Laparoscopic prostatectomy: here to stay

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In 2002, open retropubic radical prostatectomy remains the standard of care for localized carcinoma of the prostate. However, the laparoscopic approach offers several appealing advantages and is being practiced more widely. The more commonly performed technique is the transperitoneal "Montsouris" technique with defined steps which are described. There are a number of pointers that are learned with experience. The most remarkable aspect of laparoscopic prostatectomy is the relatively pain-free and trouble-free postoperative course. Patients can be discharged within 2 days, have very little analgesic requirement, and feel well faster. The catheter can be removed in 4 to 7 days. Cancer control appears comparable to that of open surgery, although results are relatively preliminary and are stated in terms of biochemical freedom from disease. The functional results continue to be reported, but in an experienced surgeon's hands, continence appears to recover more quickly and appears to be similar to that achieved after open surgery. Potency can be preserved with nerve sparing. Laparoscopic radical prostatectomy is a procedure that will be more widely practiced in North America as several of the technological limitations are overcome and as surgeons become more experienced with laparoscopic surgery.

Key Words: laparoscopic prostatectomy, postoperative course, surgical technique

Introduction

Radical prostatectomy is well established in the management of localized carcinoma of the prostate. There continues to be debate and controversy over the technique. The laparoscopic approach was pioneered in the United States more than 10 years ago, but was abandoned because of excessive operative time and inexperience with laparoscopic surgery in the urologic community. French urology deserves the credit for re-exploring the potential for this procedure which is now widely practiced following the first procedure in France in late 1997. From a few early reports it was apparent that there was a significant learning curve, but the opportunities for precise anatomical dissection including nerve sparing, reduction in blood loss and a more rapid convalescence deserved further investigation.[1,2] Nevertheless, in 2002, open retropubic radical prostatectomy remains the standard of care. There is a huge experience with open surgery with long term, well-documented outcomes. The procedure is widely and cheaply available in many institutions with well-trained and experienced surgeons. Two Parisian groups have now amassed a combined experience of well over 1000 cases and have reported outcomes to more than 3 years.[3,4]

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Technique

Two approaches are widely practiced. The more commonly performed technique is the transperitoneal "Montsouris" technique. Under general anesthesia in the supine position, the patient is secured to a flat operative table to allow movement into the exaggerated Trendelenburg position. Shoulder straps are preferable to supports to minimize the risk of nerve plexus injury. It is useful to insert a rectal bougie before prepping and draping, especially in the early experience. The anesthetist needs to be familiar with the potential for increased airway pressure and mild hypercarbia. Transfusion is rare, and therefore access for transfusion is not as important as in open procedures.

The surgical procedure consists of distinct segments. First, access is obtained in the usual manner with either a Verees needle trocar or a Hasan trocar at the umbilicus. A disposable 10-12 mm port is preferable. Four more ports are placed, usually in a fan orientation, with two large ports just below umbilicus near the lateral rectus border and two 5 mm ports below and lateral to the anterior superior iliac spines. Alternately, a midline port can be placed suprapubically as opposed to the right-hand 5 mm port. A zone of access has been defined.

The patient is then positioned in the exaggerated Tendelenburg position and the sigmoid colon manipulated up to the pelvic brim. It may be sutured to the abdominal wall. The first incision is made over the vasa and seminal vesicles below the bladder which can be seen because of the sterile Foley catheter. The vasa are divided and the seminal vesicles fully mobilized and Denovieller's fascia incised. The bladder is then filled and an inverted horseshoe incision made around the bladder to enter the retropubic space to see the endopelvic fasciae, which are incised. Dissection is carried along the lateral prostatic fascia, taking care to mobilize the nerves if indicated down to the apex of the prostate and posteriorally until the pedicle is encountered. The dorsal vein complex is then suture ligated with intracorporeal knot tying.

The bladder neck is divided with the harmonic scalpel or bipolar forceps. Care must be taken transecting the posterior bladder neck to make the incision through to Denonvier's fascia and not incise the prostatic parenchyma. It is useful to place one or two sutures in the bladder neck for later identification and manipulation. By raising the seminal vesicles anteriorally, the pedicles can be seen and followed distally the prostatic apex taking care to hug the prostate and avoid the neurovascular bundles. This leaves the prostate attached by the dorsal vein complex and the urethra.

The dorsal vein complex is divided, again with the harmonic scalpel, and the urethra sharply divided at the apex of the prostate, taking care to avoid incising the apical tissue. It is not necessary to place a suture in the urethra as it is readily visible. The prostate is lifted out of the pelvis and placed in the right lower quadrant after incising the rectal urothralus attachments.

The bladder neck does not usually need to be sutured to reduce its diameter, and anastomosis is then performed. This is the most difficult portion of the procedure for urologists who have relatively little experience in intracorporeal knot tying. A continuous suture or automatic knotting device is useful. A sound in the urethra helps to place the sutures, beginning with a posterior knot.

A drain is placed through one of the 5 mm ports and the prostate extracted through the umbilical port site or one of the other 10 mm port sites using a bag.

The alternate approach is to do to the entire procedure retropubically. There is less reported experience, but this may well become more widely practiced as it closely mimics the open procedure with which urologists are familiar. The steps are essentially the same, although the seminal vesicles have to be immobilized from the front, but there is in general less working room.

The re-operation rate initially might approach 10%, but after 20 cases, it should be substantially less than 1%, as should the transfusion rate.

Postoperative care

The most remarkable aspect of laparoscopic prostatectomy is the relatively pain-free and trouble-free post-operative course. Patients can be discharged within 2 days, have very little analgesic requirement, and feel well faster; although this has not been documented by randomized trial, it is certainly the universal clinical impression. Because of the increased intra-abdominal pressure due to insufflation and the anatomic precision of the dissection, blood loss is low and the transfusion rate is substantially less than the usual experience with open surgery. The catheter can be removed in 4 to 7 days.

Outcomes

Cancer control appears comparable to that of open surgery, although results are relatively preliminary

and are stated in terms of biochemical freedom from disease. The functional results continue to be reported, but in an experienced surgeon's hands, continence appears to recover more quickly and appear to be similar to that after open surgery. It is perhaps disappointing that to date urinary continence does not appear better, despite an initial expectation that it would be. As many as 58% of patients are continent at 1 month using the ICS questionnaire; 25% are continent immediately, and approximately 23% are dry at 1 year. As initially recognized, potency can clearly be preserved with nerve sparing. Up to 78% of patients have been reported to be potent with bilateral neurovascular preservation, and half of potent patients are able to have intercourse within a year. There may be less neuropraxia, resulting in an earlier recovery. Positive margins rates are initially 28%, but have decreased to under 15% with undetectable PSA in more than 90% of patients at 2 years. Importantly, no poor recurrences have been reported to my knowledge.

Surgical pointers

Initially, ideal patients are those with glands under 40 cc, who have not had previous abdominal surgery, and who are slim. Afro-Canadians may also not be ideal early subjects because of the potential for a narrow pelvis. Nerve sparing is initially difficult. Insertion of a nasogastric tube and antacid therapy should be considered, particularly in patients with hiatus hernia to minimize post-operative morbidity from reflux esophagitis if the procedure is prolonged in the Trendelenburg position. A mechanical device to support the camera and laparoscope is very helpful. It produces a steadier image, which reduces surgeon fatigue and provides more room around the operating table. If a robotic arm is used for the camera (AESOP™ voice controlled robotic arm by Computer Motion), the reusable metal Hasan may have too much friction. One assistant can usually provide the necessary assistance for the procedure. The learning curve in terms of reducing the operative time and surgeon fatigue is 30-40 cases depending on operator experience. Surgeons should be aware that standing high keeps their arms by their upper body side to reduce shoulder fatigue during the procedures. In this regard, standing stools are useful. It is useful to insert a rectal bougie before prepping and draping, especially in the early experience. It is useful to place one or two sutures in the bladder neck for later identification and manipulation. A continuous suture or automatic knotting device is useful, or a Foley catheter passed into the bladder with the balloon inflated may be helpful to pull the bladder down to the urethral stump during anastomotic suturing.

Costs and productivity

Calculating the cost of a surgical treatment is complex in the Canadian system, but it is clear that a program in laparoscopic prostatectomy increases the costs to an institution, at least initially. Operative times are longer, capital equipment requirements and disposable costs are higher, and there is a substantial loss in productivity for the surgeon and anesthetist. While inpatient stay may reduced, the 3rd to 5th post-operative days are relatively cheap, and it is not simple to transfer cost savings in an institution. It appears that the major beneficiaries are the patient, third party payer, and employers, not the institution. These indirect cost savings are not attributed directly to the surgeon or institution. It appears that following a very significant experience, the loss in productivity will be marginal.

Discussion

I believe that laparoscopic radical prostatectomy is a procedure that will be more widely practiced in North America as several of the technological limitations are overcome and as surgeons become more experienced with the laparoscopic surgery, which is already becoming the standard of care for many other urologic procedures, for example radical nephrectomy. The current limitation of two-dimensional image representation of a multi-dimensional operative field is only overcome by the surgeon's experience with open surgery and a long urologic experience with endoscopic and percutaneous surgery guided by TV images. The four degrees of freedom provided by current urologic laparoscopic instrumentation—rotation, in-out, yaw, and pitch—are limiting. Internal articulation would provide internal yaw and pitch to more closely mimic the surgeon's hand action. This would greatly facilitate intracorporeal knot tying. The anastomosis would be much improved by a stapling device, and efforts are underway to develop these devices. On-line imaging would assist the surgeon to recognize the margins of the prostate and minimize the risk of prostatic incision. Robotics will become more widely available. The current DaVinci™ from Intuitive Surgical and ZEUS™ from Computermotion are expensive and have high operating and maintenance costs that are not readily affordable in the Canadian health care system. Telementoring and

systems for education in laparoscopic surgery are underdeveloped but undoubtedly will improve. Urologists should remember how many open prostatectomies they assisted with before they felt comfortable performing the procedure. Transfusion rates remain 5% to 10% with open surgery, and indirect costs to society are high. Rectal injury rate initially may be 2%-3% with laparoscopic surgery, but should decrease to the same or lower rates than those associated with open surgery. Improvements in technique continue to be presented with open radical prostatectomy, indicating that we have not reached perfection with the standard technique. Suboptimal cancer control rates can be improved upon.

Surgeons beginning a program in laparoscopic prostatectomy should be prepared for a 50% loss of productivity for at least 20 cases, and should be careful to technically prepare not only themselves, but also their team. This preparation should include visits to centres that have wider experience. Patients should understand that the procedure is safe when appropriate care is taken, and that cancer control rates and functional results are as good as, but may not be better than, those associated with open surgery. Blood loss is clearly lower and recovery is faster. □

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