Study No. 12: Role of the uterosacral ligaments in the causation of rectal intussusception, abnormal bowel emptying, and fecal incontinence. A prospective study

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Abstract: The aim of this study was to assess the role of damaged uterosacral ligaments and associated rectovaginal fascia in the causation of rectocele, rectal intussusception, evacuation disorders and fecal incontinence. METHODS. 48 patients with various degrees of vaginal vault descensus, clinical rectoceles and defecatory dysfunctions were treated by insertion of a posterior IVS (syn: infracoccygeal sacropexy), reconstruction of the rectovaginal fascia and perineal body repair. RESULTS. Of the 48 patients with evacuation difficulties, 45 (94%) patients reported complete normalization of defecation at both visits after surgery. Of the 27 patients with fecal incontinence, 18 (66%) reported cure, 5 (19%) >50% improvement, and 4 no change. Postoperative proctograms showed resolution of the rectal intussusception in 89% and 94% reported completely normal defecation after surgery. CONCLUSIONS. Connective tissue damage to the anterior rectal wall supports may cause it to sag inwards, "intussusception". The posterior sling creates a foreign body reaction which reinforces the damaged uterosacral ligament and "reglues" the ligament's attachments to levator plate, cervical ring and rectovaginal fascia to suspend and stretch the rectal wall.

Key words:

INTRODUCTION

Rectoceles are common findings in patients with intractable evacuatory disorders. Typical symptoms are difficulties to evacuate, incomplete evacuation, assisted digitation to aid defecation, fecal incontinence, constipation, impression of a pelvic mass, pelvic pain and dyspareunia. Occult rectal prolapse has been found in 33% of patients with rectoceles and defecatory dysfunction.[1] Endorectal, transvaginal, transperineal, abdominal or combined approaches are treatment options discussed for symptomatic rectoceles. In the presence of rectal intussusception, open or laparoscopic rectopexy, with or without sigmoid resection, is still most widely accepted. Although the anatomic results are mostly good, all procedures widely lack functional improvement. This is in particular true for posterior colporrhaphy[2] abdominal sacrocolpopexy [3, 4] and rectopexy,[5] all resulting in increasing defecatory dysfunctions.

In the normal pelvis, the sacrouterine ligament functions as the most important supporting structure for the uterus, vaginal apex and via the rectovaginal fascia, also for the posterior vaginal wall and rectum (Fig. 1).

The rectovaginal fascia (RVF) attaches to the perineal body (PB) below and levator plate (LP) above.[6] The levator plate is attached to the posterior wall of the rectum. Contraction of the levator plate (LP) stretches both walls of the rectum during anorectal closure and defecation.

In cases with disrupted rectovaginal fascia, a rectocele may form. Due to distended sacrouterine ligaments, the rectum can no longer be kept in its normal position, and consequently proximal rectal parts may bulge into the distal rectum causing intussusception (syn. internal rectal prolapse) (Fig. 2).

According to the Integral Theory,[7] dysfunctions of anorectal opening (evacuation disorders) and closure (fecal incontinence) are mainly caused by connective tissue damage in the vagina or its suspensory ligaments. The explanations offered above expand these concepts to the pathogenesis of rectal intusssusception.

The infracoccygeal sacropexy ("posterior IVS")[8] procedure belongs to the family of "tension free tape" operations. An implanted polypropylene tape (Tyco Healthcare), reinforces the uterosacral ligaments by irritating the tissues to create a linear deposition of collagen. In contrast to other methods which aim at fixation of the rectum, the infracoccygeal sacropexy does not attach the vagina or the rectum firmly to bony structures. It allows the surgeon to restore the normal vaginal axis and the rectovaginal fascia anatomically correctly, thereby reestablishing normal function.

We could see the following reasons for the use of an IVS polypropylene sling in order to treat symptomatic rectoceles with intussusception.

1. Baden and Walker pronounced their tent theory[8] stating that if the top of a tent caves in, the walls may follow. This translates for the vaginal situation that the first step in the treatment of vaginal or even rectal prolapse should be the restoration of a competent apical fixation, namely restoration of the sacrouterine ligaments by insertion of a polypropylene tape (posterior IVS). Important in this type
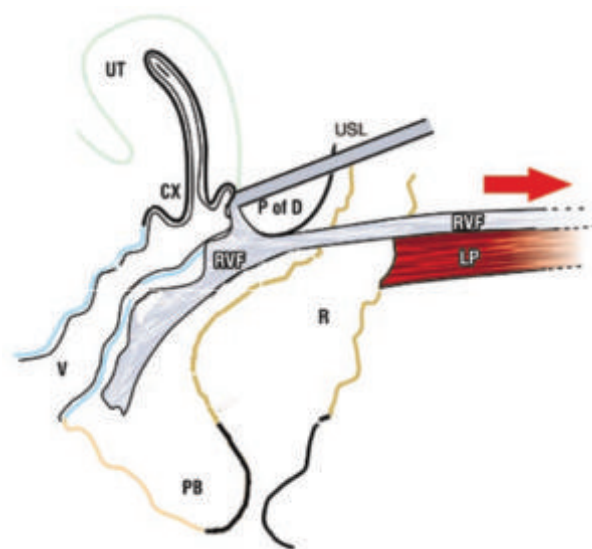

Fig. 1. – Normal anatomy. Schematic 3D sagittal view. The rectovaginal fascia (RVF) is suspended by a competent uterosacral ligament (USL) inserting into the cervical ring (CX), and tensioned by contraction of levator plate muscle (LP) pulling against perineal body (PB) and USL. P of D = Pouch of Douglas.
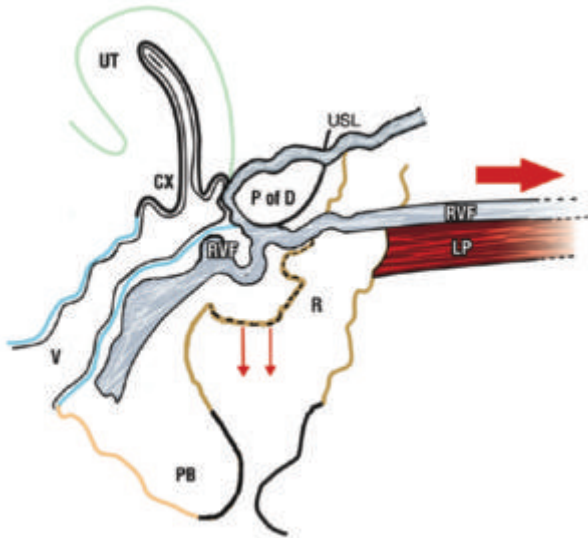
Fig. 2. – Rectal intussusception USL is lax; LP cannot tension RVF: force of gravity (small arrows) causes the rectal wall (R) to prolapse inwards, much like a tent whose apex is not firmly attached to the pole, "rectal intussusception".

of anatomical restoration is buttressing of the side walls, namely the rectovaginal fascia in cases of a rectocele.[9]

2. The technique of posterior IVS follows the Integral Theory surgical principles, that "restoration of function follows restoration of form".[10] As we did not only wish to cure anatomical defects, but functional disorders also, we believed that restoring the ligamentous supports of the organs was more promising than other methods that work by by stretching the organ and attaching it to fixed structures, either the rectum (rectopexy) or the vagina (sacrocolpopexy).[3-5]

3. Prior surgical experience with the Posterior IVS operation (PIVS) (Fig. 3), in patients who had prolapse, and who were also cured of their defecatory problems, suggested to us that this principle could be widely applied in patients with symptomatic rectocele and rectal intussusception.[11]

Our aim in this study was to prospectively test this hypothesis by reconstructing the posterior zone anatomy, uterosacral ligaments, rectovaginal fascia, and perineal body.[9-11]

MATERIAL AND METHODS

Between October 2001 and October 2004, 48 patients aged between 39 and 86 years with vaginal vault descensus I to III and clinical rectoceles presented with obstructive defecation symptoms. All patients were asked to complete a symptom focused questionnaire. After clinical assessment they underwent single contrast defecating proctography. Only patients with clear signs of rectal intussusception were included in the study. Written consent was obtained from all participants. Preoperative bowel preparation consisted of oral X-Prep (extract of mustard leaves) on the day before surgery and a micro-enema in the morning before surgery. The anus was covered with a sterile transparent drape during the entire procedure. All patients underwent the same type of surgery, that was a 3-level repair of the posterior compartment of the pelvic floor. In level 1 (apex) a posterior IVS-tape was inserted as published earlier for reinforcement of the sacrouterine ligaments, "Level 1 repair" (Fig. 3).[9] In patients requiring level 2 repair (Fig. 3), the rectovaginal fascia was reconstructed conventionally in 28 cases using mattress sutures to approximate the disrupted edges of the

rectovaginal fascia defect. In 2 cases the "bridge technique" was used to repair the Level 2 defect.[9] This technique uses a cutaneous flap of the posterior vaginal wall to bridge the distance between the ruptured edges of the rectovaginal fascia in the midline. In 18 cases the rectovaginal defect was restored by the insertion of a polypropylene mesh (Surgipro, Tyco) underneath the rectovaginal fascia. Level 3 (perineal body) repair was performed in all cases where the perineal body was loose.[9] Care was taken to strictly follow aseptic surgical technique. Surgery was exclusively performed under general anesthesia. Single shot perioperative antibiosis was provided by amoxicillin and clavulanic acid. A vaginal pack and continuous catheterization were kept for 2 days. Six to nine weeks postoperatively the single contrast defecating proctography was repeated whenever possible. During the same visit and again 6 to12 months after surgery patients were asked to complete the same questionnaire. Postoperative visits and the clinical assessment were performed by an independent assessor.

RESULTS

Only 20 (42%) patients still had the uterus in place at first visit. Hysterectomy was performed in 12 cases (60%) because of concomitant uterine pathology. The postoperative period was uneventful in all cases. After removal of the Foley catheter, micturition was normal with only minimal residual urine (0-80 ml measured by ultrasound). Discomfort and pain resolved after 3 days, mainly after removal of the vaginal pack. From that time on patients reported just minimal pain, sufficiently managed by oral analgesics (Naproxen) on demand. Patients returned to normal food on the first postoperative day and were discharged on the 7th day after surgery.

Functional results: All patients preoperatively complained about obstructive defecation disorders, and 45/48 (94%) patients reported complete normalization of defecation at both visits after surgery. They stated that no obstruction was felt any longer, no incomplete emptying, no pain and no incontinence or soiling. 3/48 (6%) felt unchanged after surgery regarding the ability to pass stools. However, these patients showed normal defecating proctograms at control.
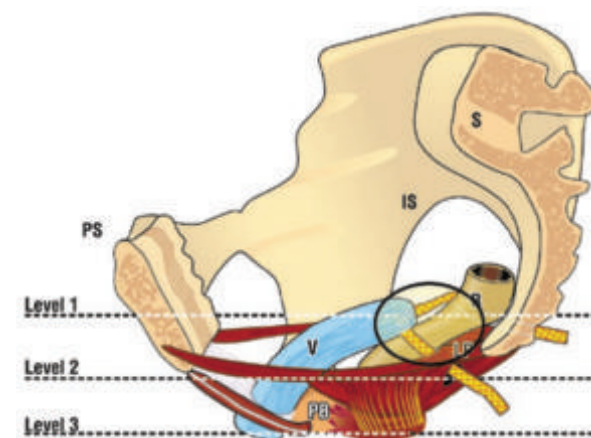

Fig. 3. – Proposed mechanism for surgical restoration of rectal intussusception Connective tissue damage to the anterior rectal wall supports may cause it to sag inwards, "intussusception". The posterior sling creates a foreign body tissue reaction (circle) which restores the damaged ligament and "reglues" the fascial attachments to levator plate and cervical ring. This re-suspends the rectal wall, and reconnects the fascia to the levator plate (LP) to stretch and tension the rectal wall to cure the intussusception. PB = perineal body; V = vagina; R = rectum; IS = ischial spine.
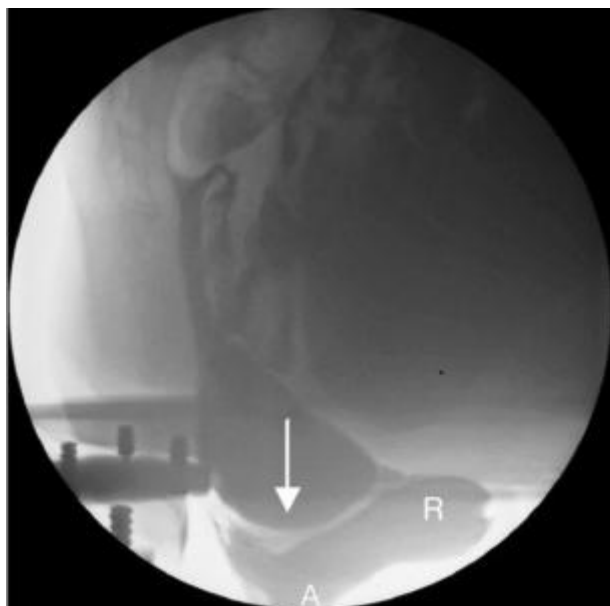
Fig. 4a. – Pre-operative defecating proctogram. Sagittal view, straining. Arrow indicates site of intussusception. R = rectum; A = anus.
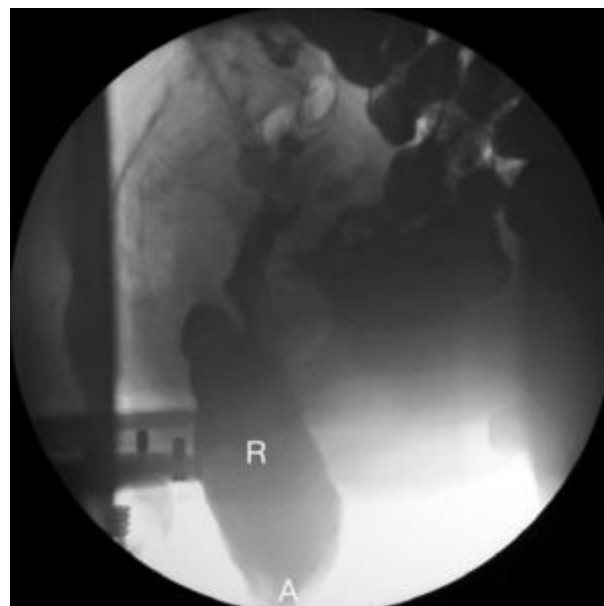

Fig. 4b. – Post-operative defecating proctogram. Sagittal view, straining. The intussusception has disappeared. R = rectum; A = anus.

Of the 27 patients (56%) who complained of fecal soiling, scoring on a numeric rating Scale (NRS), reached a total of 119 (mean 3.6). Of these, 18 (66%) were cured (NRS 0), 5 noted a very significant improvement (NRS <50%), and the other 4 reported no change. Of the 13 patients (27%) with pain in the lower pelvis (total NRS 57), 9 (71%) were cured (NRS 0), and the others reported a 50% improvement (NRS<50%)

Anatomical results: In all patients the vagina showed normal width and length and was normal in its axis. POPQ analysis showed median postoperative C – point at –9 (–7 to –11).

Radiologic results: Postoperative single contrast defecating proctography was obtained in 19 patients (40%). 17/19 (89%) showed a normal anatomy of the rectum and no intussusception (Fig. 4b). In 2/19 (11%) patients a minimal residual intussusception could be detected. However, all rectoceles disappeared. In all other cases patients denied to undergo this uncomfortable examination because they felt completely cured, especially when they lived too far from our hospital.

Complications: Intraoperative: In one patient during dissection of a large rectocele the anterior rectal wall was incidentally incised. After primary double layer suture the procedure was carried on according to standard protocol. In another patient we found the IVS tape inside the rectum on the right side after completing the procedure during routine rectal examination. After visualization by rectal speculum the perforating part of the tape was excised, the two little holes were sutured by one single stitch suture each and the patient was put on postoperative oral opium and prolonged antibiotic prophylaxis for 3 days.

Mesh erosions appeared in 2 cases and were treated by excision of the eroded tape in an outpatient setting. We did not see any haematoma, abscess formation or any other perioperative complication.

DISCUSSION

The concept of "tension free" reconstruction of distorted anatomy using intravaginal polypropylene slings has been shown to be successful for the treatment of various pelvic floor disorders in the female.[7-12] Until now it has been used to treat stress urinary incontinence, as well as various degrees of uterine and/or vaginal descensus or prolapse. These minimally invasive techniques aim to treat impaired pelvic floor function by restoration of anatomy.

The functional results of existing rectopexy regimes for these cases are not only traumatic, but widely unsatisfactory.[5] Our results appear to confirm our hypothesis that the sacrouterine ligaments are an essential structure for normal function of the anorectal complex.[7] Furthermore, reinforcement of the sacrouterine ligaments by insertion of a posterior IVS tape is successful in restoring both anatomy and function, as demonstrated radiologically in Fig. 4b.

This "tension-free" approach sets out to mimic normal anatomy without distortion, by repairing all the anatomical levels which contribute to anorectal opening and closure.[9-10] This 3 level approach does not alter the geometry or the axis of the pelvic organs, and would appear to offer a more anatomical, and therefore, more functional treatment plan than isolated rectopexy or sacrocolpopexy. The latter only perform a level 1 repair. We firmly believe that stretching and over-correction of the organs should be avoided. This is certainly the case for rectopexies. During rectopexy a distance of about 10 cm of the rectum is functionally disturbed by fixation of the rectal wall onto the sacral periostium. This may be the reason for the reported poor functional results of this procedure. The same reservations apply for sacrocolpopexy, a method which bears the problem of over-correction if fixated to the sacral promontory. Using posterior IVS avoids the danger of over-correction, since neither the rectum, nor the vagina are fixed to bony (and therefore immobile) structures during this procedure. Above all, organ mobility, a key element in pelvic floor function, can be maintained, as described in the Integral Theory.[9-12]

Compared to rectopexy, posterior IVS is less invasive and thereby less susceptible to surgical complications. In a large series,[13] 33% operative morbidity was reported after rectopexy. Most complications occurred in the early postoperative period, including severe complications like bowel obstruction and ileus, but also late complications and fistulas occurred. In our series we did not have a single severe complication. Erosions (4% incidence) and their accompanying vaginal discharge may sometimes be disturbing to the patient, but really, they are a minor problem, and usually easy to treat.

We were not successful with this approach in 3/48 patients. Interestingly, these patients showed normal anatomy on defecation proctograms. Our anatomical concepts (Figs. 1 & 2) do not seem to explain such normal findings. All three patients were sent to a specialized gastroenterologic unit for further workup, with no success to date.

In our series hysterectomy did not appear to be a factor in clinical success or failure.

Cure of posterior zone symptoms such as pelvic pain is explained in previous works.[7, 10, 12] The simultaneous cure of fecal incontinence and difficulty with bowel emptying is theoretically addressed in Part 1. The uterosacral ligament and perineal body are key functional insertion points for the backward/downward vector forces, and also, the rectovaginal fascia. Lax insertion points may invalidate these muscle forces, disabling the rotation around the anus necessary for anorectal closure, and also, the opening out of the anorectal angle during evacuation.

As concerns cure of FI, this work differs significantly from Studies No 9,10 &11 in this issue. All patients undergoing surgery had symptoms of obstructed defecation and radiological evidence of rectal intussusception; 56% had FI, and 85% of these were cured, or very significantly improved by a posterior sling repair limited exclusively to the posterior suspensory ligaments, the uterosacrals. The study emphasizes the importance of investigating such patients holistically: assessing evacuation and rectal wall intussusception, as well as incontinence. A major improvement (85%) in FI symptoms was achieved with repair only of the posterior ligaments. Whether the cure rate would have been improved with a midurethral sling is not known. Neither do we know how many patients had evidence of muscle damage, as this was not tested.

CONCLUSIONS

With regard to "obstructed defecation", rectal intussusception and FI, we find that this new approach offers clear clinical advantages compared to more conventional procedures, minimal pain and trauma, rapid recovery, and fewer complications. It is a correct anatomical approach with no unphysiologic fixation of the rectum. Thereby the function of defecation is restored and the vast majority of our patients felt rapid normalization of stool habits immediately after surgery. Although the number is small, the demonstrated results are promising, suggesting this new approach should be pursued further.

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