



Laparoscopic TOT-like Burch colposuspension: a modification of the original to adapt to the future

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Abstract: Urinary incontinence is a medical condition that decreases the quality of life of more than 35% of women worldwide and its incidence increases with age. Since their introduction in 1996, the transvaginal midurethral slings have become the treatment of choice for patients with stress urinary incontinence. In recent years the restriction of the United States Food and Drugs Administration over the transvaginal meshes for prolapse has generated considerable tension and debate over the synthetic protheses, applied to the patients via transvaginal route either for prolapse, or incontinence. Due to growing concerns over a complete ban of transvaginal tapes for incontinence in the future, gynecologists have rediscovered the Burch colposuspension for treatment of patients with incontinence. The procedure is living its renaissance and the goal of this article is to present our modification of the classical technique that we call TOT-like Burch colposuspension using a state-of-art laparoscopic approach. One of the drawbacks of the classic Burch procedure is the high rate of dysuric symptoms postoperatively, which in our modification is overcome, as the suspension of the bladder neck and the urethra includes also the pubourethral ligaments and the arcus tendinous fascia pelvis with a single suture, which provides the tension-free support resembling the effect of the TOT-tapes. The corresponding video is divided in different steps in order to make the procedure more comprehensive and reproducible.

Keywords: Stress urinary incontinence; Burch procedure; mesh-less treatment

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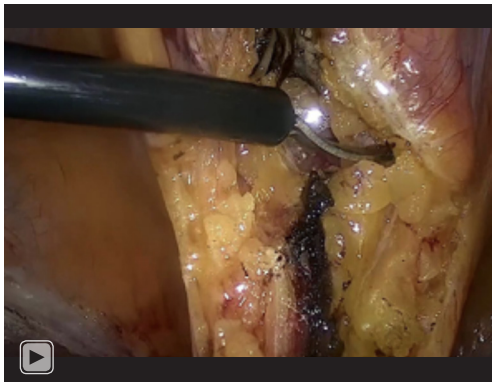
“There is nothing new except what has been forgotten.” —Marie Antoinette

Introduction

Stress urinary incontinence is a common gynecological problem, affecting 35% of all women (1), with its incidence gradually increasing with age reaching up to 65% in certain ages groups (2,3). Considering the increase in life expectancy and the substantial growth of the adult population in the developed countries, it has been estimated that urinary incontinence would eventually affect

up to 28.4 million women in the United States (US) by 2050 (4). Since their introduction in 1996, the midurethral slings have become the procedure of choice for treatment of stress urinary incontinence due to their ease-of-use, high success rates and low incidence of complications (5). However, in recent years due to the growing debate over a complete restriction of vaginal meshes used for prolapse by the US Food and Drug Administration, the midurethral slings have also suffered from the negative attention created by the media and patient groups, despite reassurance from different health authorities (6,7). Due to this condemnatory criticism regarding

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Video 1 This video provides a step-by-step guide on how to do a laparoscopic Burch colposuspension. The video is divided in 6 different steps in order to make the procedure more comprehensive and reproducible.

the synthetic meshes placed transvaginally, patients are asking for different alternatives for management their incontinence. Fortunately, the alternative procedure has already been invented and it was hiding all along in the old gynecological textbooks. Up until the mid 90's, when the midurethral slings have been introduced, the “gold standard” for management of patients with stress urinary incontinence was the Burch colposuspension. Created back in 1961 by John C. Burch, currently the procedure is living its renaissance and according to recent studies it has similar the short- and long-term results comparing it with the transvaginal tapes (6). The goal of this video is to demonstrate our modification of the original technique by describing the operation in different steps, which makes the procedure feasible and save for patients.

Technique

In order to make the description of our technique more reproducible and easier to understand, we have divided the procedure in 6 separate steps which represent the key surgical moments during the operation (*Video 1*). All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Step 1: preparation and installation

Standard laparoscopic instrumentation is required: rotating bipolar forceps, scissors, grasping forceps, two needleholders. The sutures needed for the suspension are the nonabsorbable Ethibond size 0 and the absorbable Monocryl size 1 (Ethicon, Somerville, New Jersey, USA). The patient is put under general anesthesia in lithotomy position. Access to the abdominal cavity is gained either using the Veress needle in Palmers point, or using direct trocar access, passing the optical trocar straight through the umbilicus. Four trocars are used, one 11 mm optical trocar in the umbilicus, two 5 mm lateral trocars in the suprapubic region about 4 cm medial and cranial to the anterior superior iliac spine and one 10 mm central trocar 8 cm below the umbilicus. The 10 mm trocar facilitates the introduction of the needles into the abdominal cavity and respectively the suturing. The patient is placed in Trendelenburg position, but in contrast to the standard laparoscopic surgeries, with the Burch procedure, there is no need for excessive inclination of the patients head—in this operation the surgeon works mainly in the Retzius space and the bowel does not interfere with his actions. Another important aspect for this procedure is the abdominal pressure—there are series of articles proving the negative effect of high abdominal pressure on the peritoneum and the postoperative recovery of the patient (8). Operating in the area of the Retzius space particularly does not require high pressure. The recommended measure during the Burch procedure is 6–8 mmHg. The low abdominal pressure and the low degree of Trendelenburg make the operation suitable for patients in advanced age.

Another difference of the Burch procedure compared to the standard laparoscopic surgeries is the instrument positioning. In the Burch colposuspension the surgeon has the monopolar scissors in their left lateral port and the bipolar is in the central trocar. With this setting, the scissors approach from the lateral side and not directly towards the median umbilical ligament, which decreases the chance of bladder injury.

Step 2: entry in the Retzius space

The assistant grasps the median umbilical ligament and pull downward towards the sacrum. The surgeon must be aware of the basic principles of electrosurgery. Both monopolar and bipolar currents are used to facilitate the entry and the dissection of the space. First the median

umbilical ligament is transversely incised and the incision is extended towards the medial umbilical ligaments. The correct plane of dissection lies above the peritoneum and the overlying umbilicovesical fascia. If the dissection is continued subperitoneally without opening the fascia there is a considerable risk for damaging the bladder.

Step 3: developing the Retzius space and exposing the anatomical structures

The Retzius space is one of the avascular spaces in the pelvis between the pubic symphysis anteriorly and the bladder posteriorly. The pneumoperitoneum facilitates the dissection by creating the so called “bubbles” or “champagne” effect. The dissection is continued caudally towards the bladder neck. The posterior aspect of the pubic bone with the pubourethral ligaments and the Coopers ligament are identified. The dissection continues exposing progressively the obturator internus muscle, the arcus tendinous fascia pelvis (ATFP), the iliococcygeus part of the levator ani muscle, the external iliac vein and the corona mortis—an anastomosis between the external iliac and obturator veins found in the majority of patients. Continuing the dissection in lateral and posterior direction the surgeon could reach the ischial spine, the sacrospinous ligament and the coccygeus muscle. The dissection is carried out on both sides.

Step 4: dissection of the vagina

Using the Folley catheter, the urethra and the vagina are identified. The right place for dissection in order to expose the pubocervical fascia is located medially to the insertion of the ATFC on the pubic symphysis towards the bladder neck. The right dissection identifies the vesicoureteral junction and the underlying fascia used for the suspension. Utmost care should be taken not to lacerate the veins that surround the bladder neck and form the so called “plexus of Santorini”.

Step 5: suspension of the vagina to the Coopers ligament

The suspension starts on the right side. Single suture using nonabsorbable Ethibond size 0 is made through the pectineal ligament with the left hand approximately 4–5 cm away from the pubic symphysis. The surgeon continues with two left hand stitches passing through both the ATFP and the pubocervical fascia about 1–1.5 cm away from the insertion of the ATFP on the pubic bone. The surgeon should pay attention and pass the needle

through the whole thickness of the vaginal wall but not through the mucosa as this increases the risk of infection and erosion. The knot is made using extracorporeal knots. In our technique we do not place additional sutures for the suspension of the bladder neck in order to prevent excessive tension and possible voiding difficulties. This modification resembles the support generated on the bladder neck by the transobturator tape (TOT) and thus we call our modification the TOT-like Burch colposuspension. This modified type of suspensions, involving the pubocervical fascia, the ATFP and the Coopers ligament, directs the traction in lateral direction creating more tension-free support on the urethra.

The same steps are performed on the left side. The suture on the Coopers ligament is made using the left hand and the ones on the vaginal wall – with the right hand. While performing the suture on the pubocervical fascia with the right hand, the surgeon pushes on the bladder neck medially with the left needleholder in order to prevent its piercing with the needle. Performing the sutures with the correct hand should not be neglected as these maneuvers not only facilitates the suturing, but significantly decrease the risk for bladder injury.

Step 6: closure of the peritoneum

Before closing the peritoneum, meticulous hemostasis should be verified. The peritoneum is closed using continuous suture with Monocryl size 1 and extracorporeal knotting technique.

Discussion

Since its introduction in 1961, the Burch colposuspension played an important role and was the preferred method of treatment for patients with stress urinary incontinence until the emergence of the transvaginal tapes. Some of the main advantages of the midurethral slings are their ease-of-use, short learning curve and the quick recovery. While the Burch procedure was created as a standard open surgical technique, recent studies have demonstrated the feasibility of the operation using minimally invasive endoscopic techniques (6,9). Numerous studies have proven the advantages of laparoscopy over conventional open surgery in terms of postoperative morbidity, hospital stay, shorter recovery time and cosmetic results. Disadvantages of the minimally invasive surgery are the high cost of the procedure and the long learning curve. Cost-effectiveness analyses comparing the midurethral sling with the

laparoscopic Burch procedure have shown advantage of the slings (10). Nevertheless, patients with pelvic floor disorders often combine some degree of prolapse with incontinence, therefore, the simultaneous treatment of both conditions with one single procedure seems reasonable and it seems cost-efficient. Laparoscopic suturing is regarded as one of the most difficult tasks and is a barrier for a wider application of the approach (11). Mastering the anatomy and excellence in laparoscopic suturing are crucial factors for the successful implementation of this technique. Specifically designed and structured programs have been developed by gynecological societies around the globe directed towards the young gynecologists and residents to improve their skills and widen their abilities in the operating theater (12). Nowadays, the laparoscopic equipment is virtually widespread and easily accessible in developed countries and considering the advantages of laparoscopy over open surgery, it should be the preferred approach when performing a colposuspension.

Considering the short-term results, the Cochrane meta-analyses show similar outcomes comparing the midurethral slings with the Burch procedure (13,14). As for the long-term efficacy of the procedure, the results are still debatable, with studies supporting the colposuspension, demonstrating similar outcomes compared to the transvaginal tapes (6,15,16), while others show lower success rates of the Burch over long period of time (17,18). Further studies and randomized controlled trials are needed to evaluate and compare the long-term effectiveness of the colposuspension with the midurethral slings.

When talking about the Burch procedure, it is important to emphasize a few important events, also highlighted in the above-mentioned articles. One of these is the possibility of dysuric symptoms and voiding difficulties that may occur after the surgery due to the increased tension generated by the sutures and the excessive suspension of the pubocervical fascia and vagina. In our technique we avoid creating excessive tension by performing limited number of stitches on the Cooper's ligaments and the pubocervical fascia, in close proximity to the pubourethral ligaments, which directs the traction in lateral direction, creating more physiological support on the bladder neck, resembling the effect of the transobturator tapes. Based on our experience, this slight but significant modification results in excellent postoperative results and negligible rate of short-term voiding problems. Another important issue is relatively high rate of posterior compartment prolapse that may occur years after the surgery, with many studies highlighting the

problem (6,16,17). A logical explanation to this event is be the change in the direction of traction of the anterior compartment, leaving the posterior compartment without support and prone to future prolapse. Many surgeons prefer to combine the Burch colposuspension with additional suspension of the posterior compartment by performing a concomitant uterosacral ligaments suspension or a sacrocolpopexy (6). In our department, the sacrocolpopexy has proven long term outcomes and is the preferred way of management of patients with pelvic organ prolapse and we regularly combine it with the Burch colposuspension in patients with prolapse and stress incontinence. The standard technique that we use for the sacrocolposuspension has been previously described and it is beyond the scope of this lecture (19). Regarding the possible concerns over the use of synthetic meshes for suspension on the promontory, techniques have been developed and described performing the procedures using a simple suture instead of mesh (20,21). Our team is also developing a mesh-less modification for treatment of prolapse, which combined with the Burch procedure will allow in the future to treat the patients with both incontinence and pelvic organ prolapse without using any synthetic meshes.

Conclusions

In conclusion, the laparoscopic Burch colposuspension is a valuable mesh-less alternative to the midurethral slings for patients with stress urinary incontinence. Our TOT-like modification resembles the traction generated by the transvaginal tape and it is associated with less dysuric symptoms and voiding difficulties. Although it was developed 60 years ago, the Burch procedure might be the answer for the future for the management of urinary incontinence and it is essential to understand the key steps in order to master the technique.

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Footnote

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