Laparoscopic radical prostatectomy: single centre experience after 5 years

Objective To summarise our experience of laparoscopic radical prostatectomy in a single centre in Hong Kong over 5 years.

Design Retrospective study.

Setting Urology Division, Department of Surgery, Tuen Mun Hospital, Hong Kong.

Patients A total of 87 patients who underwent laparoscopic radical prostatectomy from March 2002 to May 2007.

Main outcome measures Peri-operative data and follow-up information.

Results The operative procedure used entailed Montsouris technique and its modifications, including the latest method involving the extraperitoneal descending technique. In all, 87 patients underwent the operation; in two, the procedure was converted to open surgery. Peri-operative parameters which showed improvement included: operating time, blood loss, resort to blood transfusions, and the complication rate. There was no operation-related mortality. In organ-confined disease, a clear surgical margin was achieved in 93% of the patients, but in those whose disease was not organ-confined, the positive margin rate was 87%. Among patients with organ-confined disease, 13% had evidence of biochemical recurrence. Hormonal therapy was started in five patients, none of whom died during the follow-up period (mean, 24 months). Continence recovered in 69% of the patients by 6 months and in 92% by 12 months post-surgery. Assessment of erectile function before and after the surgery was problematic and estimated to be 20% among patients having the nerve-sparing procedure performed.

Conclusion Although Hong Kong has a relatively low incidence for prostate cancer, it was possible to develop laparoscopic radical prostatectomy with acceptable early results. Further follow-up is warranted before formulating definitive conclusions about this procedure.

Introduction

Radical prostatectomy is the gold-standard treatment of clinically organ-confined cancer of the prostate. With the development of laparoscopic techniques, the feasibility of laparoscopic radical prostatectomy was first reported in 1997 in the United States, and was soon shown to be both reproducible and practical in France. Since then, many urologists adopted the technique and it was subsequently reported that the resulting oncological control and functional recovery were comparable to those of open surgery performed in many high-volume centres in the world. However, it is also well known that this form of laparoscopic surgery is technically demanding and entails a significant learning curve.

The incidence of prostate cancer is lower among Chinese and other Asian populations than in the West, although it is evident that in the local population both its incidence and mortality are increasing. Moreover, owing to the ageing local population, Hong Kong urologists can expect to see more patients with this cancer. We report here the development of the laparoscopic radical prostatectomy programme, and adoption of this technique as the preferred surgical option for patients with prostate cancer in the Tuen Mun Hospital, which is a regional referral centre serving a population of one million.
Methods
From March 2002 to May 2007, 87 patients underwent laparoscopic radical prostatectomy. Intra-operative, early postoperative, and follow-up data were collected prospectively. In Tuen Mun Hospital, patients diagnosed to have organ-confined prostate cancer with more than 10 years’ life expectancy were offered radical surgery as the treatment of choice. The laparoscopic option was our preferred approach, with the following exclusion criteria: patient preference for other surgical approaches, eg open surgery, post-radiotherapy or prior pelvic surgery. Patients with previous hernia repair were not precluded from the laparoscopic approach.

Surgical techniques
Initially, we adopted the ‘classical’ Montsouris technique, as described by Guillonneau et al,10 because the transperitoneal approach provides a bigger working space and easier recognition of anatomical structures. This was an important advantage, especially for novice surgeons. Besides, the Montsouris technique was the most popular and well-described at the time Tuen Mun Hospital’s laparoscopic prostatectomy programme started. As experience was gained, we skipped the initial posterior dissection of the vas deferens and seminal vesicals. Instead, the first procedure was to dissect the bladder off the anterior abdominal wall and to access the retropubic space of Retzius,11 which was very similar to the tactic adopted by many surgeons using the robotic-assisted approach.12 This strategy spared the need to perform the posterior dissection, which could be very difficult in obese patients and result in inadvertent large bowel damage. By contrast, the transperitoneal approach still offered the advantage of a larger working space. Later, we readopted the extraperitoneal approach, as described by Bollens et al.13 This was to avoid manipulation, and so reduce injury to intraperitoneal organs and the ureter. Moreover, any postoperative urine leakage would remain confined to the extraperitoneal space and hence have little consequence.14 Nerve-sparing dissection was attempted for patients reporting intact sexual function before the surgery. The neurovascular bundle on the contralateral side of biopsied prostate lobe was selected for preservation. Anastomosis was completed in an interrupted manner using intracorporeal suturing.

Pelvic lymphadenectomy was performed for patients at high risk of lymph node metastasis (clinically T2 disease, prostate-specific antigen [PSA] >10 µg/L, Gleason score ≥4). If indicated, laparoscopic lymphadenectomy would be performed before undertaking prostatectomy.

Results
From March 2002 to May 2007, 87 patients underwent laparoscopic radical prostatectomy with indications and selection criteria as stated above. In two patients, the surgery was converted to the open type, one because of scarring and adhesions due to previous mesh repair for an inguinal hernia, and the other owing to the intra-operative discovery of rectal injury and difficulty with laparoscopic repair. The mean age of the patients was 65 (range, 51-75) years. All the patients were clinically staged to have localised disease before the surgery, and their preoperative staging is summarised in Table 1. In all, 86 patients had PSA levels checked before surgery; the mean value was 9.4 µg/L (range, 0.6-35.6 µg/L). Most of the patients had preoperative Gleason scores of 3+3 (Table 2).
Operative and early postoperative results

Operating time
The mean operating time including that for bilateral pelvic lymph node dissection was 238 min (range, 140–480 min). The trend for operating times is shown in Figure 1. The classical Montsouris technique was used for the initial 25 cases, and the modified technique with dissection of the bladder from the anterior abdominal thereafter. Following completion of 40 cases, the operation was divided into two parts for two different surgeons. This allowed training opportunities for more surgeons, without overtly prolonging the operating time. After 50 cases, the extraperitoneal technique was always adopted except for very large prostates (>80 g). After completing 20 cases, and despite minor modification of techniques introduced later, we were able to achieve a relatively stable operating time of approximately 200 minutes. These changes in surgical technique did not appear to have a great impact in terms of outcomes, such as operating times (Fig 1) and other parameters like complication rates or surgical margin status. However, our series was small, thus, precluding statistical testing. Nevertheless, we were of the opinion that the extraperitoneal approach confers advantages in terms of minimising the need to retract the bowel (reducing the potential danger for bowel injury), simplifying the procedure (by skipping initial dissection of the bladder from the abdominal wall), and allowing easier management of postoperative conditions like prolonged urinary leakage. However, a reduction in the operating time was not demonstrated.

Blood loss and transfusion
The mean estimated blood loss was 568 mL (range, 100–4000 mL). The extent of blood loss gradually decreased with increased experience of the surgical team (Fig 2). Of the 85 patients, 21 received blood transfusions, and resort to transfusion also revealed a similar trend (Fig 2).

Complications
One patient endured rectal injury that was noticed during the procedure, which was then converted to open for repair, to overcome resulting technical difficulties anticipated for laparoscopic closure. One patient had rectal injury with delayed presentation (14 days after the surgery), in the form of faecal matter passed in urine after removal of foley. A York-Mason procedure was performed 2 months after the surgery, and the fistula healed uneventfully. One patient developed anuria on postoperative day 1;

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**TABLE 2. Preoperative Gleason scores**

<table>
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<th>Gleason scores</th>
<th>No. of patients</th>
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</tr>
<tr>
<td>2+2</td>
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<td>3+5</td>
<td>2</td>
</tr>
<tr>
<td>4+3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>87</td>
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**FIG 1. Trend in operating time according to case number**
investigation suggested bilateral ureteric obstruction. Open exploration revealed acute kinking of the ureters due to distortion of bladder. Vesico-urethral reanastomoses facilitated subsequent recovery. Two patients had prolonged urine leakage from pelvic drain (>2 weeks) and were managed conservatively. Another patient was readmitted 2 weeks after surgery with intestinal obstruction. Exploratory laparotomy revealed an incarcerated hernia with a small bowel loop inside one of the 10-mm laparoscopic port sites. This was treated by resection and reanastomosis of relevant small bowel segments. In all, two patients formed strictures. One of them was the individual enduring the rectal injury; he underwent cystoscopic dilatation of the stricture 1 month after the surgery. The other patient had a urethral meatal stricture and was managed by meatoplasty (Table 3).

Follow-up results
The mean follow-up duration was 24 (range, 3-60) months; only one patient defaulted follow-up (18 months post-surgery).

Oncological control
Of the 85 patients, 18 (21%) were reported to have disease that was not organ-confined on final pathological study; 19 (22%) of the prostatectomy specimens were determined to have positive (involved) surgical margins. For patients with organ-confined disease, the positive surgical margin rate was 7%. On the contrary, patients with pathological features suggestive of disease that was not organ-confined (ie had capsular penetration, seminal vesical involvement or more extensive invasion), a high percentage (87%) showed a positive surgical margin. For patients with organ-confined disease, a gradual decrease in positive surgical margin rates was observed over the years, but this trend was not present in those with more extensive disease (Fig 3).

On further analysis, the 19 patients with positive surgical margins had mean preoperative serum PSA level of 14 µg/L (range, 1-35 µg/L), which was higher than the mean preoperative level of 9 µg/L in the series as a whole. The location and incidence of positive surgical margins was as follows: apex 13, peripheral 8, bladder 5, anterior 5, and posterior 1. Seven patients had positive margins at more than one location.

Of the 78 patients followed up for more than 1 year, 20 (26%) had biochemical evidence of recurrence, defined as two consecutive PSA levels exceeding 0.2 µg/L as suggested by Freedland et al. Among the 78 patients, 63 had organ-confined disease; of the latter patients, eight (8/63, 13%) had biochemical recurrence. Of the 78 patients, seven received further treatment mainly because of symptoms, five received hormonal therapy, and two had radiotherapy to the prostate bed. To date, none of the patients had died during follow-up.

Continence recovery
Of the 85 patients followed up for more than 1 year,
78 were assessed with regard to the recovery of continence after the surgery; 54 (69%) reported early recovery (≤6 months after surgery), 72 (92%) by 12 months. Continence was defined as not needing to use a pad.

Erectile function

Recovery of erectile function was difficult to assess in this group of patients, as Hong Kong Chinese men are not open about discussion of sexual function, especially in the clinic setting where their malignant disease was being managed. Many patients who reported having no sexual function before the surgery requested treatment for erectile dysfunction after the procedure. Only 15 patients had preoperative normal erectile function according to the medical records, and had a unilateral nerve-sparing procedure during surgery. Altogether, 33% of this group reported some degree of recovery; three (20%) achieved successful penetrative intercourse after the operation, one unaided, one used an oral phosphodiesterase inhibitor, and one an intra-urethral prostaglandin. Two more patients reported recovery of erections but had not had intercourse since the surgery. Of interest, two patients not undergoing the nerve-sparing procedure reported recovery of erectile function and could have unaided penetrative intercourse.

Discussion

Since its description by Schuessler et al in 1997,1 laparoscopic radical prostatectomy was rapidly accepted worldwide. The reasons are many-folded. Patients endure less wound pain and blood loss, enjoy quicker recovery and less catheter time, and also appear more satisfied. For surgeons, the 10x to 15x magnification offered by laparoscopic vision enables them to see the field much more clearly, allowing more precise dissection and anastomosis. In addition, pneumoperitoneum reduces the venous bleeding, decreasing the blood loss and further improving the surgical field vision. Trainee surgeons benefit from the laparoscopic approach by enjoying the same view as the chief surgeon, a privilege that was unimaginable in the past.

However, this procedure is technically demanding and associated with a long learning period. The usual quoted figure for the necessary learning curve was 50 cases,4 but later it was evident the figure might be up to 300 cases.7 In places like Hong Kong where there is a relatively low incidence for prostate cancer, there are inevitable difficulties for urology centres to offer such experience.

We tried to overcome this problem by facilitating learning experience via overseas training centres, attending workshops, following the standardised surgical steps and through intense skills training. In our experience, dry laboratory training was especially beneficial for shortening the time required for vesico-urethral anastomosis, one of the most time-consuming surgical steps.16-18

Notwithstanding our relatively modest series, we achieved a gradual reduction in operating times, complications, blood loss, and resort to transfusions. Apart from such intra-operative information indicative of improvement along the learning curve, falling rates of positive surgical margins (associated with higher rates of biochemical, local, and systemic progress19-21) is an even stronger indicator of the improving quality of surgery.21 The positive surgical margin rate in the present series, although relatively small, was comparable to most reported larger series. For example, the Memorial Sloan-Kettering Cancer Centre reported positive margin rates for laparoscopic radical prostatectomy to be 11 to 26% overall, and 6 to 8% for organ-confined disease.24 Gradual improvement in terms of reduction in positive surgical margin rates was also noted in patients with pathology showing organ-confined disease. However, for advanced disease our positive margin rate was 87%, which was higher than in other high-volume centres. One possible explanation was that early results from our centre reflected the high rates prevailing early on in the learning curve. Another contributory factor could be the fact that the laparoscopic approach was adopted as first-line surgery for all patients considered for radical treatment. In which case, even patients at high risk (with high serum PSA levels, advanced clinical stage and Gleason biopsy staging25,26) were not excluded. After all, our series of patients had relatively high preoperative serum PSA levels (14 vs 9 µg/L). Based on this observation, we suggest that for Asian centres with smaller caseloads (compared to the specialised centres in western countries), more stringent selection criteria should be adopted, especially at the beginning of the programme. Additional imaging studies (eg magnetic resonance imaging) may also be helpful in differentiating tumours with unclear local extensiveness.

Concerning continence recovery, our patients showed satisfactory recovery of function by 6 months and 1 year following surgery, with results comparable to other centres in the world. The follow-up of erectile function recovery was problematic in this locality. A more focused study on this aspect may be necessary to answer questions on sexual function recovery in this group of patients.

Conclusion

Although Hong Kong has a relatively low incidence for prostate cancer, laparoscopic radical prostatectomy could be developed to deal with early-
stage adenocarcinoma of the prostate, despite our relatively low caseload. Improvements in terms of operative and peri-operative parameters were noted in our series. The oncological control achieved for early disease was comparable to that in larger centres in the West. Continence function was well preserved in our patients. Continued follow-up of our patients is necessary, before more definitive conclusions can be made, especially with respect to the oncological efficacy of the procedure.

References