Laparoscopic Radical Cystectomy with Ileal Conduit Diversion

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Remaining the gold standard treatment of muscle-invasive bladder cancer and high-risk superficial tumors, the radical cystectomy has been translated into a fully laparoscopic protocol, actually gaining more and more acceptance worldwide. In this article, a transperitoneal antegrade laparoscopic protocol is described for radical cystectomy performed in both genders. After removal of the specimen, generally through a mini-laparotomy, most of the teams perform the maneuvers for urinary diversion through an ileal conduit as an open procedure, although a completely laparoscopic procedure has been successfully achieved. Laparoscopic cystectomy will face the proof of time if oncologic rules about surgical management of transitional cell carcinoma are carefully respected to avoid any cell spillage. When obvious laparoscopic advantages for the patients are encountered with laparoscopic cystectomy, it seems unlikely that a full laparoscopic protocol, including the diversion, may gain wide acceptance; in that case, the true laparoscopic benefits would be wasted by unjustified lengthening of operative time and by compromising the quality of uretero-ileal anastomoses.

Introduction

Approximately 57,400 new cases of bladder cancer will be diagnosed in the United States yearly, and 12,500 people will die of the disease. Radical cystectomy remains the gold standard for muscle-invasive bladder cancer and high-risk superficial tumors resistant to intravesical therapy [1]; moreover, open cystoprostatectomy with urinary diversion remains a major procedure that may be demanding for surgeons and threatening for patients.

Although cystectomy performed through a laparoscopic approach was described first in 1992 [2], this indication remained very controversial and still was considered as experimental for the treatment of bladder cancer [3]. More recently, the laparoscopic approach for advanced disease, such as cytoreductive nephrectomy, and other novel therapies, such as laparoscopic radical cystectomy with urinary diversion and laparoscopic retroperitoneal lymph node dissection, hold great promise of benefit for patients with severe urologic malignancies [4].

Beyond initial reports on feasibility, a justified controversy persisted regarding the risk of cell spillage or port metastases in transitional cell carcinoma. As the strict observation of oncologic safety rules (*eg*, the respect of closed urinary cavities) has increased, so has the acceptance of laparoscopic nephro-ureterectomy [5]; accordingly, should radical cystectomy become more accepted if the same rules are carefully observed? Moreover, animal and clinical experimental work has demonstrated that laparoscopy may be less immunodepresssant than its open counterpart [6].

Although laparoscopic cystectomy with different urinary diversions already has been described and has been shown to provide intraoperative and postoperative advantages versus open surgery [7,8•,9], the laparoscopic cystoprostatectomy rarely has been well codified and illustrated. As elegantly shown in a recent paper by Simonato *et al.* [10••] and in another review by Moinzadeh and Gill [11••], all of the technical steps of an open surgical radical cystectomy with urinary diversion have been translated into equivalent laparoscopic maneuvers.

The potential advantages of performing the procedure laparoscopically reside in the smaller incisions; hence, decreased pain and quicker recovery time occur, implying shortened hospital stay, decreased blood loss, and fluid imbalance compared with the open technique. A stepwise protocol actually is established, with minor alternative variations among centers [8•,10••,11••]. Having set up an experience in radical prostatectomy since 1999, our group started to perform laparoscopic radical cystectomy 1 year later; since then, until November 2004, 33 patients were operated on in Brussels (31 patients for transitional cell carcinoma and two female patients for untreatable interstitial cystitis) [12]. A stepwise protocol for transperitoneal, descending radical cystectomy in view of the published short series is discussed in this article.

Equipment

The technique is challenging, requiring considerable laparoscopic infrastructure and expertise. Using a five- or six-port transperitoneal approach, the radical cystectomy and pelvic lymph node dissection are performed first. Standard laparoscopic surgical equipment with few special instruments are required (Table 1).

Table 1. Equipment for laparoscopic radical cystectomy

Standard laparoscopic equipment
High-flow insufflator
300-W Xe light fountain
3CCD camera
One 10-mm 0º endoscope (30º endoscope is optional)
Trocars
Two to three 10- to 12-mm trocars
Three 5-mm trocars
Instruments
One laparoscopic Metzenbaum scissors
One laparoscopic bipolar forceps
Two laparoscopic atraumatic prehension forceps
One laparoscopic suction irrigation canula
Laparoscopy bags (optional)
Harmonic scalpel or Ligasure (Tyco Healthcare, Mansfield, MA) 5- to 10-mm forceps
Surgical endoscopy 5- to 10-mm clip appliers
Classical surgical set of instruments
Vaginal blade retractor (cystectomy in female patients)

Patient Preparation

As usual, the bowel is prepared preoperatively by oral self-administration of 2 L of electrolyte lavage solution during the 2 days before the surgical procedure. Antibiotic prophylaxis with a cephalosporin is performed from day 1 to 5 and low molecular weight heparin (4000 units) is administered preoperatively and until postoperative day 15. Compression stockings are applied as the patient is placed in the supine position with the legs apart to allow free access to the perineal space. The table is set to a 30º Trendelenburg position. An 18-Fr Foley catheter is inserted to drain the bladder and a nasogastric tube is positioned. Because the lower limbs are strapped carefully to the table without compressions, no shoulder pads are necessary.

Trocar placement

The patient is in supine position, with the lower limbs slightly abducted (15º). A 30º flexion is given to the knees, to define accordingly the value of the Trendelenburg position. Extension of the hips should be avoided to prevent any backache.

A five-port diamond or fan-shaped transperitoneal approach is used. The first 10-mm trocar is placed 1cm above the umbilicus. This trocar is reserved for the 0º laparoscope. An open technique through a mini-laparotomy is optional at this level. The remaining four ports are placed under visual control after classical establishment of the pneumoperitoneum (12–14 mm Hg) with or without the use of a Veress needle.

At the left Mac Burney point, a 12-mm trocar is placed to ease the retrieval of pelvic lymph nodes after dissection. At the true Mac Burney point, a 10-mm trocar is placed to accept 10-mm instruments if necessary.

On the midline, a 5-mm trocar is placed, one span below the umbilical trocar. A fifth 5-mm trocar is placed at the horizontal level of the navel, on the vertical line of the right lateral trocar. The abdomen and pelvis are inspected; eventual adhesions of the sigmoid loop in the left fossa are released by blunt and sharp dissection.

Laparoscopic Cystoprostatectomy in the Male Patient

Dissection of the retrovesical space

In a male patient, the operation starts by dissection of the plane behind the seminal vesicles; the dissection is started at the level of the Douglas pouch. The posterior wall of the bladder is lifted vertically by means of a fenestrated forceps held by the second assistant. A horizontal 6- to 8-cm incision is carried out on the peritoneum, two fingers above the bottom of the Douglas pouch.

Ampullae and seminal vesicles are exposed, but not dissected from the bladder, during the entire procedure. If necessary, the posterior aspect of Denonvilliers fascia is exposed and incised horizontally to open the prerectal space. If started high enough, the dissection is able to leave the Denonvilliers posterior sheet covering the seminal vesicles.

The dissection is continued bluntly on each side and on the anterior aspect of the rectum toward the apical area of the prostate. The vascular supplies of the vesicles are recognized laterally, but not divided. A tunnel between the rectum and the prostate, with the vesical and prostatic fibrovascular pedicles laterally, is created.

Lateral dissection of the bladder

The umbilical arteries are identified close to the abdominal inguinal ring and the peritoneum is incised just laterally to them. From the internal inguinal ring caudally, a vertical incision of the peritoneum follows the medial aspect of the external iliac artery until the crossing of the ipsilateral ureter. The vas is divided at the level of the inguinal ring and retracted medially to open the space medial to the external iliac vessels.

The classical or extended ilio-obturator lymph node dissection [13,14] may be carried out at this time; sampling of the nodes in view of frozen sections can be extended to external or internal node groups.

The peritoneal incision then is extended cranially at the anterior aspect of the ureter, beyond the crossing of iliac vessels; this allows the surgeon to prepare an adequate length of free ureter in view of the ulterior reimplantation. Careful hemostasis of the arteriolar supply to the iliac portion of ureters should be ensured to avoid potentially neglected bleedings.

The superior vesical artery is divided at its origin, eventually by means of a 10-mm Ligasure (Tyco Healthcare, Mansfield, MA) forceps or by section between laparoscopic clips.

The ureter then is followed further, completely dissected, and divided between clips close to its intramural portion. The

last centimeter is resected and properly oriented for frozen section to exclude dysplasia of the lower ureter.

The inferior vesical artery and the vesiculo-prostatic artery then are divided as described previously. Their division is carried out in close vision of the lateral aspect of the seminal vesicle to which they provide arterial supply. The division of the successive pedicles is interrupted temporarily at the upper lateral edge of the prostate, on each side, to temporarily preserve the emergence of the neurovascular bundles. Thus far, the bladder remains suspended through its anterior attachments and the Retzius space is kept closed except for its lateral aspects.

Anterior dissection of the bladder

When the antegrade dissection and division of the bladder's upper vascular elements are achieved, the umbilical ligaments are sectioned and the Retzius space then is opened. The high section of umbilical ligaments is enabled by the supraumbilical position of the telescope, by the working position of the scissors in the upper right trocar, and by a hemostatic forceps working in the left lateral trocar. At this point, the anterior peritoneum is incised lateral to the umbilical arteries from the umbilicus to the inguinal ring. The prevesical space is entirely opened and the bladder is dissected from the anterior abdominal wall. With a combination of sharp and blunt dissection, the space between the lateral wall of the bladder and the pelvic side wall is developed until reaching the endopelvic fascia on both sides. The superficial dorsal vein then is divided on the anterior aspect of the prostate and the endopelvic fascia is opened on its line of reflexion; the lateral surface of the prostate is separated from the levator ani muscle to carefully isolate the dorsal vein complex and the prostatic apex.

Nerve-sparing dissection of the vesicoprostatic complex

At this time, the lateral aspect of the prostate is exposed by the first assistant exercising a traction on the vesicoprostatic junction in the opposite direction. This maneuver exposes the superior vesiculo-prostatic pedicle left intact thus far. In the meantime, the rectum is pushed downward with the suction cannula to expose the medial aspect of the vesicoprostatic pedicle.

The visceral fascia is opened on the lateral aspect of the prostate and the branches of the ipsilateral neurovascular bundle to the prostate are divided successively toward the apex of the prostate, on each side, using a harmonic scalpel, a 5–10 Ligasure, or a bipolar forceps.

Apical dissection

At this point, the vesicoprostatic complex still is fixed to the pelvic floor by the deep dorsal vein complex and the urethra. The Santorini plexus is divided after ligation or by means of the Ligasure forceps.

The anterior aspect of the urethra is exposed as close as possible to the prostatic parenchyma to maintain intact the puboprostatic ligaments and an adequate urethral stump, if an orthotopic neobladder is planned.

From the points reached by the division of the visceral fascia, the lateral and posterior aspects of the urethra then are dissected with a right-angle Maryland forceps (5 or 10 mm). When free, the urethra is ligated with an intracorporeal knot or clamped by a 10-mm Hem-o-Lock clip (Weck Closure Systems, Research Triangle Park, NC) and divided after removal of the indwelling catheter. The urinary lumen is never opened by this means to avoid any cell spillage. The terminal plate and the distal insertions of Denonvilliers fascia are incised, releasing the specimen completely.

If the available length of both ureters is considered too short by the surgeon, the former dissection is continued cranially. The left ureter is tunnelized behind the sigmoid loop to join the right ureter in the retro-peritoneal space; a fenestrated atraumatic forceps is passed through the upper right trocar, lifting the posterior peritoneum caudally to the aortoiliac bifurcation and bluntly dissecting the sigmoid mesentery to allow the passage of the left ureter to the opposite side.

After a last overview of main hemostatic controls, the pneumoperitoneum is deflated temporarily; lateral trocars remain as they were placed. A mid-line laparotomy incision is made, unifying the two medial trocar holes; these trocars are removed temporarily.

The vesicoprostatic specimen then is removed en bloc through this incision; its entrapment into a bag is optional.

Laparoscopic Cystectomy in the Female Patient

The posterior dissection starts at the level of the rectovaginal space

As described in laparoscopic surgery for prolapse [15], the posterior vaginal bottom is lifted by the second assistant with a curved metal retractor, immediately exposing the recto-vaginal space to blunt and sharp dissection. This dissection is extended laterally to the ischiorectal fossae; peritoneal incisions then are continued cranially at the level of the first peritoneal fold to find and dissect the ureters.

The lateral incisions of the parietal peritoneum are started at the internal inguinal ring, and both ligamenta teres are divided and retracted medially to expose the medial aspect of the external iliac vessels. Pelvic lymph node dissection is done on each side, as already described in view of frozen sections. The subsequent dissection and antegrade division of the ureters and upper vesical pedicles then are carried out as they would be in the male patient.

The umbilical ligaments and urachus are divided and the prevesical space is opened and bluntly dissected to expose the anterior aspect of the bladder, the bladder neck, urethra, and anterior wall of the vagina. Opening of the endopelvic fascia allows the dissection to be continued until the lateral aspects of the urethra, which is dissected completely, is secured between clips and transected. If an

orthotopic bladder replacement is planned, a maximal urethral stump then is preserved in view of the anastomosis. According to the patient's age and expectations, cystectomy may be carried out with vaginal and uterine preservation [16]. More often, according to the tumor burden and stage, the uterus and part of the vagina may need to be taken with the bladder.

The metal retractor is moved to the anterior vaginal bottom to enable the dissection of the urethro-vaginal space, which is developed in a retrograde way after a section of the urethra. The section of the vaginal anterior wall is carried out with the help of the retractor, giving a flat, horizontal shape to the vagina; the gas leak during section of the vagina is prevented by packing the vagina, eventually with Vaseline gauze.

Thereafter, the vagina is repaired and closed with O-woven PGA sutures, after retrieval of the specimen.

Ileal Conduit Construction

The ileal conduit is created usually by isolating a 15- to 20-cm segment of the ileum located 15 cm away from the ileocecal junction. The continuity of the small bowel is restored outside the body through the incision made for specimen retrieval. The ileo-ileal anastomosis is performed by stapling or by interrupted seromuscular stitches and the ileum is brought back into the abdominal cavity. A termino-terminal uretero-ileal anastomosis then is performed through the same incision, according to Wallace or to Bricker.

Ureters are intubated with 8-Fr smooth catheters temporarily attached to the inner aspect of the ileal wall at the stoma level, with fastly absorbable sutures (Vicryl rapid 2/0; Ethicon, Somerville, NJ). Both catheters are also secured to the abdominal wall.

Most often, a Jackson-Pratt drainage is placed into the pelvis; the tube is exteriorized through a trocar hole in the right fossa. Fascial incisions of 10 mm are closed with interrupted 0 sutures. The skin is closed with surgical staples.

For male patients, the ileal conduit usually is performed laparoscopically assisted. The extended sub- or supraumbilical mini-laparotomy incision for retrieval of the specimen is used for the isolation of the 20-cm segment of the distal ileum in an open technique. Subsequently, the 10-mm trocar incision in the right lower abdomen is used as ileostoma.

As an alternative option, the incision at this level can be enlarged and the rectus fascia can be incised to a size allowing for specimen retrieval and ileo-ileal anastomosis; the distal end of the ileal conduit then is pulled through the wound and sutured to the skin at the upper end of the incision. After placement of two single J stents, the ileal segment is manipulated back into the abdominal cavity, the subumbilical or pararectal incision is closed, and the pneumoperitoneum is re-established. Finally, the left ureter is transposed retroperitoneally behind the sigmoid and both ureters are sutured, stented, and sutured to the ileal conduit using interrupted sutures.

In the female patient, following transvaginal extraction of the specimen, the formation of an ileal conduit can be carried out completely laparoscopically. For this purpose, a 20-cm ileal segment is isolated by use of an endoscopic stapler. The ileo-ileal anastomosis is performed with antimesenteric side-to-side stapling and closure of the remaining opening by endoscopic suturing. The distal end of the ileal segment then is pulled out through an enlarged trocar incision in the right lower abdomen and sutured to the skin. Through the so-created urostoma, single J stents can be introduced and both ureters are stented and sutured to the ileal conduit in a modified Wallace-type technique or individually using interrupted sutures, according to the Bricker technique.

Postoperative management

On the first night, all of the patients were monitored on the intensive care unit for vital parameters monitoring and adequate pain management. Parenteral nutrition was continued until complete oral feeding. The drains are removed after reduction of secretion below 50 mL. On day 10, the ureteral stents are removed without loopogram.

Discussion

The successful introduction of laparoscopic radical prostatectomy at the end of the past decade pioneered by European urologists represented a major step in the technical development of minimally invasive surgery for cancer [17–19]. Obviously, even complex ablative-reconstructive procedures in the pelvis became feasible laparoscopically. Moreover, some studies showed that despite initially longer operating times, such procedures provided significant advantages for the patient when compared with their open counterparts [20,21].

Therefore, it seemed to be a logical step that at the beginning of this century, the first centers reported their initial experience with laparoscopic radical cystectomy [22,23•]. Similar to what happened with radical prostatectomy, there were early reports in the nineties showing significant technical difficulties, preventing the clinical introduction of cystectomy [24–26]. In the meantime, an increasing number of urologists, including those of various international centers, published their experiences with laparoscopic radical cystectomy associated with an ileal conduit diversion (Table 2).

With regard to the radical treatment of localized prostate cancer, radical cystectomy deals with an initially ablative procedure followed by a reconstruction; moreover, it also needs to be adapted to a disease present in both genders, regardless of whether it is for malignant indications.

In contrast to laparoscopic radical prostatectomy, the numbers of the different series still are limited. Open radical cystectomy requires an abdominal incision with prolonged retraction of the abdominal wall, which is responsible for a

Table 2. Laparoscopic radical cystectomy with ileal conduit

Year	Study	Procedures, *n*	Laparoscopic assistance	Length of procedures, *h*	Complications	Open reoperations, *n*
1995	Sanchez de Badajoz *et al.* [25]	1	Yes	8	Nerve (1)	None
1995	Puppo *et al.* [24]	4	Yes	6–8	None	None
2002	Peterson *et al.* [28]	1	Yes	7	None	None
2002	Gupta *et al.* [27]	12	No	7–8	Ileus (1), sepsis (1)	Two
2003	Rassweiler *et al.* [30]	4	Yes/no	6–7	Urine leak (1)	None
2003	Hoepffner *et al.* [32]	10	Yes/no	6	Sepsis (1)	None
2003	Popken *et al.* [29]	5	Yes/no	5–6	None	None
2004	Sakakibara *et al.* [31]	11	Yes	7–9	Ileus (4), leak (2)	None
2004	van Velthoven *et al.* [12]	13	Yes	5–7	Rectum (1)	None
2004	Rimington *et al.* [33]	25	Yes	4–7	Not available	None
	Total	87			11/87 = 12.6%	2/87 = 2.3%

high level of postoperative pain and requires narcotic administration for several days. Consequently, normal activity is regained only slowly and patients remain hospitalized with continuous nursing care.

The main apparent advantage of the laparoscopic radical cystectomy is less postoperative pain, partly because of the smaller incisions made. There also usually is less blood loss, minimizing the chances for blood transfusion. Subsequently, the patients are encouraged to be out of bed and ambulate sooner; many patients also experience quicker return of bowel function. The diet is advanced from clear liquids to regular diet sometimes on the second postoperative day. The laparoscopic approach also offers a better cosmetic result because of the small and almost neglectable incisional scars over time.

Nevertheless, much controversy persists about the ability of urologic surgeons to master difficult laparoscopic procedures; one of the key points is the yield of lymph nodes obtained by laparoscopy, when one remembers that this issue sometimes appears unsatisfying even in teams with large experience with open cystectomy.

With regard to some pessimistic concerns, the initial European experience showed the feasibility and safety of the technique including all of the variations of urinary diversion. The goal was to translate the technical steps routinely used in the open technique and to standardize a laparoscopic protocol. At no time during the development of laparoscopy were surgeons ready to compromise oncologic or functional results because of a new surgical approach. Differences with the open access are the immediate transperitoneal approach, posterior dissection of the seminal vesicles, Denonvilliers fascia incision, and lymphadenectomy eventually done after the cystoprostatectomy for staging purposes.

Beyond the unavoidable learning or discovery curve, the mean laparoscopic operative time in our experience is 120 to 150 minutes for the cystectomy; the average blood loss is below 500 mL. For what regards node sampling, there is no doubt that the laparoscopic approach enables surgeons to perform extended lymph node dissection, yielding more than 10 lymphatic nodes [34]; this skill is inherited from conventional ilio-obturator dissection and from the modified retroperitoneal templates performed laparoscopically.

Although it could be demonstrated that the ablative part of the procedure does not cause major problems for experienced surgeons, the urinary diversion represents a challenging operation, even for centers of expertise, particularly if performed intracorporeally. However, most of the reports do not differ significantly with regard to operating time and the type and frequency of the observed complications. We were able to collect 87 reported cases worldwide of radical cystectomy associated with an ileal conduit diversion. The incidence of complications (12.6%) and the reintervention rate (2.3%) reflect the technical difficulties of the procedure, even in the hand of laparoscopically experienced surgeons. On the other hand, it is obvious that such difficulties are largely linked to the discovery curve of the techniques and mainly concern the reconstruction of the urinary diversion (*ie,* urinary leakage, urine fistula, ileus) rather than the radical cystectomy itself, which usually requires only 2 to 3 hours.

The transitional cell carcinoma is much more aggressive than the adenocarcinoma of the prostate, for example. This concerns the development of local recurrence and progressive metastatic disease. There already have been reports of disease-specific mortality after a short-term follow-up [5,35]. Although recent studies could not reveal any specific risk factors for the development of port-site metastases related to the laparoscopic technique, most of the reported trocar metastases in the field of urology have been observed in cases of transitional cell carcinoma [30,35]. Such issues require further prospective long-term studies.

Moreover, there have been oral reports about unusual abdominal metastases observed after laparoscopic cystectomy; these cases exclusively concern cystectomies associated with prostate apex preservation in view of performing optimal nerve-sparing laparoscopic cystectomies [36]. Beyond the specific risk of incidental prostate cancer [37], this technique also implies a wide opening of the bladder

neck in the presence of eventual residual tumor material in the bladder lumen. We, along with others [10••,11••], strongly estimate that the bladder should be removed, remaining strictly closed, and that the urinary pathway should be divided only after it is secured with clips or ligations. Moreover, with respect to the same risk of transitional cell spillage, the lack of tactile control and the risk of dysplasia of the upper tract or of the urethra make frozen sections of these organs mandatory.

Abiding to the rules of classical radical cystectomy [38] implies that the procedure be performed strictly transperitoneally, allowing for the removal of the peritoneal coverage of the bladder. This explains our choice of a systematic supraumbilical trocar on the midline for the lens and the relatively high position of the upper right trocar, at the horizontal level of the former one. The latter position allows the scissors held in the surgeon's right hand to perform a high, juxtaumbilical section of the urachus and of the umbilical ligaments. This maneuver enables the opening of the Retzius space, avoiding an excessively long way into the perivesical fat and useless maneuvers to improve the visibility on bladder limits. Tactical reasons as a result of the size of the specimen delay this anterior exposure until the moment when the posterior dissection is completely achieved, releasing the specimen from the prerectal space and dividing the upper pedicles and the ureters.

The same logical features of an antegrade procedure explain the stepwise progression, following the ureters from crossing with the iliac vessels, performing an extended pelvic lymph node dissection, and successively securing the superior and inferior vesical arteries and the vesiculo-prostatic arteries in the male patient [10••]. Nonetheless, attention should be paid to avoid premature division of the pedicles adjacent to the seminal vesicles, in view of an optimal preservation of the neurovascular bundles. This dissection should be delayed until the anterior attachments of the bladder are released and the endopelvic fascia are opened on each side of the prostate. Lifting the whole specimen toward the upper opposite side then allows the antegrade dissection of the neurovascular bundles, using the appropriate tools. For the same reason, the use of blind wide diathermy or endoscopic staple appliers should be prohibited.

There is no doubt that the actual reported operative techniques require further standardization. Some authors emphasize their completely intracorporeal procedure [8•,9], whereas others focus on the advantages of a laparoscopically assisted or even hand-assisted technique [39]. The authors think that an entirely laparoscopic approach should be performed only if the retrieval of the specimen can be accomplished without an additional incision (*ie*, transvaginally, transrectally). Regarding what constitutes the possibility of hand-assisted laparoscopic cystectomy, as stated by Moinzadeh and Gill [11••], we think that the presence of the operator's hand actually may compromise exposure during pelvic surgery, dealing with a large specimen in a reduced workspace. Moreover, skilled surgeons generally have wide experience with laparoscopic prostatectomy before starting cystectomy; therefore, it is unlikely to see them needing hand assistance for the easier procedure.

In the case of the ileal conduit in male patients, the extended paraumbilical trocar incision can be used subsequently for the retrieval of the specimen, the formation of the ileal conduit, the ileo-ileal anastomosis, the creation of the ileostoma, and the placement of the ureteral stents. Therefore, any type of intracorporeal technique seems to represent an unnecessary prolongation of the operating time, without true patient benefit.

Two groups reported on their early experience with the use of da Vinci telemanipulators (Intuitive Surgical, Inc., Sunnyvale, CA) in the field of laparoscopic radical cystectomy [40,41]; the role of the robotic arms essentially was limited to the nerve-sparing dissection during the ablative time and to the vesico-urethral anastomosis (*eg*, in the case of neobladders). This adds to the catalogue of urologic procedures already described with robotic assistance [42,43]; further functional results still are awaited to evaluate the true return of this investment in the fields of reduced operative times and improved erectile function.

Conclusions

Radical cystectomy remains the gold standard for muscle-invasive bladder cancer and high-risk superficial tumors resistant to intravesical therapy and a laparoscopic approach can reproduce open surgery. However, operative times for these radical procedures remain longer than those for open surgery. Blood loss is less and patient recovery is quicker.

It has been illustrated that even for the experienced surgeon, laparoscopic radical cystectomy with urinary diversion represents a technically challenging procedure.

The learning curve of laparoscopic radical cystectomy may take several years to perfect, which already has been realized with laparoscopic radical prostatectomy. One reason represents the significantly lower incidence of the procedure.

The operating time obviously has to be reduced significantly to minimize the associated morbidity of the procedure. On the other hand, there are no principle technical obstacles and increasing experience may lead to a dramatic reduction of operating times in the near future. New trends in this field may concern the improvement of suturing devices or the availability of absorbable staples to reduce the time devoted to the building of neobladders.

Furthermore, the patients have to be followed carefully with regard to the functional and oncologic long-term results.

Laparoscopic cystoprostatectomy is a feasible, fast, safe, and rather easy procedure, but laparoscopic radical cystectomy still is an operation for pioneers; however, in our opinion, this procedure may not be strictly relegated to a few centers of expertise in the future. We think that this

technique is here to stay; however, it is easily reproducible and thus indicated only for patients affected by clinically organ-confined invasive bladder cancer. As long as we keep respecting the rules of oncologic surgery for transitional cell carcinoma, it may become a standard of care, even in the elderly.

Patients treated with this technique benefit from the advantages associated with laparoscopic surgery, which are not reduced by the external reconstruction of a urinary diversion performed through a mini-laparotomy.

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