Actas Urológicas Españolas

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Special article

Laparoscopic promontofixation. Our technique

Promontofijación laparascópica. Nuestra técnica

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ARTICLE INFORMATION

Article history:
Received 14 December, 2009
Accepted 13 May, 2010

Keywords:
Laparoscopic promontofixation
Cystocele
Genito-urinary prolapsus
Colpopromontofixation

A B S T R A C T

Objectives: The pathology of the pelvic floor, including urinary incontinence, anal incontinence and genital prolapse, is very dominant, concerning approximately a third of adult women. It is fundamental that this musculature supports a good function, because weakness of the pelvic floor produces urinary incontinence, cysto and rectocele, genital prolapses and sexual dysfunctions. The abovementioned pathology can be corrected by laparoscopic promontofixation, whatever the previous history of pelvic surgery, including the placing of prosthetic material. In this article we describe the abovementioned intervention.

Material and methods: Preoperative care is standardized and is accompanied by antibiotic prophylaxis, preventive antithrombotic treatment and in the event of a history of pelvic surgery, a digestive preparation. Positioning of the patient must plan a 30° Trendelenbourg position. After the introduction of the trocars, initial surgery comprises anterior dissection of promontory after incision of the posterior peritoneum with the patient placed beforehand in a Trendelembourg position. After that, we make interrectovaginal dissection to free the whole posterior surface of the vagina. This is followed by the installation of a posterior mesh pre-cut in an arc. After intervesical vaginal dissection, the anterior prosthesis comprising a precut polyester mesh is fixed avoiding excess traction. The end of the surgery involves careful reperitonization of all the prosthetic parts. Possible specific surgical complications are vascular and visceral wounds.

Results and conclusions: The technique allows the correction of the dysfunction of the pelvic floor and incontinence with good anatomical and functional results. Postoperative secondary haemorrhage and gastrointestinal occlusion may occur. Occurrence of an inflammatory syndrome and low back pain suggests spondylodicitis and MRI should be performed. Vaginal erosion on the prosthesis may occur after several months and seems relatively independent of the prosthetic material used.

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0210-4806/$ - see front matter

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Palabras clave:
Promontofijación laparoscópica
Cistocele
Prolapso genito-urinario
Colposacropexia

RESUMEN

Objetivo: La patología del suelo pélvico, incluyendo la incontinencia urinaria, la incontinencia anal y el prolapso genital, es muy prevalente, afectando aproximadamente a un tercio de las mujeres adultas. Es fundamental que esta musculatura mantenga una buena función, ya que la debilidad del suelo pélvico es causa de incontinencia urinaria de esfuerzo, cisto y rectocele, prolapsos genitales y disfunciones sexuales. Dicha patología, puede corregirse mediante promontofijación laparoscópica, que puede llevarse a cabo a pesar de antecedentes de cirugía pélvica e incluso si existe ya colocación de material protésico previo. En este artículo describimos dicha intervención.

Material y métodos: La preparación operatoria está estandarizada, y se acompaña de una profilaxis antibiótica y antitrombótica, y en caso de antecedentes quirúrgicos pélvicos, de una preparación intestinal.

La instalación del paciente debe ser en Trendelemburg de 30°. Después de la introducción de los trócares, el primer paso de la cirugía es la disección de la cara anterior del promontorio mediante la incisión del peritoneo posterior con el paciente bien colocado en posición de Trendelemburg para rechazar las asas intestinales y el mesocolon. A continuación, se realiza la disección interrecto-vaginal y sobre todo, la liberación de la vagina en su cara posterior para emplazar correctamente la malla posterior previamente recortada en arco.

Tras la disección intervesico vaginal, la prótesis anterior, del mismo material y previamente recortada, se fija sobre la cara anterior de la vagina.

El fin de la intervención comprende una reperitoneización cuidadosa de todos los elementos protésicos. Las complicaciones vasculares y viscerales intraabdominales son excepcionales.

Resultados y conclusiones: La técnica permite la corrección de la disfunción del suelo pélvico, junto con la incontinencia con buenos resultados anatómicos y funcionales. En el postoperatorio, las oclusiones intestinales son la mayor complicación, pero son raras. La aparición de un síndrome inflamatorio y dolor lumbar bajo sugiere espodilodiscitis y debe realizarse una RM. La erosión vaginal de la prótesis (1,6 a 10% según las series) puede aparecer algunos meses después, pero parece relativamente independiente del material protésico utilizado.

Introduction

Genital prolapse is a common problem. It is estimated that approximately 42.6% of women aged 15-97 years will experience some pelvic floor condition during their lifetimes. Pelvic floor disorders, including urinary incontinence, anal incontinence, and genital prolapse, are highly prevalent, affecting approximately one third of adult women. While these conditions are not life-threatening, their social and economic consequences may be significant.

The pelvic floor or perineum consists of a number of muscles which supporting the lower part of abdomen and the bladder, uterus, and a part of the bowel. Adequate function of these muscles is essential because a weak pelvic floor leads to stress urinary incontinence, cystocele, rectocele, genital prolapse, and sexual dysfunction (dyspareunia, decreased sensitivity and orgasm intensity).

Perineal muscle damage or weakness may occur for various reasons, including pregnancy, labor, estrogen deficiency in postmenopausal women, perineal surgery, obesity, constipation, chronic cough from smoking, some risk occupations (sportswomen, etc.).[2]

All of these may contribute to pelvic floor weakness and to occurrence of the various types of prolapse. As previously noted, this is a very common condition, and many types of surgical procedures have therefore been developed over time for its treatment.[3]

Abdominal promontofixation, first described in 1957 but initially performed in the 19th century, was considered as the standard procedure. Its principle is based on the need for strong posterior fixation, which is based in turn on the importance of uterosacral ligaments as support for the uterus.[4]

Sutures were initially used for fixation, but in 1970 they were replaced by prostheses. Sutures were at first placed in the vaginal apex, but were subsequently placed along the entire vagina to distribute tension.[5]

Performance of this procedure by a laparoscopic route was considered, and early studies and reports by work groups which pioneered this procedure appeared at the beginning of the 20th century.

The group at the Clinique Saint Agustin in Bordeaux started to perform this procedure in 1996, and based on its excellent results made it the standard technique for the treatment of complete or incomplete pelvic floor prolapse.

Since then, this group has performed more than 2,000 laparoscopic promontofixations.

Specific contraindications

There are currently no local contraindications for experienced groups even in the event of uterine, bladder, genital, or rectal surgery. Presence of prosthetic material from a prior procedure is no contraindication either.

Obesity could initially be considered as a contraindication; however, a laparoscopic approach to the pelvic region appears to facilitate vision and surgery.

Preoperative care

Urine sterility should be verified first. Genitals should be thoroughly washed the day before surgery.

Preoperative antibiotic prophylaxis and mandatory antithrombotic prevention, started after surgery and lasting for one week, are also administered. If previous surgery has been performed, gastrointestinal preparation is advised to eventually allow for bowel suture in good conditions and with no risk of major sepsis in the event of gastrointestinal damage.

Patient positioning

Patients should be placed in a supine position with their lower limbs in abduction and slight flexion. The perineum is placed level with the table (projecting 10-15 cm from it) to allow for insertion of a vaginal blade to expose the vaginal cul de sac. The laparoscopic tower is positioned between the legs of the patient.

Upper limbs are placed along the body, thus allowing surgeons to be as close as possible to the middle axis of patient. Patients are finally placed in a Trendelenburg position at approximately 30°. The bladder catheter is inserted at the beginning of surgery on a sterile field.

Instrumentation

- A Hasson or 10-mm trocar for the optic;
- Two or three 5-mm trocars for instruments;
- A 0° optic to be inserted through the 10-mm trocar;
- Bipolar forceps to allow for grasping;
- Electric scissors with a concave end;
- Two atraumatic flat, fenestrated grasping forceps;
- A needle-holder whose end should be sharp and with good quality teeth;
- A suction device.

On the other hand, we think that use of a specific vaginal blade is indispensable for this procedure. This is a flat, rigid, metal blade 25 mm wide and 20 cm long. The endovaginal end is blunt to avoid damage to the vaginal cul de sac. The assistant may move the blade with the other end at any time during dissection and reconstruction.

Operating room arrangement

The surgeon positions himself to the left of the patient and his assistant to the right, possibly with an instrumentist nearby. Surgeons should be at the level of patient scapula.

Trocar placement

A 10-mm trocar for the optic is first inserted at umbilical level. A 5-mm trocar is then introduced into each iliac fossa over the anterior superior iliac spine and inner to this. The last trocar is placed midway between the pubis and umbilicus, virtually in the axis of lateral trocars (fig. 1).

The main surgeon will use scissors with coagulation with his right hand and atraumatic or bipolar forceps with his left hand; the needle holder is used by the middle trocar.

The assistant moves the camera through the umbilical trocar, the flat fenestrated forceps through the right iliac fossa, and the suction device if needed, and takes the vaginal blade on demand (fig. 2).

Operating manual

Promontory preparation

This is the first operating time. A maximum Trendelenburg of 20-30° and eventually a slight tilting to the left to achieve sliding of the mesosigmoid are required.

Sigmoid fixation may exceptionally be used to pull the mesosigmoid, passing a transparietal suture at left hypochondrium level.

Figure 1 – Positioning of trocars for laparoscopy.

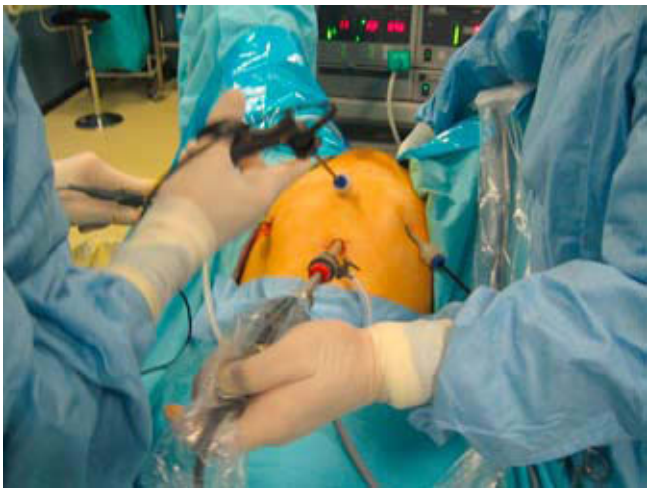

Figure 2 – Positioning of patient, tower, and surgeons.

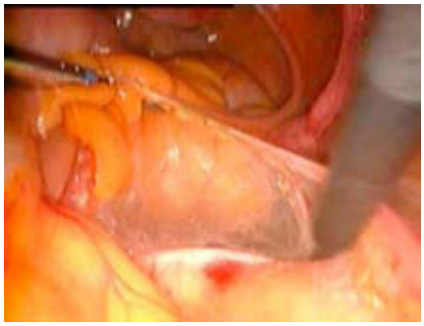

Figure 3 – Dissection of promontory. The anterior vertebral ligament is seen.

The promontory is easily located by the tip of scissors, regardless of patient morphology or surgical history. The assistant reflects any bowel loops interposed with flat forceps. Posterior peritoneum is opened with the tip of monopolar scissors with the help of forceps that lift and separate the posterior plane to avoid damage to presacral vessels.

The anterior side of the promontory is carefully exposed with the tip of scissors to see the white pearly surface of the anterior vertebral ligament and middle sacral vessels in contact with the surface, and is thus prepared for the final part of mesh fixation (fig. 3). From the peritoneal incision, gas opens the retroperitoneal dissection plane, which allows for location of the primary iliac venous axis and ureter, structures which are a legitimate cause of concern for all surgeons because they are close to or at this dissection plane.

The peritoneal incision is usually continued up to the prerectal peritoneum, beyond the uterosacral ligament ridge. Exposure at this level is once again facilitated by manipulation of the vaginal blade.

Interrectovaginal dissection

The flat vaginal blade is inserted by the assistant into the posterior vaginal cul de sac or to the bottom of the vagina if patient is hysterectomized. The blade is pushed forward, which tenses uterosacral ligaments and exposes the anterior side of the Douglas sac.

If the patient is not hysterectomized, the uterine body is fixed to the abdominal wall through a straight needle suture that passes through the wall and uterus and exits again to be temporarily tied in the outside and facilitate dissection.

Peritoneum is thus exposed, and may continue to be opened form the right uterosacral ligament previously reached by dissection to the other ligament. Forceps and monopolar scissors are used for this purpose and allow for opening an avascular plane corresponding to the rectovaginal fascia, which extends from the central fibrous nucleus of perineum to uterosacral ligaments, and laterally up to the pubococcygeal muscles. This dissection is assisted by bipolar forceps to apply coagulation if required.

This step allows for releasing the entire anterior aspect of the rectum and the posterior aspect of the posterior vaginal cul de sac. Rectal ampulla is easily released on its sides by reflecting it towards the midline with flat forceps. Opening of the laterorectal fat space allows for approaching the posterior aspect of levator muscles covered with their fascia, to which the posterior mesh will subsequently be fixed.

Thus, posterior dissection of the rectovaginal plane allows for releasing and exposing:

- The anterior and lateral aspects of rectum up to the anal canal;
- The entire posterior aspect of vagina;
- Pubococcygeal muscles;
- The two sacroischial ligaments.

Placement of posterior mesh

The length of vagina dissected should be 5 or 6 cm.

The posterior mesh is fixed from one to the other side of rectum, with suture encompassing levator ani muscles (fig. 4).

The first thread is previously knotted on one of the plate ends.

An arch is previously cut in mesh to allow the rectum to pass underneath without compression and a stitch is placed in the apex of the mesh arch. The mesh is then fixated to the posterior aspect of vagina (interrectovaginal space) avoiding transfixion at all times. Finally, posterior mesh is directly fixated on both uterosacral ligaments together with the posterior peritoneum using the MacCoy technique.

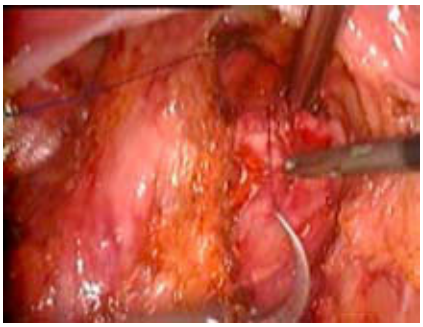

Figure 4 – Fixation point of the posterior mesh to the right levator ani muscle.

Figure 5 – Intervesicovaginal dissection.

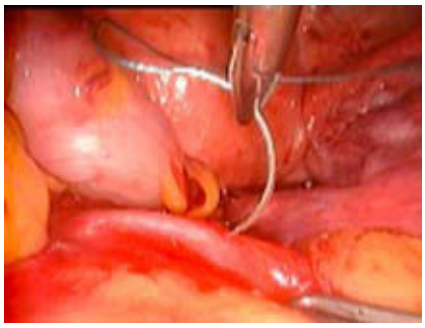

Figure 6 – Fixation point of the meshes to the promontory (above anterior vertebral ligament).

Intervesicovaginal dissection

This should be done similarly to posterior dissection. Bladder is felt by the catheter balloon. Vaginal blade is placed at the anterior cul de sac, or at the bottom of the vagina in hysterectomized patients.

Dissection thus starts over the midline. The anterior pearly white aspect of vagina serves as reference. Simple section of adherent tissue with scissors allows for separation of the two organs; hemostasis is not usually required. Dissection is laterally limited by bladder flaps, and approximately 25 mm are released up to the retrotrigonal space (fig. 5). Finally, if uterus has been preserved, a window is made in both parametria or only in the right one through the pars flaccida to subsequently allow for passage of the anterior mesh.

Placement of the anterior plate

The mesh, previously cut and tied with a thread at its end, is placed under the bladder and over the anterior aspect of the vagina. The needle should not pass through the vagina, which is however thicker than at posterior cul de sac level.

The plate is laterally fixed by two sutures along the whole length of the vagina. If the uterus is preserved, the blade should be removed and the uterus should be pulled backwards to ensure plate fastening at uterine isthmus level. This maneuver prevents the cervical protrusions occurring in our early personal experience.

If the uterus is preserved, longitudinal traction is applied to the mesh to give it a Y shape. The left arm is passed through the space in the left parametrium and the right arm through its corresponding side. Both arms of the anterior mesh are finally passed to the right side for joint fixation with the posterior mesh over the promontory. Both arms may be passed through the right side if preferred by the surgeon.

Mesh fixation to the promontory

A Mersuture® 00 thread with a 26-mm triangular needle is passed through the middle trocar (optic). The free end is removed through the middle trocar (5 mm) and an extracorporeal knot is made. Passage is done with no force so that the periosteum is not crossed. The needle should pass above the anterior vertebral ligament. Both meshes are then taken with adequate tension and jointly fixed to the promontory.

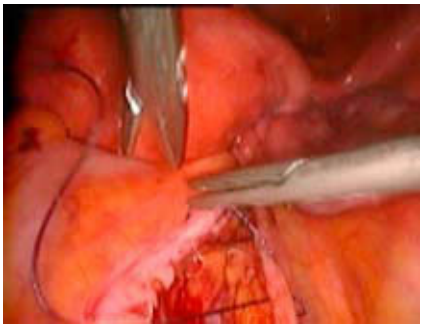

Figure 7 – Closure of posterior peritoneum.

Fixation is performed with an extracorporeal knot which gives strength to the assembly. Any surplus mesh is cut and removed (fig. 6).

Reperitonealization

Reperitonealization is a very important step which should not be neglected. It is more delicate when the uterus has been preserved, and should cover meshes completely.

Attention should be paid to the right ureter, which is usually fixed to the right part of the posterior parietal peritoneum. Start at the anterior peritoneum and continue with the same suture, which is passed under the right fallopian tube up to posterior peritoneum (fig. 7).

According to our experience, no drain should be left after placement of prosthetic material.

At the end of or even during surgery, the effect of traction of the meshes to fix them to the promontory may be verified. Effects are seen immediately after surgery.

Technical variants

Concomitant hysterectomy

Hysterectomy may be required to cure prolapse because of uterine size or associated conditions. When the cervix is healthy, some groups think that subtotal hysterectomy may be performed to preserve the supporting elements of the cervix, thus avoiding opening of the vagina to be able to place the prosthetic elements with no risk.

If total hysterectomy is indicated, the possibility of a vaginal approach should be considered when the patient is positioned. Hemostasis of most pedicles is performed by the laparoscopic route. The procedure is completed by the vaginal route. The vagina is closed through this approach, while reperitonealization and cure of prolapse are performed laparoscopically. Extreme asepsis is required in this case.

Postoperative care

Bladder catheter is usually removed on the first or second day after surgery.

Antibiotic prophylaxis, eventually associated to analgesics, anti-inflammatory agents, or morphine derivatives, is mandatory. The patient is discharged from hospital three or four days after surgery.

Complications

Specific surgical complications

Bladder lesions

These occur during intervesicovaginal dissection. Damage is suggested by the occurrence of gas in the urine bag. Immediate closure and a good quality repair are required in order to be able to continue surgery. This complication occurs in approximately 1% of patients in the reported series.

Vaginal lesions

These may occur during release of the posterior cul de sac and contraindicate in principle the placement of prosthetic material. Vaginal lesions are more common in hysterectomized elderly women, in whom vaginal wall vascularization is precarious.

Rectal lesions

Rectal lesions are much more uncommon. They mandate an immediate quality repair whose prognosis is also conditioned by a good preoperative preparation. Rectal lesions contraindicate any further surgery.

Other gastrointestinal lesions

These are common to any pelvic surgery and occur in approximately 1% of patients in the reported series. The procedure may possibly be continued, with a good antibiotic coverage, if the affected structure is the small bowel. The problem lies in the recognition of damage during surgery.

Specific vascular lesions

Bleeding has varied between the different series. The part of surgery inducing more bleeding is the pararectal approach, because of potential damage to hemorrhoidal vessels. However, damage to sacral vessels during approach to the promontory is more common. Hemostasis of these vessels may be performed by passing a thread under tension below the anterior vertebral ligament (less than 1% of cases).

Damage to the iliac axis, particularly the right iliac vein, may result from exposure of the promontory in patients with low bifurcation of the vena cava. This requires careful repair, for which conversion to open surgery should be done in many patients if laparoscopic repair fails. Other potential complications include ureteral damage, particularly at the time of reperitonealization.

Postoperative complications

Erosion by the prosthesis

Clinically, vaginal erosion results in serum and blood discharge with no general infectious syndrome. In such cases, mesh removal through the laparoscopic route by simple ablation of the sutures fixing it is imperative.

Erosion has been reported in 3%-10% of patients in large series.

All erosions occur after several months. Intraoperative perforation may thus be ruled out in principle as a cause, but there is no absolute certainty that a dissection very close to the vaginal wall may not have an influence.[1,6] We could possibly blame the nature of the mesh, but vaginal erosion rates are similar regardless of the mesh used. However, it seems logical to use meshes with an open frame, thin, and not very dense. Today, soft prolene or polyester monofilament prostheses provide optimum resistance to infection. If atypical urinary symptoms occur, cystoscopy should be performed to rule out bladder erosion by the mesh.[7]

Postoperative obstruction

Three types of obstruction were found in our series:

1. Incarceration of a bowel loop in the hole of the upper 10-mm trocar (resolved by laparoscopy in one patient). This could be prevented by fascial closure at this port with Vicryl.
2. Adhesion of bowel loops to the mesh in the event of incomplete reperitonealization. This required excision of the necrotic loop fragment and mesh removal in some cases.
3. Obstruction caused by section of rectal wall by the posterior prosthesis, with resultant gastrointestinal hemorrhage.

Secondary hemorrhage

This should always be treated by conventional surgery. Hemorrhage was found after a total hysterectomy, requiring surgical hemostasis of a cervicovaginal artery. A pelvic hematoma occurred in another patient 10 days after surgery as rectal bleeding caused by passage of one of the mesh bands through the right parametrium.

Spondylodiscitis

This should always be considered after a promontofixation. It has been reported in the literature, but is an uncommon complication.[8-10]

Spondylodiscitis was seen in two of our patients. Clinical signs of the condition include an inflammatory symptom and low back pain. Diagnosis is made by MRI.

Discussion

Genital prolapse is a common problem in women. The wide variety of surgical procedures used to treat this condition attest to the difficulty of its management. Laparoscopy provides a new approach allowing for a good vision of the anterior and posterior compartments, and above all a global access to prolapse with the same surgical approach.

Laparoscopic promontofixation by placement of an intervesicouterine mesh for the treatment of hysterocele and cystocele is associated to laparoscopic treatment of rectocele by fascial reinforcement with a prosthesis. All potential female prolapses are thus treated.[11]

After 20 years of use of the abdominal procedure, laparoscopy started to be used for this surgical procedure at the beginning of the 20th century, fixing the uterus and vaginal floor to the promontory for cystocele correction.

Laparoscopic treatment of prolapse provides a good anatomical and functional outcome, as shown by the results in series reported in the literature and by our own experience. Use of two meshes, of which the posterior mesh is fixed to the levator ani muscles, is effective for correcting rectocele or preventing its occurrence if not evident yet, as it will most likely occur at a later time because of the existing pelvic floor defect. In series reporting placement of an anterior or posterior mesh only, risk of recurrence is much higher. Combined anterior and posterior treatment should therefore be considered to ensure success.[12,13]

The material used for mesh fixation, particularly to the promontory, has also been debated. Some groups have used screws which are fixed to the promontory together with meshes. Such screws have been designed to facilitate the technique and ensure a strong fixation. The conclusions reached by some of such groups are that the risk of spondylodiscitis is rare but somewhat higher than with sutures because screw penetration is deeper and poorly controlled, while the final fixation resistance is not stronger.[14]

Based on our experience, we think that nonabsorbable multifilament sutures are best for anterior and posterior fixation, and also for fixation to the promontory.

Peroperative complications and conversion to open surgery were rare in the reported series and in our experience. Laparoscopic surgery has its attendant risks (hypercapnia, subcutaneous emphysema due to poor trocar placement, …), but complications are virtually nil in the hands of groups experienced in laparoscopic surgery.

Long-term complications do not usually occur either, but some of them may be severe and require mesh removal as discussed above.[15,16]

Finally, some studies have also reported that the procedure appears to completely preserve sexual function after surgery.[17]

Thus, based on our own experience, which agrees with that reported by other groups, we recommend use of this sacrocolpopexy technique with anterior and posterior meshes as the procedure of choice for the treatment of genitourinary prolapse because it allows for restoring pelvic floor anatomy and function by adding suspension of uterosacral ligaments to achieve a more anatomical repair.[18,19]

Conclusions

- Laparoscopic promontofixation may be performed by experienced laparoscopic surgeons. It is good training for the practice of laparoscopic dissection and suture.
- The greatest difficulty lies in identification of the anatomical elements in the surgical field.
- Magnified vision of all muscle, fascial, or ligament anatomical defects allows for successful repair and a good functional outcome of treatment of genitourinary prolapse with advantages over conventional surgery.
- Laparoscopic mesh placement is uncomplicated and provides very good anatomical and functional results.
- In addition, this is a minimally invasive surgical procedure with an earlier postoperative recovery.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

Our special thanks to the urologists of Clinique Saint Agustin for sharing their knowledge and for their kindness.

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