Original article

Transperineal Bilateral Sacrospineous Colpofixation (TPBCF) for the treatment of vaginal vault prolapse – description of a refined method

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Abstract: Vaginal vault prolapse is observed with increasing frequency in the era of large aging populations. Various surgical techniques have been established, varying in performance, difficulty and outcome, specifically complications. In order to optimize both aspects, we have developed a refined transperineal bilateral sacrospineous colpofixation technique (TPBCF) and give a detailed, step-by-step description of the technique, with focus on the key differences to the "old" method of Intravaginal Sling (IVS). Importantly, we rely not on a transverse but instead on a longitudinal incision and blunt finger dissection to gain access to the sacrospinous ligament. Introducers for transischiorectal sling placement are guided from bilateral stab incisions lateral and dorsal from the anus (to avoid the rectal arteries and risk of arterial injuries) with the inserted finger, thereby ensuring that no undesired structures, mainly bowel, are injured by the advancing introducers during their passage through the pelvis. Preferably, horizontally oriented sutures are used to attach the sling to the underside of the vaginal apex or the posterior aspect of the cervix. As a minimally invasive approach with the potential for conservation of the uterus, our technique should be applicable to all age groups and the increasingly frequent elderly patient with significant co-morbidities.

Keyword: Transperineal bilateral sacrospinous colpofixation; Operative therapy; Transischiorectal vaginal sling placement; Vaginal vault prolapse.

INTRODUCTION

Vaginal vault prolapse is a known clinical entity observed increasingly frequently in the era of large aging populations[1]. Historically, treatment options included abdominal surgical interventions such as sacrocolpopexy or fascial slings[2,3] and operations via the vaginal approach such as the unilateral Amreich-Richter operation with the vaginal apex sutured to the sacral bone after hysterectomy.4 More recently, extensive reconstructions using prosthetic mesh for the induction of neo-ligaments and neo-fasciae have been advocated[5], sometimes also in the context of primary surgical interventions in the unpretreated patient[6].

Intravaginal slings (IVS) placed transischiorectally have been proposed by Petros and Farnsworth and shown to be promising in a small series of cases[7,8]. However, rectal injury and erosions were identified as major problems of this technique which led to the abandonment of IVS[9]. A multi-center series in Austria yielded better results but still described severe complications[10].

It appears that total lack of a formalized anatomically based procedure was a major contributing factor to these unfavorable outcomes, as well as a deficit of education in potential surgeons, potentially even amplified by encouragements and assurances of "simplicity" by the manufacturers. Several parts of the technical description itself already harbored the potential for major complications, for example the initial para-anal entry point at the three and nine o'clock positions where the rectal arteries is found.

In the development of our refined transperineal bilateral sacrospinous colpofixation (TPBCF) technique, we have strived to optimize the surgical procedure of transischiorectal vaginal sling placement regarding the anatomical and clinical outcome and the potential for complications. Here, we present the resulting surgical procedure and explain it step by step, with special emphasis on the aspects setting our TPBCF technique apart from the ill-fated posterior IVS.

SURGICAL TECHNIQUE

Step1: Pre-operative treatment. Each patient is treated with vaginal or systemic estriol application for four weeks before surgery. Single dose antibiotic prophylaxis with a combination of a cephalosporin and metronidazole is administered i.v. half an hour before starting the procedure. The vagina is thoroughly disinfected with copious amounts of antiseptic solution during the initial phase of the operation. The anus is thereafter covered with an adhesive sterile impermeable membrane and thereby sealed off from the operative field.

Step 2: Incision in the posterior vaginal wall. Two important changes have been made to the initial IVS approach when developing the TPBCF: A longitudinal (not transverse) incision is made in the midline of the posterior vaginal wall 3 cm distal to (not at) the vaginal apex. The injection of vasoconstringent medication under the vagina before incision may be considered, is, however, by no means necessary as significant bleeding is the exception when choosing this approach.

Step 3: Access to the sacrospinous ligament. A canal designated to admit the index finger of the surgeon is formed by advancing Metzenbaum scissors immediately under the vaginal wall horizontally in the direction of the pelvic side wall. By inserting the finger, a direct access to the sacrospinous ligament can thereafter be developed by blunt dissection. No extensive mobilization of tissue planes or retractor placement, nor visualization of the target structure is required at this point.

Step 4: Dissection of a horizontal space under the cranial vaginal tissue. From the upper end of the longitudinal vaginal incision, the tissues of the rectovaginal septum are dissected off the posterior aspect of the vaginal wall. This will facilitate the subsequent attachment of the prosthetic tape under the intact vagina, thereby removing it from the incision and thus from potential contamination during

wound healing and physiological inflammatory reactions, which both would predispose the tape to erosion. If the uterus remains in situ, the space is developed with the goal to expose the posterior surface of the cervix for later tape attachment.

Step 5: Choosing the entry points for the introducer on the buttocks of the patient.

The original description of transischiorectal sling placement involves a stab incision at the 3-and 9-o'clock positions 5 cm lateral to the anus. However, these are the precise locations of the rectal arteries. Therefore, the transischiorectal TPBCF placement uses bilateral stab incisions 3-5 cm lateral and 5 cm dorsal from the anus instead so that bilateral incisions 0.5 cm long are made in the perianal skin at 4 and 8 o'clock, halfway between the coccyx and external anal sphincter (EAS) in a line 2 cm lateral to the EAS.

Step 6: Introducer placement. It is a matter of personal preference, on which side the introducer is placed first (we used disposable DST Series EEA Introducer devices from Covidien, New Haven, CT). We have mostly placed it first on the left side of the patient and then on the right. This means that the tape is guided through from the surgeon's right to the left. Some surgeons may prefer the alternative sequence, especially during the short learning phase, as the sacrospinous ligament as the first anatomical entry point for the introducer is more removed from the bowel on the patient's right side than on the left.

From the small incision, the introducer is first guided horizontally above the fascia of Scarpa for a distance of approximately 5 cm and then oriented strictly cranially. This moves the introducer away from the rectal canal, and provides the benefit of later increasing the friction of the 1-cm-wide polypropylene monofilament sling (e.g. SERASIS from Serag-Wiessner, Naila, Germany) in the tissue. This mechanical resistance counteracts potential "pull-through" as the tape will not be sutured to the pelvic wall. The introducer is then advanced in the ischiorectal fossa peripheral to the levator plate until the desired exit point at the sacrospinous ligament is reached. The inserted finger marks the optimal entry point through the muscular structures and meets the tip of the introducer upon penetration of the muscle layer. The contact between introducer tip and finger tip should only be broken once the introducer has been advanced through the vaginal incision and its apex can be clearly seen. This "closed circle technique" ensures that no undesired structures, mainly bowel, are injured by the advancing introducer during its passage through the pelvis.

The blue stylus (from the introducer) or the tip of any alternative instrument is left in place and should be easily visible protruding into the vagina.

Step 7: Placement of the contralateral introducer. The insertion of the introducer on the contralateral side follows the same rules as above, except that after placement, the blue stylus is removed from the introducer and reinserted with its former tail end first, thereby exposing the opening at the end, which allows for threading the tape through the stylus. On this second side, the metal introducer remains in place. In this case, the tape will be guided outside-in-inside-out, while the use of alternative introducers would result in an inside-out-inside-out approach.

Step 8: Placement of the tape. At the time of placement of the second stylus, the tape is immersed in antibiotic solution. While realizing, that scientific data for this measure are lacking, we have still chosen a cephalosporin in combination with metronidazole to cover the expected potential germ spectrum in an effort to avoid clinically meaningful contamination of the tape by viable germs during placement. Gloves are changed by all team members before handling the tape.

The moist tape is now threaded through the opening of the first stylus which is situated outside the buttock. The stylus with the tape attached is then pulled through to the vagina with manual outside guidance to assure flat and undistorted orientation of the mesh. It is then detached from the stylus and threaded into the opening of the contralateral stylus which is still situated inside the introducer. An atraumatic forceps is used to stabilize the flat tape's orientation during this maneuver and the subsequent pulling through the contralateral pelvic side and out through the corresponding incision. Traction on the forceps additionally assures adequate mobility of the vaginal arch of the tape for suture fixation to the underside of the vaginal apex in the designated area of intact vaginal wall structure or the posterior aspect of the cervix, respectively. Two small instruments, e.g. Crile or short Kocher clamps, are used to mark the ends of the tape outside the patient.

Step 9: Fixation of the tape to the underside of the vaginal apex or the posterior aspect of the cervix. It is probably a more philosophical question, whether one should use resorbable or permanent suture for fixing the tape to the underside of the vagina. In an effort to assure suture stability during fibroblast invasion of the graft, while at the same time avoiding permanent multi-knotted strings under the vaginal skin, we have adopted the use of polydioxanone threads (USP 2-0) for this purpose. Three sutures are placed, the first in the midline, the second and third 2-3 cm lateral on either side of the midline. The suture technique involves threading the needle first through the graft, then through the tissue, and then out through the graft resulting in a U-shape with the branches both traversing the mesh.

A horizontal orientation of the sutures is preferred. An identical approach is used when fixing the mesh to the posterior cervix. Finally, the vaginal incision is closed with a running suture of resorbable braided material (USP 2-0 or 3-0).

Step 10: Considerations before definitive tape adjustment. At this point, if indicated, colporrhaphy can be performed, with the advantage that the uncorrected prolapse makes access to the vaginal walls easier.

Step11: Definitive tape placement. Immediately, or after additional vaginal surgeries have been completed (see Step 10), a sponge stick is inserted for positioning the vagina in the desired anatomical position. With the sponge still in place, the tape is pulled gently outward by symmetric bilateral traction on the marking clamps until the vagina is stabilized in its physiological position. The tape is then pulled out slightly and cut above skin level. The cutaneous wound margins are elevated with small surgical forceps to prevent mesh from attaching directly to the wound and eroding through the skin surface. Skin closure can be achieved by fibrous glue, one single interrupted suture, steristrips, or by simply mechanically adapting the skin margins with small Kocher clamps until the patient has been transferred back to her bed. All of the above options have been tried by our team, at the end we mostly reverted back to the traditional "one single interrupted".

Step 12: Preparation for postoperative care. At the end of the procedure, a vaginal gauze pack liberally coated

with estriol ointment is inserted into the vagina for 24 hours together with a Foley catheter for bladder drainage. If outpatient treatment is desired, which is definitely an option due to the excellent tolerability of the intervention, this step can probably be safely omitted. In any case, weekly vaginal estriol applications are prescribed, as known from other clinical management guidelines after vaginal mesh placement.

DISCUSSION

Fascia lata slings and suspension procedures using the round ligaments have been abandoned as have resorbable meshes due to the fact, that the body does not maintain neo-ligaments without continuing stimulation of fibroblasts on site. Sacrocolpopexy with or without prosthetic mesh interposition should be combined with a Burch procedure for optimal results as shown by the studies of the NIH Pelvic Floor Disease Network[11-13]. In sum, this amounts to a significant surgical intervention with laparoscopic techniques adding their own spectrum of possible complications due to their transabdominal nature.

Amreich-Richter results are known for their surgery-induced dyspareunia, deep pelvic pain and secondary urinary continence problems[14] making them unattractive especially for, but not limited to, the younger patient. While having been in clinical use for a long time, systematic studies of this entity are few. Modifications using unilateral or bilateral non-resorbable sutures that serve as fixing strings suspending the vaginal apex at a distance from the sacrum have never been formally evaluated and remain experimental with anecdotal results.

Large prosthetic implants as a primary treatment approach for female genital prolapse are meeting with increased scepticism due to their potential for complications. The FDA has recently issued a statement to the effect, that large meshes are contraindicated as primary treatment in such situations[15].

The TPBCF approach outlined here offers the potential for the generation of an anatomy-analogous support of the vaginal vault or the uterus mimicking the sacrospinous ligaments or creating sacro-vaginal ligaments in it's place. The challenge for the surgeon adopting the procedure will be to overcome a possible initial hesitancy when faced with the insertion of the introducer into the ischiorectal fossa, but in our experience the procedure becomes routine quickly. The indication for TPBCF is vaginal vault or uterine prolapse, it is not designed to correct anterior, posterior or lateral pelvic floor defects. As a minimally invasive approach with the potential for conservation of the uterus TPBCF would potentially be applicable to all age groups and also the increasingly frequent elderly patient with significant co-morbidities.

ACKNOWLEDGEMENTS AND DISCLOSURES

The authors declare no conflict of interest.

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