor dystonia. Transanal rectal resection (STARR), which includes double stapling technique - two circular sutures, has become widely recognized and tested in multi-center trials with good results, proving that the technique is safe when used by qualified surgeons. However, this STARR procedure has also been improved by the new design stapler-Contur Transtar. Partial redistribution of *M.puborectalis* (good results in the short term, more effective than any non-surgical method), *Delorme's* procedure (good long-term results, low relapse rate, minor complications especially post-operative obstipation, indicated for patients with ODS and postoperative incontinence risk), *PPH-STARR* (no anal sphincter damage, long-term good results), *Countour-Transtar* (good results, relatively few complications like rectovaginal fistulae and incontinence), *Bresler* procedure (long-term results good, no severe complications like rectovaginal fistula and perforations, easy to resect rectoceles deeper than 4.5cm), *TRREMS* (good results in the long-time, no serious complications, possibly to resect prolapse over 5cm). Guidelines for Visceral Surgery issued in 2016, however, we believe that in the near future there will be new ways by introducing new methods and demonstrating oneself in practice.

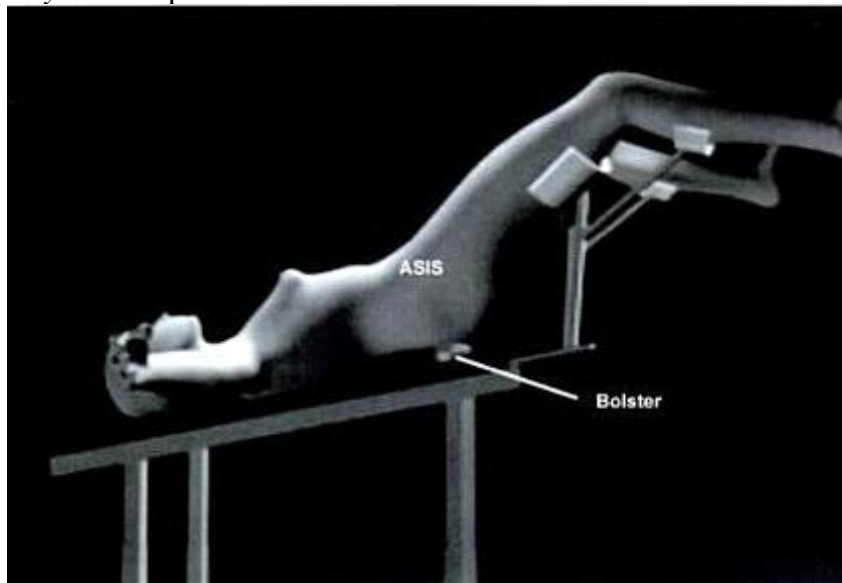


In November 2004, Fco.Sergio Regada in Brazil developed a procedure for the treatment of rectocele using circular stapler : transanal rectocele resection and rectal mucosectomy with one circular stapler (TRREMS).

TRREMS- transanal reappear of rectocele and rectal mucosectomy with one circular stapler.

Technique:

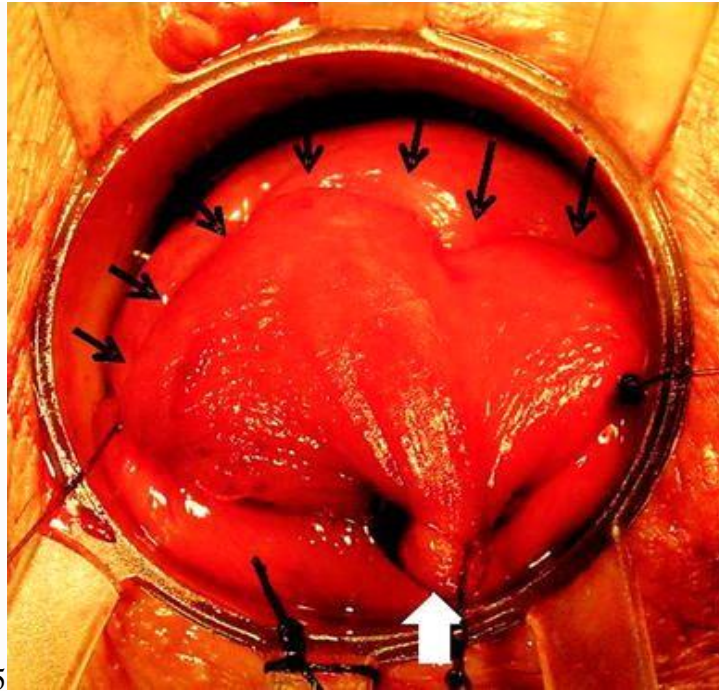
The lower gastrointestinal tract of the patient is mechanically prepared (cleansing enema before surgery, or triple administration of laxative candles in the rectum with a 4-hour interval before surgery, which is also dubious, taking into account the visual and perfusion changes of the rectal mucous after hyperosmolar preparations). Surgery is performed in spinal anesthesia. It is important that the patient is positioned in the *Lloyd-Davis* position.



(Fig.4)

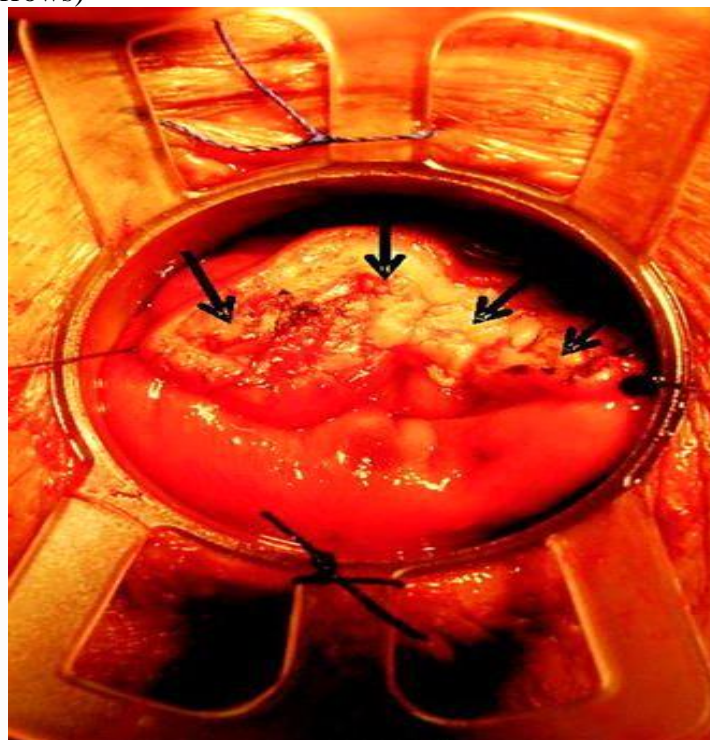
This position in studies does not relate to a significant reduction in perfusion of the lower limbs, ischemia and compartment syndrome during hyperperfusion during recovery ⁽¹⁾. A wide range of antibacterial prophylaxis before surgery - 3rd generation cephalosporins- (Ceftriaxone 2g) in Brazil it is 2nd generation cephalosporin (1g cephoxitins) ⁽²⁾.

Place the circular anal dilatator in the anal canal, which is fixed to the perianal skin with separate sutures (front and back surface). The rectocele was pushed through the anal canal with a finger inserted into the vagina to identify the apex. The posterior vaginal wall was pulled up with a Babcock forceps, the apex of the rectocele was pulled down (Fig.5) and a running horizontal suture (Greek suture technique) was placed through the base of the rectocele, including mucosa, submucosa and the muscle layer of the whole anorectal junction wall (Fig. 6). This suture was placed approximately 2.0 cm above the dentate line, depending on the size of the rectocele. The exceeded prolapsed mucosa and the muscle layer were then excised with an electrical scalpel, keeping the wound open with the edges joined by the previous manual suture. A continuous pursestring rectal mucosa suture was then placed 0.5 cm from the wound of the previously resected rectal mucosa. Posteriorly, the pursestring suture included only mucosal and submucosal layers. The stapler was then inserted through the pursestring suture which was tied around the stapler's center rod (Fig.7), taking care to include the full rectal wall anteriorly, fired and withdrawn, keeping a circular stapled suture (Fig.8).



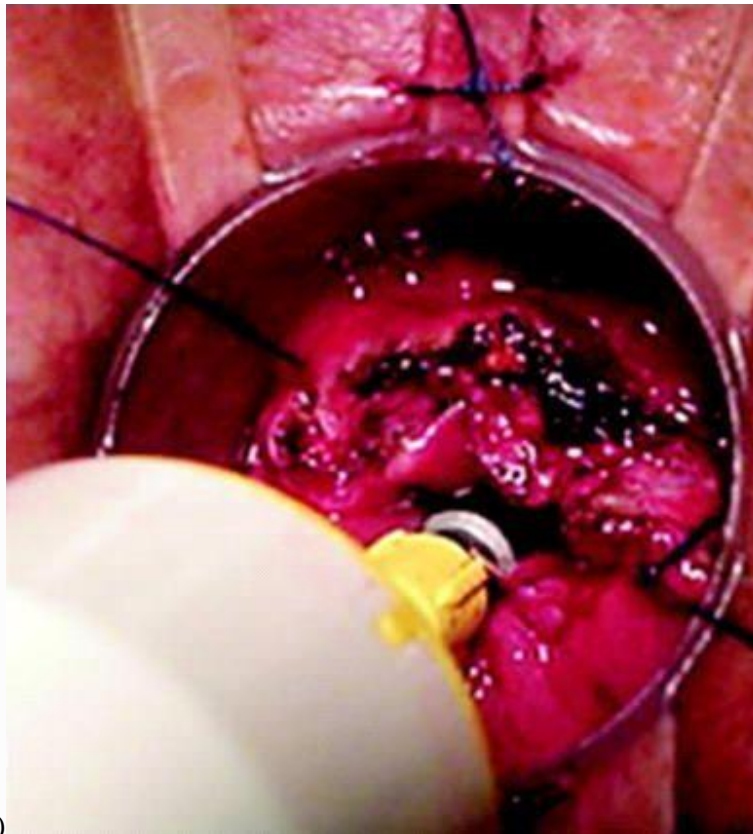
(Fig.5)

The apex of the rectocele is identified and pulled down through a stitch(circle). A running horizontal suture (Greek suture technique) is palsed through the base of the rectocele (black arrows)



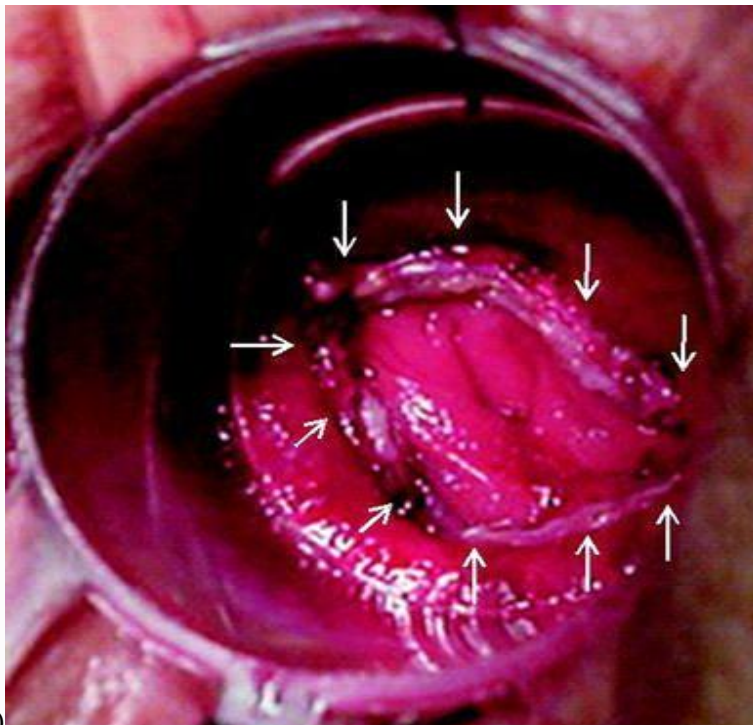
(Fig.6)

The exceeded prolapsed mucosa and the muscular layer were exised, keeping and opened wound with theedges joined by previous manual suture.Arrows- there is seen all layers.



(Fig.7)

The continuous circular suture of the mucous is placed deeper, mucosa is fixed at the center of the circular stapler



(Fig.8)

Staplers are shot and evacuated, seam circular, hemostasis good (white arrows)

Results At this time we have made only two TRREMS procedures. The age of both women was 45 years. Average duration of surgery was 47 min. Hospitalization for 24 h, with no early complications. On the first postoperative day, the average pain score was 5, on the eighth day it was 1. Patients were followed for 3 months now. There is no evidence of stenosis, there were no bleedings this far. ODS score decreased from 10.9 to 2.11. Obstructed defecation score (straining, sensation of incomplete evacuation, using of enemas, laxatives etc., digital evacuation) is reduced after surgery. The satisfaction 3 months following surgery is 87%. After making this literature review we made indications and criteria for TRREMS procedure. Criteria for including will be ODS and rectocele +/- rectal mucosal prolapse, won't be included patients with rectal wall all layers prolapse. We will include patients after previous operations (hemorrhoidectomy etc.) 1- symptoms and complaints, 2- proctoscopy, 3- defecography, 4- Longo scale, 5- operation-TRREMS procedure, 6- control proctoscopy+Longo scale 2 weeks after operation, 7 - proctoscopy+ control defecography+Longo scale 3 months after operation. All patients will receive broad spectrum antibiotics before operation. Will be hospitalized for 24 h. And will be tested on pain scale.

Discussion

ODS caused by rectocele or prolapse of rectal mucosa is eliminated by this method, improves quality of life in the long term, reduces anatomical defect, is a safe and economically beneficial method. The main important aspect - the presence of muscle tissue in histological material - already in 2005, *Kllemann* published a study in which several layers with a thickness of 16.6mm were excised with one circular suture. *Regaas* thought the 5cm wide fragment of circular tissue with 100% smooth muscle tissue was perfect. This method allows a resonance of the front tissue segment with a horizontal length of 6.2 ± 1.6 cm with a width of about 5.7 ± 1.2 cm. The back segment with a horizontal length of 4.8 ± 1.4 cm and a width of $4, 8 \text{ cm} \pm 1.4$ cm⁽³⁶⁾. Obstructive manifestations decrease / disappear, postoperative discomfort is minimal, complications are rare. After clinical trials with ODS points, constipation and functional manifestations are significantly reduced after TRREMS more than three times⁽³⁵⁾. After this operation, the average pain scores between 1 and 8 postoperative days are not 5.23 but 1.20 ($p = 0.001$) after the visual analogue pain scale. No difference was found between either PPH 34 or PPH 36 sutures, either in the excised material or in the clinical manifestations⁽³⁵⁾. Treatment satisfaction was achieved in 88.06% of cases over 12 months. By measuring six parameters in the control defecography, the size of the rectocele has decreased more than three times from the previous size, which is similar to the use of two circular staplers or *Countour Transtar*. After treatment, patients do not use or rarely use laxatives, digitalisation, feel incomplete evacuation or clogging^(36,37). The complications that were observed were not severe-loose stenosis that occurred because the mucosectomy was done a little far from the dentata line. TRREMS produces rectocele suppression, followed by mucosectomy and anorexia, which corrects the rectovaginal fascia by strengthening it with fibrous tissue in the healing process.

In past few years familiarity with surgical staplers has grown, there is very many multicenter studies, based on STARR procedure^(33,34,36). But, there are reported very many complications too⁽³⁶⁾. Some surgeons optimize the technique, some modifying the stapler or using one stapler (as proposed *Regadas* et al.) The present study was to

see how this method helps patients who were diagnosed by clinical, gynecologic, proctologic and defecographic examination and underwent the TRREMS procedure, how quality of life grows. All of the above leads to the conclusion that the existence of ODS, a set of criteria, indications for operation, allows the use of this comparatively new method in Latvia, possibly competing with other more expensive methods.

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