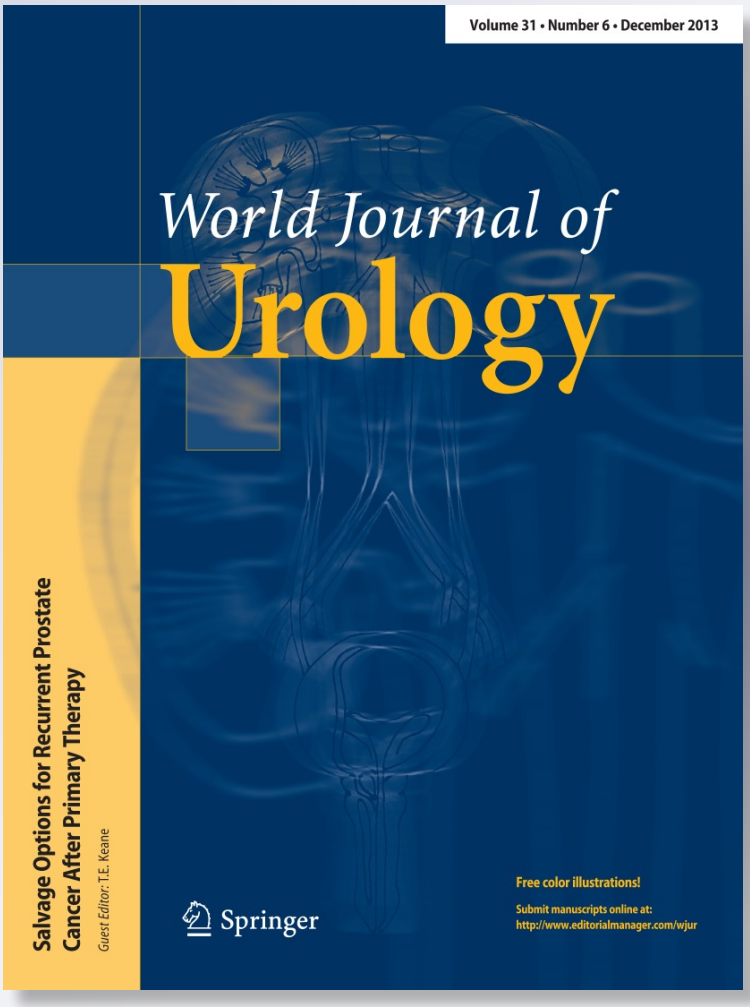
Laparoscopic versus open bilateral intrafascial nerve-sparing radical prostatectomy after TUR-P for incidental prostate cancer: surgical outcomes and effect on postoperative urinary continence and sexual potency

Christopher Springer, Antonino Inferrera, Giovannalberto Pini, Nasreldin Mohammed, et al.

World Journal of Urology

ISSN 0724-4983
Volume 31
Number 6

World J Urol (2013) 31:1505-1510
DOI 10.1007/s00345-013-1036-0



Springer

World J Urol (2013) 31:1505–1510
DOI 10.1007/s00345-013-1036-0

ORIGINAL ARTICLE

Laparoscopic versus open bilateral intrafascial nerve-sparing radical prostatectomy after TUR-P for incidental prostate cancer: surgical outcomes and effect on postoperative urinary continence and sexual potency

Christopher Springer · Antonino Inferrera · Giovannalberto Pini · Nasreldin Mohammed · Paolo Fornara · Francesco Greco

Received: 9 November 2012 / Accepted: 29 January 2013 / Published online: 12 February 2013

Abstract
Objective To evaluate the surgical and functional outcomes in nerve-sparing laparoscopic radical prostatectomy (nsLRPT) and nerve-sparing retropubic radical prostatectomy (nsRRPT) after TUR-P for incidental prostate cancer.
Materials and methods Between January 2003 and August 2011, 125 nsLRPT and 128 nsRRPT for incidental prostate cancer diagnosed after TUR-P were performed at our clinic. Demographic data, peri- and postoperative measurements and functional outcomes were compared.
Results The mean operative time was 153.1 ± 35.4 min for nsLRPT and 122.5 ± 67.5 min for nsRRPT ($p = 0.03$). The mean catheterization time was 8 ± 1 days in the laparoscopic group and 11 ± 2 days in the open group ($p = 0.02$). Also, the length of hospitalization presents statistical significant difference in the two groups. Positive margins were detected in 2.4 and 4.7 % of patients with pT2c tumours in the laparoscopic and open groups, respectively ($p = 0.09$). At a mean follow-up of 26.9 ± 9.3 months for the nsLRPT group and of 27.8 ± 9.7 months for the nsRRPT group, all patients were alive with no evidence of tumour recurrence. Twelve months postoperatively, complete continence was reported in 96.8 % of patients who underwent an nsLRPT and in 89.4 % of patients in the nsRRPT group ($p = 0.02$). At that time, 74.4 % of patients in the nsLRPT group and 53.1 % in the nsRRPT group reported the ability to engage in sexual intercourse ($p = 0.0004$).
Conclusion nsLRPT after TUR-P, performed by expert surgeons, results to be a safe procedure with excellent functional outcomes with regard to the urinary continence and sexual potency.

Keywords Bilateral intrafascial nerve-sparing radical prostatectomy · Incidental prostate cancer · Laparoscopy · Transurethral prostate resection · Outcomes

Introduction

Currently, radical prostatectomy (RP) is the only surgical treatment for localized prostate cancer that has shown a cancer-specific survival benefit when compared with conservative management [1].

In the last decade, laparoscopic radical prostatectomy has been increasingly used for the surgical treatment of prostate cancer (PCA), and it is now considered a well-established alternative to open surgery [2]. Furthermore, LRP has been demonstrated to reduce the surgical trauma for the patient compared to open surgery [3].

Incidental cancer of the prostate is found in 3–16 % of transurethral resection of the prostate (TURP) specimens [4].

It has been reported that RP after previous prostate surgery can be challenging [4–7]. In literature, there are only few reports regarding the nerve-sparing open radical prostatectomy (nsRRPT) in patients previously subjected to prostatic surgery for benign prostate hyperplasia (BPH) [8] but no study regarding the laparoscopic bilateral nerve-sparing radical prostatectomy after TUR-P are actually available.

C. Springer · A. Inferrera · G. Pini · N. Mohammed · P. Fornara · F. Greco (✉)
Department of Urology and Kidney Transplantation, Clinic of Urology, Martin-Luther-University, Ernst- Grube- Str. 40, 06120 Halle, Saale, Germany
e-mail: francesco_greco@ymail.com; francesco.greco@uk-halle.de

The aim of our study was to investigate the effect of extraperitoneal laparoscopic bilateral nerve-sparing radical prostatectomies (nsLRPT) versus nsRRPT on the surgical outcomes so as on urinary continence and sexual potency in patients previously treated with TUR-P.

Materials and methods

This was a retrospective single-centre study including 253 consecutive bilateral nerve-sparing radical prostatectomies after TUR-P, performed between January 2003 and August 2011. One hundred twenty-five consecutive patients underwent an nsLRPT, and 128 consecutive patients underwent an nsRRPT. All patients were informed about other possible therapies for incidental PCA (active surveillance, brachytherapy, HIFU and external beam radiation), and the choice between nsLRPT and nsRRPT was based on a joint decision by the patients and physicians.

All patients were theoretically suitable for the other surgical approach. There was no attempt to randomize patients, and this represents the main limitation of this study. Our surgical technique to perform bilateral nerve-sparing radical prostatectomy was previously described [2].

Shortly, after dissection of the bladder neck, the periprostatic fascia including the neurovascular bundles is mobilized and dissection is performed posteriorly behind the bladder neck, and the seminal vesicles and the ductus deferens are identified and dissected.

The Denonvilliers' fascia was stripped from the prostatic capsule, and the prostatic pedicles were clipped and dissected. No coagulation or ultrasound dissector was used during this step.

Inclusion criteria to perform a bilateral nerve-sparing radical prostatectomy were as follows: PSA <10, Gleason ≤ 7 and only two positive of at least 12 biopsy cores.

Each prostatectomy specimen was examined by two uro-pathologists at our institution.

Tumour staging was assigned according to the 2002 American Joint Committee on Cancer TNM staging system [9], and the differentiation was assigned according to the Gleason scheme. Positive surgical margin (PSM) was defined as the tumour extending to the inked surface of specimen, and in areas without a definite identifiable capsule, we followed the definition previously described by Rosen et al. [10, 11].

All complications occurring ≤ 30 days after surgery were recorded and defined according to the Dindo modification of the Clavien system [12].

Surgical and functional outcomes were compared. Urinary continence and erectile function at the follow-up were evaluated using the International Prostate Symptom Score (IPSS), the International Consultation of Incontinence Questionnaire-Urinary Incontinence (ICIQ-UI) short-form instrument and the IIEF-5, respectively. Questionnaires were self-completed before surgery and at the postoperative follow-up. All patients reporting the need of no pad and the absence of urinary incontinence episodes were defined as continent. All patients with an IIEF-5 of >22 were defined as potent [13]. No single patient underwent nerve-sparing RP within the first 4 months after TUR-P, in order to diminish the periprostatic inflammation due to the first intervention.

All surgical procedures were performed by two surgeons (F.G. and P.F.) who had completed at least 70 nsLRPTs and nsRRPTs and at least 200 laparoscopic and open radical prostatectomies each before the beginning of the study, thus reducing the learning curve effect. Each patient underwent a cystography on the 7th postoperative day to evaluate the urethral anastomosis for leakage.

Follow-up was calculated from the date of surgery to the date of the most recent documented examination. In all patients, a physical examination and a PSA measurement were performed at 3, 6 and 12 months postoperatively, and every 6 months thereafter until 3 years.

Data were expressed as mean $\pm$ standard deviation (SD), and statistical significance was accepted at $p < 0.05$. Statistical analysis was performed using SigmaPlot® software version 13.0 (SPSS Inc., Chicago, IL, USA) and Graphpad Prism 5 (Graphpad Software, CA, USA).

Fisher's exact test and the Pearson's chi-square test were applied to evaluate statistical between-group differences in pathological stages and functional outcomes (continence and potency), respectively.

Results

Baseline characteristics

The baseline characteristics of the patients are summarized in Table 1.

The final analysis included 253 patients in both groups, with similar data for age (laparoscopy: 56.8 ± 6.7 years; open surgery: 57.2 ± 7.4 years, $p = 0.12$), mean preoperative prostate specific antigen (laparoscopy: 3.2 ± 1.4 ng/ml; open surgery: 3.1 ± 1.7 ng/ml) and tumour's characteristics (clinical stage and Gleason score).

Preoperatively, the mean IIEF-5 was 22.5 ± 2.3 and 22.9 ± 2.6 in the laparoscopic and open group, respectively ($p = 0.15$), and the mean preoperative IPSS was 10.6 ± 4.2 and 11.9 ± 5.7 in both groups, respectively ($p = 0.12$).

Intra- and postoperative outcomes

The mean operative time was 153.1 ± 35.4 min for nsLRPT and 122.5 ± 67.5 min for nsRRPT ($p = 0.03$).

Table 1 Preoperative data

	nsLRPT ($n = 125$)	nsRRPT ($n = 128$)	p value
Mean age (years)	56.8 ± 6.7	57.2 ± 7.4	0.12
Body mass index kg/m^2	27.7 ± 3.8	28.3 ± 2.6	0.08
PSA level (ng/ml before TUR-P)	3.2 ± 1.4	3.1 ± 1.7	0.19
Clinical stage			
T1a	74 (59.2 %)	78 (60.9 %)	0.17
T1b	51 (40.8 %)	50 (39.1 %)	0.11
Preoperative Gleason score			
Patients (%)			
5–6	92 (73.6 %)	96 (75 %)	0.21
7	33 (26.4 %)	32 (25 %)	0.19
8–10	0	0	–
Mean IIEF-5 I	22.5 ± 2.3	22.9 ± 2.6	0.15
Mean IPSS	10.6 ± 4.2	11.9 ± 5.7	0.12
Mean ICIQ-SF	0.2 ± 0.4	0.3 ± 0.2	0.18

The mean intraoperative blood loss was 350.3 ± 150.4 ml and 475.6 ± 225.3 ml in the nsLRPT and nsRRPT groups ($p = 0.03$). The mean catheterization time was 8 ± 1 days in the laparoscopic group and 11 ± 2 days in the open group ($p = 0.02$). The length of hospitalization was shorter after nsLRPT (7.2 ± 2.1 vs 9.7 ± 3.6 days, $p = 0.03$) (Table 2).

The median complication rate was 1.6 % in the LPN and 5.5 % in the OPN groups ($p = 0.02$). The number of patients who required postoperative blood transfusions (Clavien grade 2) was 2 in the nsLRPT (1.6 %) and 6 in the nsRRPT groups (4.7 %) ($p = 0.03$).

Furthermore, one patient developed a perivesical haematoma after nsRRPT, which was treated by conservative therapy (Clavien grade 1). There were no grade 4 or 5 complications and no conversion to open surgery was necessary in the laparoscopic group.

Oncologic outcomes

There were no statistically significant differences between the two groups for Gleason score and distribution of tumour stages. No patient showed absence of prostate cancer at definitive pathologic examination (pT0).

Positive surgical margin was detected in 2.4 and 4.7 % of patients with pT2c tumours in the laparoscopic and open groups, respectively, without any statistically significant difference ($p = 0.09$) (Table 2). At a mean follow-up of

Table 2 Intra- and postoperative data

	nsLRPT ($n = 125$)	nsRRPT ($n = 128$)	p value
Mean operation time (min)	153.1 ± 35.4	122.5 ± 67.5	0.03
Mean estimated blood loss (ml)	350.3 ± 150.4	475.6 ± 225.3	0.03
Blood transfusion (%)	1.6	4.7	0.03
Mean catheterization time (days)	8 ± 1	11 ± 2	0.02
Mean prostata weight (g)	21.1 ± 4.3	19.8 ± 6.5	0.09
IQR	(14–65)	(14–65)	
Mean Gleason score	6.35 ± 0.63	6.41 ± 0.69	0.16
Tumour stage (patients)			
T0	0	0	–
T2a	54	59	0.17
T2b	28	23	0.09
T2c	43	46	0.19
T3a/b	0	0	–
Positive surgical margins (pT2c)	2.4	4.7	0.09
Tumour recurrence at 1 year (patients)	0	0	–

26.9 ± 9.3 months for the nsLRPT group and of 27.8 ± 9.7 months for the nsRRPT group, all patients were alive with no evidence of tumour recurrence.

Urinary continence and sexual potency

Significant differences were observed with regard to continence. The early return to continence at 4 weeks after the operation was achieved by 50 (40 %) patients in the nsLRPT and 36 (28.1 %) in the nsRRPT groups ($p = 0.01$).

Six months postoperatively, in the nsLRPT group, 108 patients (86.4 %) were continent, 15 (12 %) experienced a minimal stress incontinence (1–2 pads per day) and only 2 (1.6 %) experienced a moderate stress incontinence (2–4 pads per day).

In the nsRRPT group, 94 patients (73.4 %) achieved a complete continence, 30 (23.4 %) had a minimal stress incontinence and four (3.1 %) had a moderate incontinence.

No case of complete or severe incontinence was observed 6 months after surgery in both groups.

At the 12th month, a complete continence was reported in 96.8 % of patients who underwent an nsLRPT and in 89.4 % of patients of the nsRRPT group ($p = 0.02$) (Table 3).

Regarding sexual potency, 74.4 % in the nsLRPT and 53.1 % in the nsRRPT groups reported the ability to engage in sexual intercourse 1 year after surgery ($p = 0.0004$) (Table 3). The use of phosphodiesterase type 5 (PED5) inhibitors must be considered when interpreting the potency results (on demand Vardenafil 20 mg).

Discussion

In recent years, LRP has been established as a safe and effective treatment for prostate cancer in specialized centres [2, 14–20].

Performed by any of the surgical approaches, previous TURP may impose difficulties for the surgical team during radical prostatectomy. Infections of the prostate and seminal vesicles and perforation of the prostate's capsule during TURP with extravasation of irrigation fluid might result in peri-prostatic fibrosis and distortion of the surgical plains, making the dissection difficult [21–23].

With better visualization of the anatomy and a relatively bloodless field, LRPT has the potential to provide good functional outcomes with equal oncologic effectiveness [21].

Although Jaffe et al. [22] reported that patients with a history of transurethral prostate resection, who undergo laparoscopic radical prostatectomy, have worse outcomes with respect to operative time, length of stay, positive margin rate and overall complication rate, other reports indicated that radical prostatectomy may be performed safely with an acceptable morbidity rate following TURP, although postoperative urinary incontinence and erectile dysfunction are more frequent as compared to primary cases [6–8, 21–26].

Colombo et al. [7] reported on 109 patients who had RRP for prostate cancer, after surgical intervention for BPH. In 88 of these 109 patients, the previous intervention was TURP. Patients were matched in pairs according to their PSA level, age and clinical stage. The peri- and postoperative morbidity increased moderately in comparing with naïve patients, but functional results were assessed in only 48.8 % of the patients. In that study, complete urinary control was achieved in 86 % and adequate erectile function in 12 % at a follow-up of 1 year after RRP.

Performing nerve-sparing radical prostatectomy in patients who previously had surgery for urinary obstruction can present some unexpected difficulties, requiring better surgical skills [6, 8].

In 2008, Suardi et al. [8] reported their experiences with 15 consecutive patients who underwent nsRRPT after holmium laser enucleation of the prostate (HoLEP) and after TUR-P, with encouraging results. All operations were successfully performed without major complications.

To the best of our knowledge, this is the largest study to address the feasibility and the safety of bilateral intrafascial nsLRPT in patients previously undergoing TUR-P.

It has been postulated that nsLRPT resulted in a higher rate of positive margins. For an objective evaluation of the positive margin rate, three aspects have to be considered. The first is the technique of histopathologic examination, because pathologic evaluation of the prostate can influence the detection of positive margins. The second aspect is the stratification of positive margin rates according to pathologic stage. The third aspect is the case selection (with or without adjuvant therapy) [19]. In many reports in the literature [7, 8, 23–26], there was no significant difference in the rate of positive margins associated with open or laparoscopic RP after TUR-P, as resulted also in our study (2.7 and 4.7 % in the laparoscopic and open groups, respectively).

Table 3 Postoperative functional outcomes

	nsLRPT ($n = 125$)	nsRRPT ($n = 128$)	p value
Complete urinary continence (%)			
4 weeks after surgery	40	28.1	0.01
6 months after surgery	86.4	73.4	0.03
12 months after surgery	96.8	89.4	0.02
Potency (%) at 12 months after surgery	74.4	53.1	0.0004

The quality of life is strongly affected by urinary incontinence. It had been shown that incidence of postoperative incontinence depends on the urologist's experience, patient's age (increased frequency after 70 years) and operative technique (i.e. nerve-sparing or not) [27, 28]. Laparoscopic surgery may offer an improved identification of anatomic landmarks such as striated muscles and neurovascular bundles, resulting in less damage to the striated sphincter. Moreover, Stolzenburg et al. [18] proved better results on early continence by preserving the puboprostatic ligament during nsLRP. The main question associated with a RP after TUR-P is represented by its safety concerning the postoperative continence and potency rate. Again the study group of the University Vita-Salute San Raffaele, Milan [8] reported interesting continence rate in all patients who underwent nsRRPT after HoLEP and TUR-P. At 6 months after the procedure, 93.3 % of all patients were continent and 53.3 % of the patients after HoLEP and 40 % of the patients after TUR-P reported satisfactory sexual intercourse, with use of PED5 inhibitors.

In our study, we observed an earlier return to continence in the patients who underwent an nsLRPT after TUR-P compared to the patients who underwent an nsRRPT after TUR-P.

Already in the early postoperative phase, a complete continence was reported in 40 % of the laparoscopic group and in 28.1 % in the nsRRPT groups. An increased continence rate in the laparoscopic group was also presented in the next months, and at the 1 year after surgery, a complete continence was reported in 96.8 % of patients who underwent a nerve-sparing laparoscopic procedure and in 89.4 % of patients of the open group.

Significant differences were also reported for postoperative sexual potency. One year after bilateral nerve-sparing radical prostatectomy, 74.4 % of patients of the laparoscopic group and 53.3 % of patients of nsRRPT groups had erections sufficient for intercourse.

There are a several limitations to the present study that must be acknowledged, however. Firstly, this was a retrospective study hence imparting an inherent selection bias that cannot be overcome. Another limitation of the present study includes the small cohort of the patients and the short follow-up. Moreover, all surgeries were performed by expert surgeons, and this aspect must be considered in the evaluations of the results.

Conclusion

Although it may require higher surgical skills, nsLRPT for incidental PCA after TUR-P provides satisfactory oncologic results, presenting superior functional outcomes when compared with nsRRPT. Nevertheless, further prospective randomized studies are necessary to confirm the superiority of nsLRPT.

Acknowledgments Dr. Christopher Springer is a research fellow of the Department of Urology and renal transplantation of the Martin Luther University.

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Heidenreich A, Aus G, Bolla M et al (2008) EAU guidelines on prostate cancer. Eur Urol 53:68–80
2. Greco F, Wagner S, Hoda MR et al (2010) Laparoscopic versus open retropubic intrafascial nerve-sparing radical prostatectomy: surgical and functional outcomes in 300 patients. BJU 106:543–547
3. Greco F, Hoda MR, Wagner S, Reichelt O, Inferrera A, Fischer K, Fornara P (2010) Adipocytokine: a new family of inflammatory and immunological markers of invasiveness in major urologic surgery. Eur Urol 58:781–787
4. Rassweiler J, Teber D, Kuntz R et al (2006) Complications of transurethral resection of the prostate (TURP)—incidence, management, and prevention. Eur Urol 50:969–979
5. Rossignol G, Leandri P, Ramon J, Gautier JR (1992) Radical prostatectomy in the management of stage A carcinoma of the prostate. Eur Urol 21:269–273
6. Bandhauer K, Senn E (1988) Radical retropubic prostatectomy after transurethral prostatic resection. Eur Urol 15:180–181
7. Colombo R, Naspro R, Salonia A et al (2006) Radical prostatectomy after previous prostate surgery: clinical and functional outcomes. J Urol 176:2459–2463
8. Suardi N, Scattoni V, Briganti A et al (2008) Nerve-sparing radical retropubic prostatectomy in patients previously submitted to holmium laser enucleation of the prostate for bladder outlet obstruction due to benign prostatic enlargement. Eur Urol 53:1180–1185
9. Greene FL, Page DL, Fleming IR et al (2002) AJCC cancer staging manual, 6th edn. Springer-Verlag, New York
10. Rosen MA, Goldstone L, Lapin S, Wheeler T, Scardino PT (1992) Frequency and location of extracapsular extension and positive surgical margins in radical prostatectomy specimens. J Urol 148:331–337
11. Kim SC, Song C, Kim W et al (2011) Factors determining functional outcomes after radical prostatectomy: robot-assisted versus retropubic. Eur Urol 60:413–419
12. Dindo D, Demartines N, Clavien PA (2004) Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 240:205–213
13. Rhoden EL, Telöken C, Sogari PR, Vargas Souto CA (2002) The use of the simplified international index of erectile function (IIEF-5) as a diagnostic tool to study the prevalence of erectile dysfunction. Int J Impot Res 14(4):245–250
14. Artibani W, Grosso G, Novara G et al (2003) Is laparoscopic radical prostatectomy better than traditional retropubic radical prostatectomy? An analysis of peri-operative morbidity in two contemporary series in Italy. Eur Urol 44:401–406
15. Guazzoni G, Cestari A, Naspro R et al (2006) Intra- and peri-operative outcomes comparing radical retropubic and laparoscopic radical prostatectomy: results from a prospective, randomised, single-surgeon study. Eur Urol 50:98–104

16. Jurczok A, Zacharias M, Wagner S, Hamza A, Fornara P (2007) Prospective non-randomized evaluation of four mediators of the systemic response after extraperitoneal laparoscopic and open retropubic radical prostatectomy. BJU Int 99:1461–1466
17. Rassweiler J, Stolzenburg JU, Sulser T et al (2006) Laparoscopic radical prostatectomy-the experience of the german laparoscopic working group. Eur Urol 49:113–119
18. Stolzenburg JU, Liatsikos E, Rabenalt R et al (2006) Nerve sparing endoscopic extraperitoneal radical prostatectomy—effect of puboprostatic ligament preservation on early continence and positive margins. Eur Urol 49:103–112
19. Lein M, Stibane I, Mansour R et al (2006) Complications, urinary continence and oncologic outcome of 1000 laparoscopic transperitoneal radical prostatectomies—experience at the charitè hospital Berlin, Campus Mitte. Eur Urol 50:1278–1284
20. Galli S, Simonato A, Bozzola A et al (2006) Oncologic outcome and continence recovery after laparoscopic radical prostatectomy: 3 years' follow-up in a "second generation centre". Eur Urol 49:859–865
21. Katz R, Borkowski T, Hoznek A, Salomon L, Gettman MT, Abbou CC (2006) Laparoscopic radical prostatectomy in patients following transurethral resection of the prostate. Urol Int 77:216–221
22. Jaffe J, Stakhovsky O, Cathelineau X, Barret E, Vallancien G, Rozet F (2007) Surgical outcomes for men undergoing laparoscopic radical prostatectomy after transurethral resection of the prostate. J Urol 178:483–487
23. Yazici S, Inci K, Yuksel S, Bilen CY, Ozen H (2009) Radical prostatectomy after previous prostate surgery: effects on surgical difficulty and pathologic outcomes. Urology 73:856–859
24. Teber D, Cresswell J, Ates M et al (2009) Laparoscopic radical prostatectomy in clinical T1a and T1b prostate cancer: oncologic and functional outcomes—a matched-pair analysis. Urology 73:577–581
25. Menard J, de la Taille A, Hoznek A et al (2008) Laparoscopic radical prostatectomy after transurethral resection of the prostate: surgical and functional outcomes. Urology 72:593–597
26. Palisaar JR, Wenske S, Sommerer F, Hinkel A, Noldus J (2009) Open radical retropubic prostatectomy gives favourable surgical and functional outcomes after transurethral resection of the prostate. BJU Int 104:611–615
27. Salomon L, Sebe P, De La Taille A et al (2004) Open versus laparoscopic radical prostatectomy: part I. BJU Int 94:238–243
28. Salomon L, Sebe P, De La Taille A et al (2004) Open versus laparoscopic radical prostatectomy: part II. BJU Int 94:244–250