ORIGINAL ARTICLE

Laparoscopic radical prostatectomy: single centre experience after 5 years

Steven WH Chan 陳偉希
KM Lam 林建文
SC Kwok 郭善淳
C Yu 俞 昌
WH Au 歐永恆
YP Yung 翁義平
Ida SF Mah 馬素芬
Peggy SK Chu 朱秀群
CW Man 文志衛

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.

Key words
Laparoscopy; Postoperative complications; Prostatectomy; Prostatic neoplasms; Treatment outcome

Hong Kong Med J 2008;14:192-7

Division of Urology, Department of Surgery, Tuen Mun Hospital, Tuen Mun, Hong Kong
SWH Chan, MB, BS, FRCS
KM Lam,[i] MB, ChB, FRCS
SC Kwok, MB, BS, FRCS
C Yu, MB, ChB, FRCS
WH Au,[ii] MB, BS, FRCS
YP Yung,[iii] MB, ChB, FRCS
ISF Mah,[iv] MB, BS, FRCS
PSK Chu, MB, BS, FRCS
CW Man, MB, BS, FRCS

Current addresses: [i] Division of Urology, Department of Surgery, Caritas Medical Centre, Hong Kong; [ii] Division of Urology, University Surgical Unit, Queen Mary Hospital, Hong Kong; [iii] Private Urologist, Baptist Hospital, Hong Kong; [iv] Private Urologist, Hong Kong Urology Centre, Hong Kong

Correspondence to: Dr SWH Chan
E-mail: stevewh@gmail.com

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,[1] and was soon shown to be both reproducible and practical in France.[2] 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.[3-6] However, it is also well known that this form of laparoscopic surgery is technically demanding and entails a significant learning curve.[7,8]

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.[9] 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 intra-corporeal 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).

腹腔鏡前列腺癌根治術：一所中心的五年經驗總結

目的 總結一所中心進行腹腔鏡前列腺癌根治術的五年經驗。

設計 回顧研究。

安排 香港屯門醫院外科部泌尿中心。

患者 2002年3月至2007年5月期間，共87位進行腹腔鏡前列腺癌根治術的病人。

主要結果測量 圍手術期的數據及隨訪資料。

結果 手術採用Montsouris技術及其改良版，包括最先進的腹膜外下降技術。87位接受手術的病人中，兩位改為開放式手術。圍手術期數據顯示手術時間、失血量、輸血、及併發症發生率均有改善，也沒有與手術有關的死亡。局限性前列腺癌患者中，有93%患者的手術切緣清晰。但在非局限性前列腺癌患者中，87%手術切緣屬陽性。局限性前列腺癌患者中，13%的病人有生化學數據顯示有復發。其中7位接受激素治療，在平均24個月的隨訪期內，沒有病人死亡。術後6個月及12個月，分別有69%和92%患者可完全控尿。術前或術後量度病人的勃起功能有困難，估計在接受保留神經術的患者中，有20%恢復性功能。

結論 雖然本港的前列腺癌率相對較低，但仍可發展腹腔鏡前列腺癌根治術，而且早期結果令人滿意。在作出明確的結論前，須作進一步的觀察跟進。

TABLE 1. Preoperative staging

Stage	Patients No. (%)*
T1a	14 (16)
T1b	9 (10)
T1c	55 (63)
T2a	6 (7)
T2b	3 (3)
Total	87

* Because of rounding, the percentages do not total 100

TABLE 2. Preoperative Gleason scores

Gleason scores	No. of patients
1+1	1
2+2	2
2+3	2
3+2	2
3+3	70
3+4	7
3+5	2
4+3	1
Total	87

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;

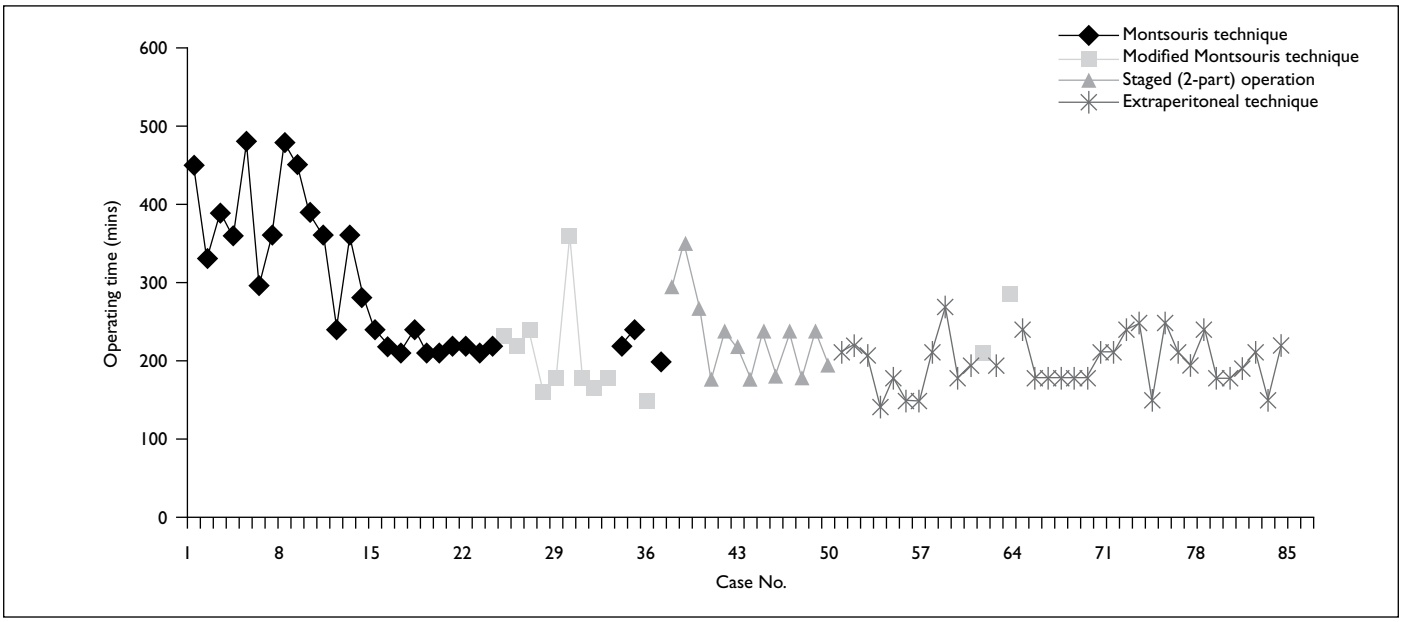

FIG 1. Trend in operating time according to case number

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).

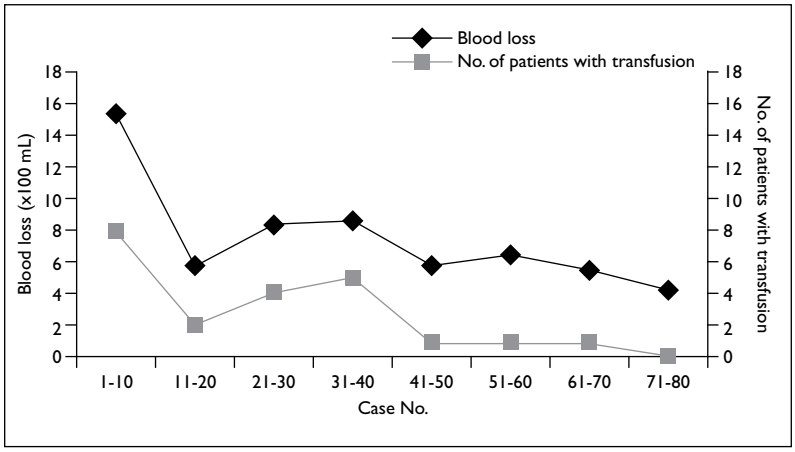

FIG 2. Blood loss and blood transfusion trends according to case number

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).

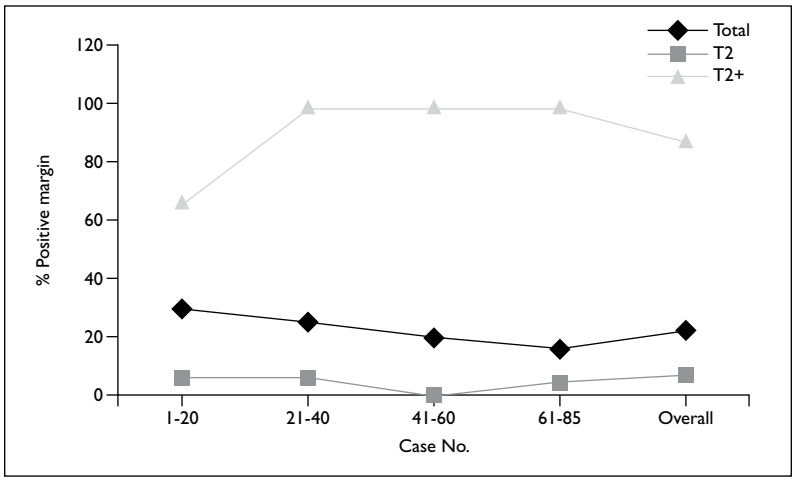

FIG 3. Surgical margin status according to case number

TABLE 3. Summary of complications

Cases 1-40	Cases 41-85
Unrecognised rectal injury with delayed presentation	Rectal injury with open conversion, later developed anastomotic stricture; underwent dilatation
Bilateral ureteric obstruction	Meatal stenosis
Incarcerated incisional hernia	
Prolonged pelvic drain output (2 cases)	

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.[15] 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,[8] 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]

Not withstanding 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 progress[19-22]) is an even stronger indicator of the improving quality of surgery.[23] 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 staging[25,26]) 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

1. Schuessler WW, Schulam PG, Clayman RV, Kavoussi LR. Laparoscopic radical prostatectomy: initial short-term experience. Urology 1997;50:854-7.
2. Guillonneau B, Cathelineau X, Barret E, Rozet F, Vallancien G. Laparoscopic radical prostatectomy. Preliminary evaluation after 28 interventions [in French]. Presse Med 1998;27:1570-4.
3. Türk I, Deger S, Winkelmann B, Schönberger B, Loening SA. Laparoscopic radical prostatectomy. Technical aspects and experience with 125 cases. Eur Urol 2001;40:46-53.
4. Anastasiadis AG, Salomon L, Katz R, Hoznek A, Chopin D, Abbou CC. Radical retropubic versus laparoscopic prostatectomy: a prospective comparison of functional outcome. Urology 2003;62:292-7.
5. Rassweiler J, Schulze M, Teber D, Seemann O, Frede T. Laparoscopic radical prostatectomy: functional and oncological outcomes. Curr Opin Urol 2004;14:75-82.
6. Trabulsi EJ, Guillonneau B. Laparoscopic radical prostatectomy. J Urol 2005;173:1072-9.
7. Guillonneau B, Rozet F, Cathelineau X, et al. Perioperative complications of laparoscopic radical prostatectomy: the Montsouris 3-year experience. J Urol 2002;167:51-6.
8. Guillonneau B, Vallancien G. Laparoscopic radical prostatectomy: the Montsouris experience. J Urol 2000;163:418-22.
9. Fast stats for prostate cancer 2004. Hospital Authority, Hong Kong Cancer Registry website: http://www3.ha.org.hk/cancereg/prostate.pdf. Accessed 29 Jun 2007.
10. Guillonneau B, Rozet F, Barret E, Cathelineau X, Vallancien G. Laparoscopic radical prostatectomy: assessment after 240 procedures. Urol Clin North Am 2001;28:189-202.
11. Chan SW. Transperitoneal laparoscopic radical prostatectomy. The Tuen Mun Hospital experience. Surgical Practice 2006;10:65-9.
12. Menon M, Tewari A; Vattikuti Institute Prostatectomy Team. Robotic radical prostatectomy and the Vattikuti Urology Institute technique: an interim analysis of results and technical points. Urology 2003;61(4 Suppl 1):15S-20S.
13. Bollens R, Vanden Bossche M, Roumeguere T, et al. Extraperitoneal laparoscopic radical prostatectomy. Results after 50 cases. Eur Urol 2001;40:65-9.
14. Rozet F, Galiano M, Cathelineau X, Barret E, Cathala N, Vallancien G. Extraperitoneal laparoscopic radical prostatectomy: a prospective evaluation of 600 cases. J Urol 2005;174:908-11.
15. Freedland SJ, Sutter ME, Dorey F, Aronson WJ. Defining the ideal cutpoint for determining PSA recurrence after radical prostatectomy. Prostate-specific antigen. Urology 2003;61:365-9.
16. Traxer O, Gettman MT, Napper CA, et al. The impact of intense laparoscopic skills training on the operative performance of urology residents. J Urol 2001;166:1658-61.
17. Poulakis V, Dillenburg W, Moeckel M, et al. Laparoscopic radical prostatectomy: prospective evaluation of the learning curve. Eur Urol 2005;47:167-75.
18. Katz R, Nadu A, Olsson LE, et al. A simplified 5-step model for training laparoscopic urethrovesical anastomosis. J Urol 2003;169:2041-4.
19. Catalona WJ, Smith DS. 5-year tumor recurrence rates after anatomical radical retropubic prostatectomy for prostate cancer. J Urol 1994;152:1837-42.
20. Stamey TA, McNeal JE, Yemoto CM, Sigal BM, Johnstone IM. Biological determinants of cancer progression in men with prostate cancer. JAMA 1999;281:1395-400.
21. Kattan MW, Wheeler TM, Scardino PT. Postoperative nomogram for disease recurrence after radical prostatectomy for prostate cancer. J Clin Oncol 1999;17:1499-507.
22. Epstein JI. Incidence and significance of positive margins in radical prostatectomy specimens. Urol Clin North Am 1996;23:651-63.
23. Touijer K, Kuroiwa K, Vickers A, et al. Impact of a multidisciplinary continuous quality improvement program on the positive surgical margin rate after laparoscopic radical prostatectomy. Eur Urol 2006;49:853-8.
24. Touijer K, Guillonneau B. Laparoscopic radical prostatectomy: a critical analysis of surgical quality. Eur Urol 2006;49:625-32.
25. Cheng L, Slezak J, Bergstralh EJ, Myers RP, Zincke H, Bostwick DG. Preoperative prediction of surgical margin status in patients with prostate cancer treated by radical prostatectomy. J Clin Oncol 2000;18:2862-8.
26. Sofer M, Hamilton-Nelson KL, Schlesselman JJ, Soloway MS. Risk of positive margins and biochemical recurrence in relation to nerve-sparing radical prostatectomy. J Clin Oncol 2002;20:1853-8.