LEARNING THE LESSONS FROM 1000 ROBOT-ASSISTED RADICAL PROSTATECTOMY PROCEDURES
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It has been observed that, unlike those involved in the aviation industry, clinicians are often slow to learn from their mistakes [1]. Having recently completed the 1000th robot-assisted radical prostatectomy (RARP) in one institution, as treatment for clinically significant, localized prostate cancer, we thought it would be useful to share the lessons learned from dealing with problems and complications we have encountered. Our technique has continuously evolved with various refinements along the way.

Robot-assisted radical prostatectomy is becoming the method of choice for the surgical removal of the prostate [2], with a substantial proportion of radical prostatectomies performed this way in the UK in 2011. The wristed instruments, 3D vision and 10x magnification and the robotic cart, which obviates the need for an assistant to hold the camera, facilitate the operation, especially the creation of watertight urethrovesical anastomosis. Since we adopted this technology, our patients have not been troubled by any of the anastomotic troubles postoperatively. Our technique has continuously evolved with various refinements along the way.

Peri-operative problems can and do occur, but these can be avoided with the correct technique and meticulous attention to detail. A well-trained and consistent team of nurses and surgical assistants who have a good grasp of the technology is important. Experienced mentoring in the early cases is important as is prior whole team and individual simulation training.

Patient selection is critical: we have achieved zero mortality over 1000 cases by carefully excluding those with significant cardiopulmonary morbidity from surgery, instead opting for radiotherapy in those patients. Those patients who are overweight and physically unfit undergo an intensive programme of cardiovascular training and dietary manipulation in the 4-6 weeks before surgery [4].

The first operating step is the careful preparation of the patient with adequate padding of vulnerable pressure areas. The steep Trendelenburg position and the overlying da Vinci cart places the patient at significant risk of nerve compression.

Procedure length should be kept to <4 h because the risk of complications including facial swelling and leg compartment syndrome rises significantly after this point. Establishing the pneumoperitoneum with the Veress needle carries a risk of bowel and vascular injury and should be avoided in our opinion. If adhesions are present, once the camera is operative, the remaining five ports can be sequentially introduced with careful division of any adhesions to avoid injury to small or large bowel. If this does occur, it is critical to recognize the problem and repair the injury at the time of surgery, otherwise peritonitis and fistula formation may occur.

Taking down the bladder is usually straightforward, unless an inguinal hernia is present, in which case a segment of the bladder can sometimes prolapse through the hernial orifice. In this situation, the hernia is carefully reduced, without injury to the bladder, and can subsequently be fixed with a non-absorbable stapled mesh. The anterior dissection of the prostate includes removal of the overlying fat, taking care to avoid bleeding from the superficial dorsal vein; this should be diathermied before its division. Dissection of the endopelvic fascia frees the prostate, helps orientation, and allows insertion of a suture to secure the deep dorsal vein. Not all surgeons feel this is necessary, but this step prevents subsequent venous bleeding when the urethra is divided. Care should be taken to avoid including the catheter in this suture, as this will prevent its removal subsequently.

The next step involves opening the bladder anteriorly, precisely at the junction of the bladder neck and prostate. This can readily be identified by retracting the urethral catheter and indenting the bladder neck bilaterally with the robotic arms. Incision into the prostate at this juncture should be avoided. The posterior incision at the apex of the trigone is even more critical. Establishing the correct plane down to the vasa and seminal vesicles results in a sturdy posterior bladder neck; this in turn facilitates its anastomosis to the urethra and avoids incision into the prostate, which may result in a positive surgical margin. Retraction and cranial elevation of the posterior bladder neck allows easier identification of the underlying planes.

The posterior dissection involves division of the vasa and mobilization of the seminal vesicles. Careful haemostasis without excessive use of diathermy is critical as a haematoma beneath the trigone can be troublesome postoperatively. The posterior prostate is then carefully separated from the rectum. Injury to the rectum can be avoided by keeping close to the prostate. If suspected, a ‘bubble test’ with the pelvis filled with water and air insufflated into the rectum should be performed. If rectal injury does occur, a two layer repair is required.
together with the use of antibiotics postoperatively. In our hands, in three cases, this manoeuvre resolved the problem without further incident.

The prostate is placed in a bag after dissection of the neurovascular bundles with metal or Hem-o-Lok clips (Teleflex Medical, Research Triangle Park, NC, USA). A decision is made preoperatively on the degree of nerve sparing required, depending on clinical stage, Gleason grade, PSA level and MRI. Careful apical dissection preserves urethral length and minimizes positive margins.

At this point, a careful check is made for bleeding from the deep dorsal vein and neurovascular bundles and judicious diathermy or further clips applied. Instillation of a fibrin agent, such as Evicel® (Ethicon, Johnson and Johnson, Somerville, NJ, USA), at this point reduces the risk of a pelvic haematoma in the prostatic bed [5].

The creation of anastomosis is one of the most critical parts of the operation. The use of the so-called posterior 'Rocco' suture facilitates the anastomosis significantly. It also helps to close the potential space posteriorly; this is the location in which a haematoma may form. A van Velthoven continuous vesico-urethral anastomosis is then created with two sutures tied together or more recently using the V-Lok (Covidien, Mansfield, MA, USA) or Quill (Angiotech, Vancouver, Canada) barbed absorbable sutures. If there is leakage when the bladder is filled to 150 mL, either additional sutures can be placed or the anastomosis refashioned. It should be remembered that the ureteric oriﬁ ces can be very close and that it is possible to include them in the anastomosis. If ureteric obstruction does occur, ureteric colic-type pain often follows and insertion of a nephrostomy and antegrade stenting may be necessary.

We have performed pelvic lymphadenectomy only in those with d’Amico high risk disease. Care is needed to avoid injury to the iliac vessels and obturator nerves at this stage. After insertion of a drain through the fourth arm port, the other ports are removed under direct vision. In particular, attention is required to exclude bleeding from the inferior epigastric arteries, as this may result in significant postoperative bleeding, haematoma formation and sometimes the need to return to theatre. In our hands, on the few occasions when signiﬁ cant bleeding has occurred, we have managed to resolve the situation by replacing the ports and redeploying the robot to secure the bleeding vessels [6].

Most patients recover quickly and can be discharged within 48 h with the use of a specific postoperative protocol. Problems usually occur early (<24 h) and there should be a low threshold for CT imaging if complications are suspected. Removing the urethral catheter at 7 days with a cystogram only for speciﬁ c cases has worked well.

In conclusion, provided that it is meticulously performed, RARP is a safe and effective way of eradicating clinically signiﬁ cant localized prostate cancer. We hope that the description here of the lessons we have learned during our ﬁ rst 1000 cases undertaken in a single institution, will help others to avoid the possible pitfalls for practitioners of robot-assisted laparoscopic surgery and their patients [7].

CONFLICT OF INTEREST

None declared.

REFERENCES

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