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Review – Prostate cancer

Early experience in laparoscopic radical prostatectomy using the laparoscopic device for umbilical access SILS Port®

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A B S T R A C T

Since 2007, various urological procedures have been performed with laparoendoscopic single-site surgery (LESS surgery), including nephrectomy, pyeloplasty, simple prostatectomy and, with the refinement of laparoscopic instrumentation, radical prostatectomy. This paper reports our initial experience in radical prostatectomy using the SILS™ Port from Covidiem and two lateral 5-mm trocars for triangulation. The SILS™ Port allows for accurate, simple insertion through a Hadson incision. The flexible port accomodates three 5-mm cannulas or two 5-mm cannulas and a 12-mm port for easier instrument exchange through a single incision. This approach decreases morbidity from bleeding, hernia and/or internal organ damage and improves cosmetic results.

One-port single-incision laparoscopy is part of the natural development of minimally invasive surgery. Future research is required to assess the intraoperative and postoperative benefits of LESS surgery as compared to standard laparoscopy.

Experiencia inicial en prostatectomía radical laparoscópica con el dispositivo de acceso laparoscópico umbilical Single-Incision Laparoscopic Surgery Port®

Palabras clave:
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R E S U M E N

Desde el año 2007 se están realizando distintos procedimientos en cirugía laparoendoscópica por puerto único (laparoendoscopic single-site surgery), incluyendo nefrectomía, pieloplastia, adenomectomía prostática y, con el perfeccionamiento del instrumental laparoscópico, prostatectomía radical. Presentamos nuestra experiencia inicial en prostatectomía radical laparoscópica utilizando el dispositivo Single-Incision Laparoscopic Surgery Port® de Covidien y 2 trocares auxiliares de 5 mm colocados lateralmente para triangulación. El Single-Incision Laparoscopic Surgery Port® permite una inserción precisa y sencilla a través de una incisión de Hadson. El puerto flexible contiene 3 cánulas de

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5 mm o 2 cánulas de 5mm y una de 12 mm para facilitar el intercambio de instrumental a través de la incisión única. Este abordaje disminuye la morbilidad por sangrado, hernias y/o lesión de los órganos internos y mejora los resultados cosméticos.

El puerto único forma parte del desarrollo natural de la cirugía mínimamente invasiva. Se necesita más experiencia para determinar los beneficios intra y postoperatorios de la cirugía laparoendoscópica por puerto único en comparación con la laparoscopia convencional.

Introduction

Over the past decade, urological laparoscopy has made major advances. New devices have been developed for minimally invasive surgery that reduce procedure-associated morbidity, shorten the hospital stay, and improve the patient's quality of life. These innovations include robot-assisted laparoscopic surgery[1], natural orifice translumenal endoscopic surgery, and laparoendoscopic single-site surgery[2].

In this paper we present our initial experience with radical prostatectomy using the Single-Incision Laparoscopic Surgery (SILS) Port® and two auxiliary lateral ports for suturing the vesicouretral anastomosis. SILS Port® is a single-port, flexible device inserted through a small periumbilical incision similar to the Hasson technique. The port has three 5-mm, or two 5-mm and one 12-mm channels that allow for greater versatility for exchanging instruments through a single port (figs. 1 and 2).

Early steps

Having undergone a long and rigorous training in experimental laparoscopic surgery in animals at accredited centers and conducted more than 150 radical prostatectomies with the conventional 5-port approach, on 16 June 2009 we performed our first laparoscopic radical prostatectomy at the Hospital San Juan de Dios del Aljarafe; the umbilical access laparoscopic SILS Port® device was inserted through a Hasson-type periumbilical mini-laparotomy; we inserted two 5-mm accessory trocars in both iliac fossas to help with the procedure (fig. 3). The procedure, which reproduced the Montsouris technique, was uneventful. The neurovascular bundles were preserved, and the ureterovesical anastomosis was done with a continuous PDS 3/0 suture. Bleeding was approximately 200 cm^3, and the surgical time was 210 min.

The patient resumed eating and walking 24 hours after the intervention and was released at 48 hours; his hospital progress was favorable. The bladder catheter was maintained for 2 weeks; at the visit on day 45, the patient reported comfortable urination (peak flow: 29.3 mL/s), with no urine leakage, and complete loss of spontaneous erections (he had previously experienced partial erectile dysfunction). His PSA was 0.00 ng/mL on his first oncology follow-up visit at 45 days.

We subsequently performed the same procedure in three additional patients; in two, the prostatectomy was completed, but in the third patient we converted to conventional laparoscopy, for we had to introduce two additional trocars because it was impossible to dissect properly on account of the patient's obesity.

Figure 1 – The SILS Port inserted through a periumbilical incision.

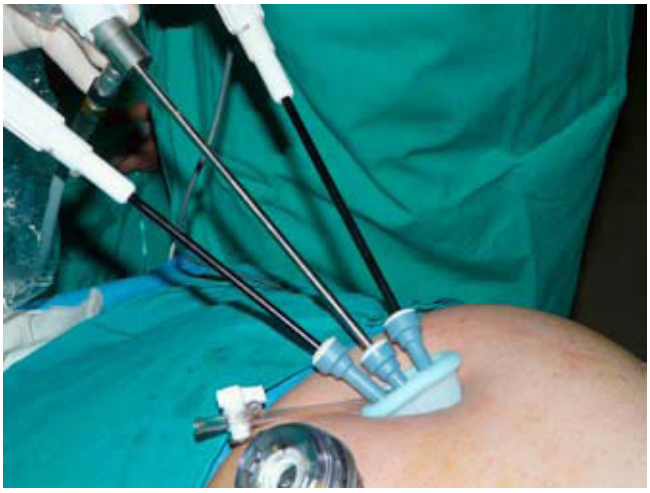

Figure 2 – Laparoscopic instruments inserted through a single port.

Figure 3 – Insertion of laparoscopic instruments through the single port and two auxiliary trocars.

Discussion

The trend towards increasingly less invasive surgery has encouraged surgeons to explore new forms of access that reduce or even eliminate trocars in the abdominal wall. New devices have recently been developed for conducting surgery through natural orifices through a single incision (SILS Port®) or a single umbilical port. The most recent nomenclature consensus includes them under the term single-site laparoendoscopic surgery[3]. These techniques were initially employed for kidney surgery and other less complicated procedures such as transvesical simple prostatectomy[4], but its spread to increasingly complex techniques such as laparoscopic radical prostatectomy or partial nephrectomy was inevitable[5,6].

Despite our limited experience (experimental surgery in animals and our first human cases), some conclusions can be drawn.

This is a complex technique that requires prior experience with laparoscopy; it reproduces the steps of conventional laparoscopic surgery; it can be performed with the usual laparoscopy equipment, albeit with some difficulty and with the help of auxiliary trocars. Other authors have used additional trocars in single-site nephrectomies under the 12th rib in order to facilitate the intervention without increasing its associated morbidity[7].

At this time (June 2009), since our center lacks articulated laparoscopic instruments, we believe that this method should be indicated for patients who are not overweight (body mass index under 25 kg/m^2), in whom dissection is easier, assuming limited help is expected from the assistant.

The utility of the technique is not as clear in overweight patients (especially those with a BMI over 30 kg/m^2) due to the greater difficulty in dissecting and the unavailability of help to retract tissues, which would permit a precise approach and an adequate field of vision.

The conventional instruments currently available to us continually interfere with each other in the small space during the procedure, so a tight coordination between surgeon and assistant is essential. A 5-mm optical device inserted in the SILS Port® through the umbilicus permits an adequate medial field of vision; otherwise, if space issues so require, the device can be inserted through the right lateral 5-mm trocar. More experienced authors have presented their results with this technique using only the single umbilical port[8]. While performing this procedure without lateral trocars is not possible for us at this time due to the lack of instruments and training, we expect that in a not too distant future, as we perfect our technique and acquire articulated instruments, we will be able to forego the use of one, or perhaps both, auxiliary trocars.

After comparing the advantages and disadvantages of the two devices commercially available —SILS Port® (Covidien) and TriPort® (Olimpus)— we chose SILS Port® because the instruments inserted through trocars, which minimizes the fatigue caused by continually inserting and withdrawing the instruments through the valves. With TriPort®, the valves suffer due to the instruments coming in and out, and soon there is CO_2 leakage. Frequent application of lubricant on the forceps help to alleviate this problem.

The abdominal wall anchoring system is also better in the SILS Port®, as the design permits a secure position after insufflation. If the placement steps of the TriPort® system are not followed perfectly or the ribbon in the internal ring is not tightened with the appropriate tension, the device can become dislodged from the abdominal wall and come out of the umbilical orifice. Once a device is displaced, it is very difficult to reintroduce; a new one must be used, which implies associated costs. Repositioning the SILS Port® is easier.

Because the TriPort® does not use trocars, it has the advantage of clearly reducing interference between the instruments, and because it has no lip (especially the 10-mm one), it is easier for the camera and the forceps to work with relatively "more freedom" of movement. In the case of SILS Port®, the need to use the 12-mm port (in order to insert the Hem-o-lock® or the 10-mm camera if a 5-mm one is not available) considerably impairs mobility and increases space issues for the surgeon and the assistant.

The articulated pincer tools currently available complicates prostate surgery mainly due to two facts:

1. The surgeon's posture and position relative to the patient (lateral) create difficult handling and more fatigue for the surgeon. The forceps are designed to approach the target organ from the front. This problem can be partially addressed by the surgeon positioning himself near the patient's head (fig. 4).
2. The camera head continually collides with the forceps and the surgeon's hands; frontal vision is very distant because the optical device cannot get close. A careful and precise dissection is almost impossible to achieve. We believe that in order to overcome this problem, it should be suggested to the manufacturers to design longer and more flexible optical devices and develop smaller camera heads, or use optical devices with tips fitted with microchips.

Figure 4 – Position of the surgeons during the intervention.

Until a system similar to ENDO STITCH® (assisted laparoscopic intra-abdominal knot tying system) is available, which would permit to suture the anastomosis from the umbilical approach, we will have to use auxiliary 5-mm trocars to obtain the necessary triangulation. It is possible to use 3-mm trocars and instruments, which would create smaller incisions, but this would limit the possibility of inserting the 5-mm optical devices and instruments that are currently part of our standard equipment.

The development of 5-mm (0-30°) optical devices offers a new possibility of approaching the surgical area from various angles. The option of inserting the optical device through any trocar facilitates vision, especially when the camera and the pincer tools are in conflict in certain surgical steps. The use of 5-mm and 30° optical devices through the right auxiliary trocar may simplify certain surgical steps.

Therefore, we emphasize that for us at this time, inserting two auxiliary trocars in both iliac fossas is absolutely necessary in order to obtain adequate triangulation for the vesicouretral anastomosis. These ports can be used by the assistant throughout the intervention to facilitate the principal surgeon's work, and they also permit the insertion of 5-mm (0-30°) optical devices in different positions according to the needs of each moment.

The principal surgeon's training is fundamental for developing the technique, as the usual "solitude" of the laparoscopic surgeon is increased in this procedure due to the limited help that can be offered by the assistant.

Another advantage of this technique is that it can be performed by the principal surgeon and a single helper, which reduces the number of members in the surgical team. In our service, usually three urologists are present for a conventional laparoscopic surgery of the prostate (principal surgeon, assistant and camera). A reduction would have a great impact on the capacity of a small service such as ours, constituted by only five urologists and which has a heavy work load, a limited number of operating rooms (three per week), and a major specific weight of prostate laparoscopic surgery (45-50 interventions/year).

Figure 5 – Final appearance of the incisions.

For the patient, the benefits are a lowered risk of lesions to the vessels of the abdominal wall and viscera due to fewer trocars (3 instead of 5), which implies less postoperative pain and a faster recovery, allowing him to return to his daily activities in shorter period of time[9]. Esthetic issues may also be important for some patients; only the "hidden scar" around the umbilicus and two small wounds measuring less than 1 cm are made (fig. 5).

Recent advances such as the use of magnetic field-operated or robotic instruments[10], plus research on these new forms of laparoscopic access allow us to assert that umbilical single-site devices open a new field for exploration in minimally invasive surgery for the treatment of clinically localized prostate cancer; perfecting the design of laparoscopic instruments will open new horizons for this emerging surgical technique.

We emphasize that training on the technique, familiarity with the various specific instruments, and the exploration of sensations involved in this new approach should be done in an orderly manner in accredited centers for animal experimentation, which will allow us to incorporate these techniques to our standard therapeutic arsenal without impairing the oncological and functional outcomes and without compromising the safety of our patients.

Conflict of interest

The authors state that they have no conflicts of interest.

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