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TRANSVESICAL SINGLE-PORT LAPAROSCOPIC RADICAL PROSTATECTOMY FOR ORGAN-CONFINED PROSTATE CANCER: TECHNIQUE AND OUTCOMES

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Background. Laparoendoscopic single-site radical prostatectomy (LESS-RP) is obtaining popularity. To improve continence and overcome current limitations, transvesical single-port laparoscopic RP could be applied to LESS. Our experience in performing transvesical single-port laparoscopic RP was analyzed.

Methods. A total of 20 consecutive men with organ-confined prostate cancer underwent transvesical single-port laparoscopic RP between November 2010 and July 2011 by a single surgeon. A novel port (QuadPort®) was used percutaneously into the bladder to establish pneumovesicum through a 4-cm bladder incision. All the operative procedures, including incision of the posterior bladder neck, dissection of the seminal vesicles and vas deferens, ligation of prostatic pedicles, preserving of neurovascular bundles, apical dissection, urethral transection, and urethro-vesical anastomosis with ventral inlay forskin graft, were performed transvesically and laparoscopically.

Results. All of the 20 transvesical single-port laparoscopic RP was successfully performed, and there was no conversion to standard laparoscopic approach or open surgery. Patients were hospitalized for a mean (range) of 14.7 (12–25) days after surgery. The total operative time range was 75–180 min, and the mean operative time was 105 min. The estimated blood loss was 75–500 ml, and no blood transfusion was required. Catheters were removed after a mean (range) of 12.1 (9–16) days. No intraoperative complications occurred. No patient had positive surgical margins. All the cases were continent after removal of the catheter.

Conclusions. Transvesical single-port laparoscopic radical prostatectomy is technically feasible for cases with organ-confined prostate cancer.

Key words: LESS, prostate cancer, radical prostatectomy, transvesical, single port.

Introduction

As laparoscopy becomes a standard approach in many urological procedures, researchers are striving to make minimally invasive surgery less invasive. Laparoendoscopic single-site radical prostatectomy (LESS-RP) is being increasingly used for the surgical treatment of organ-confined prostate cancer and could be regarded as the most recent progression in laparoscopic RP [1–12]. However, some early clinical experiences with LESS-RP have demonstrated several limitations associated with technical constraints, including limited operating space, and lack of triangulation.

Desai et al. [13] first reported an initial feasibility of performing transvesical single-port RP in a cadaver. They suggested that the insufflated bladder might supple with an optimal portal of access to the prostate for RP, by eliminating contact with the peritoneal cavity and its contents, thus providing a direct in-line exposure of the prostate and relevant periprostatic anatomy. The transvesical approach also excludes the need for mobilizing the bladder and dissecting the prevesical space, and could further reduce the dissection injury during RP. However, to our knowledge no study has clinically evaluated the technique in patients with organ-confined prostate cancer.

Herein we report our initial clinical experience of transvesical single-port laparoscopic RP for organ-confined prostate cancer patients. Our aim is to demonstrate the feasibility of the procedure by describing the technique and analyzing early outcomes.

Patients and Methods

Study design

The patient with low risk organ-confined prostate cancer (PSA = 10 ng/ml, Gleason score <7, and clinical stage T1c or T2a) fit for laparoscopic surgery was offered transvesical single-port laparoscopic radical prostatectomy. All data were entered prospectively into an institutional

review board-approved database and queried retrospectively.

Demographic data were accrued including patient age, body mass index, preoperative prostate-specific antigen (PSA) level, the International Index of erectile function 5 (IIEF-5), biopsy Gleason score, Clinical TNM stage, and D'Amico risk classification. The preoperative evaluation included standard history and physical examination, basic laboratory blood work, metastatic staging when required, and further cardiac/pulmonary workup when indicated. Exclusion criteria included previous radiotherapy to the prostate and conventional contraindications to laparoscopic procedures.

Perioperative data including the estimated blood loss, operative time, additional ports or conversion to conventional laparoscopy, intraoperative complications and length of stay were recorded. The patient was checked at 9D postoperatively with fiber cystoscope examination and removed the catheter. Patients were followed at 40D, every 3 mo for 1 yr, and every 6 mo thereafter for continence assessment (pads daily), IIEF-5 and biochemical recurrence (PSA>0.2 ng/ml).

Surgical technique

Port placement

The patient's bladder was instilled with saline water through a catheter and an incision (3–4.5 cm) was created in halfway between the umbilicus and pubic symphysis. The wall of the bladder incision was sutured to the anterior rectus sheath and fixed. An QuadPort® (Olympus Surgical Technologies Europe) was deployed into the bladder through a 4-cm incision (Fig. 1, *a*). The Olympus high-resolution digital 10 mm laparoscope was inserted through a 12 mm inlet; the other two inlets were actually used during the surgery to reduce instruments clashing that is commonly occurred with the single-port approach. There was a separate channel each for insufflation and venting.

Incision of the Posterior Bladder Neck

The initial step consisted of creating a posterior incision along the bladder neck distal to the ureteric orifices (Fig. 1, *b*), which were clearly identified with the transvesical approach. The posterior bladder neck incision was deepened full-thickness to expose the vas deferens and seminal vesicles.

Dissection of Vas Deferens and Deminal Vesicles

The anterior layer of Denonvillier's fascia was incised and the vas deferens and seminal vesicles were completely isolated and incised (Fig. 1, *c*), thereby exposing the fascia of Denonvilliers that is incised for the posterior dissection.

Separation of Denonvilliers' Fascia

Denonvillier's fascia was separated along the posterolateral surface of the prostate in an antegrade direction (Fig. 1, *d*), reaching the prostatic apex, maintaining a completely intrafascial plane.

Lateral Separation of Prostate

The posterior bladder neck incision was extended on both sides to encircle the bladder neck. The bladder neck incision was initially deepened from the 7 o'clock to 11 o'clock position on the left side and the 1 o'clock to 4 o'clock position on the right side (Fig. 1, *e*). This gave exposure to the lateral prostate surface medially and the levator fibres laterally. These incisions were joined in the midline at the 12 o'clock position to expose the anterior surface of the prostate and the dorsal vein complex (Fig. 1, *g*). The lateral prostate pedicles were divided using harmonic scapel and the neurovascular bundles were conserved under surveillance with nerve stimulator (Fig. 1, *f*) [1].

Control the Dosal Vein Complex and Dissection of Urethra

The dorsal vein was controlled with hemostatic forceps and the pubo-prostatic ligaments were incised close to the prostate surface (Fig. 1, *h*), exposing the underlying urethra. The urethra was transected without cautery. The tip of the urethral catheter was withdrawn, and the posterior urethral wall was transected sharply (Fig. 1, *j*). Complete dissection of the prostate apex was accomplished in a retrograde fashion. The completely mobilized prostate was placed within the bladder. The prostate was extracted and examined grossly for adequacy of excision. The catheter balloon was injected with 40 ml of saline water and pulled for oppressing urethra stump and hemostasis.

Vesicourethral Anastomosis by using the Stripe of Free Foreskin Fraft

According to the prostate gland diameter, the isometric stripe of foreskin was prepared and quilted onto the ventral prostatic fossa. Both ends of the free foreskin were anastomosed respectively with margin of the posterior urethra and the posterior bladder neck (Fig. 1, *k, l, m*). A 20F Foley catheter was inserted under vision into the bladder after completion of the anastomosis. A bladder fistula drain was exited via the same skin incision.

Cystograms

Cystogram was performed at day 9 after surgery. The urethral catheter was removed when appropriate.

Results

Demographic data

From Nov 2010 to July 2011, 20 transvesical single-port laparoscopic RPs were scheduled at our institution. Table 1 lists the complete demographic data.

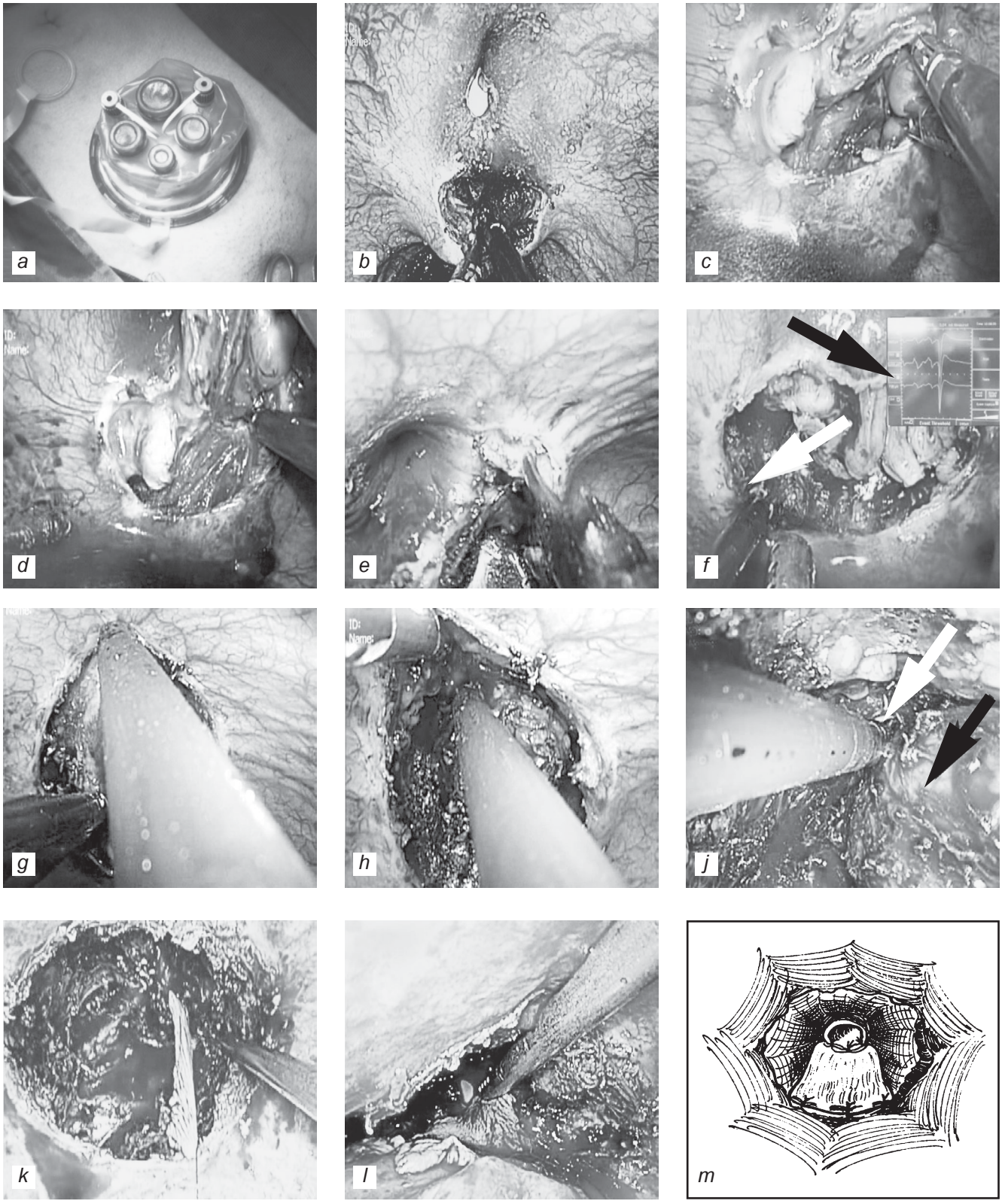

Fig. 1. a — QuadPort® (Olympus Surgical Technologies Europe) was deployed into the bladder through a 4-cm incision; *b* — incision of the posterior bladder neck; *c* — dissection of *Vas deferens* and seminal vesicles; *d* — separation of Denonvilliers' fascia; *e* — lateral separation of prostate; *f* — the neurovascular bundles were under surveillance with nerve stimulator (white arrow: bipolar electrocoagulation as stimulator, black arrow: reflected voltage; *g* — the bladder neck incisions were joined in the midline at the 12 o'clock position; *h* — control the dorsal vein complex; *j* — dissection of urethra (black arrow: prostate, white arrow: urethra); *k* — urethro-vesical anastomosis using the stripe of foreskin; *l* — skin flap was well adhered to the prostate socket; *m* — the model of urethro-vesical anastomosis using the stripe of foreskin

Operative data

The mean operative time was recorded from incision of the bladder to the bladder closure finished by a single surgeon (X.G.). Table 2 details the operative and postoperative data. All of the 20 transvesical single-port laparoscopic RPs were successfully performed, and there was no conversion to standard laparoscopic approach or open surgery. No intraoperative complications occurred. No patient had positive surgical margins.

Postoperative data

The fiber cystoscope examination of epithelial crawling situation and anastomotic healing status was performed on all patients, and catheters were not removed if there was evidence of anastomotic leakage. Seventy percent of patients had their catheters removed 9d postoperatively and 30% after 2 wk. All PSA values postoperatively were less than 0.06 ng/ml as compared with preoperative PSA values (mean: 7.5 ng/ml). All the cases were immediately continent as soon as removal of the catheter. 12 of 20 patients reached satisfactory erection on 6 M postoperatively with IIEF-5 score = 21. No cases demonstrated vesicourethral stricture on 6–15 M follow up postoperatively.

Discussion

Laparoscopic RP has been reported with encouraging results as an alternative to open RP in patients with organ-confined prostate cancer. More recently, the introduction of novel single-port devices has enabled the performance of laparoscopic RP procedures in a virtually scarless fashion through a solitary intraumbilical incision. Although not enough randomized data are available in the literature, it appears as though this technique may have promise compared with its conventional laparoscopic counterpart, in terms of operative outcomes, postoperative pain, and patient-reported convalescence [14–17]. Although promising, it is important to remember the underpinnings of this technique and its inherent difficulties. First and foremost, limited operating space and considerable instrument clashing limits precise tissue handling and retraction. We report our initial experience with transvesical single-port laparoscopic RP for organ-confined prostate cancer performed through a solitary suprapubic incision by way of a single access port inserted directly into the bladder in 20 patients with low risk organ-confined prostate cancer.

There may be several advantages of the single-port transvesical approach for RP. Firstly, with the transvesical approach we do not need to mobilize the bladder or dissect the pre-vesical space, thus the operation is restricted to the area of the deep bony pelvis, which could minimize the dissection injury during RP. Furthermore, recent studies

Table 1

Demographic and Preoperative Data

No. of patients	20
Age, yr, mean (range)	62 (37–74)
BMI, Kg/m^2	22.5 (20–26)
Preoperative PSA, ng/ml, mean (range)	7.5 (3.4–10.0)
IIEF-5, No. ≥21 ≤21	 13 (65.0) 7 (35.0)
Clinical TNM stage, No T1c T2a	 15 (75.0) 5 (25.0)
Biopsy Gleason score, No. (%) 2+2 3+2 3+3	 7/20 (35.0) 11/20 (55.0) 2/20 (10.0)
D'Amico risk stratification, No. (%) Low Intermediate High	 20/20 (100.0) 0/20(0) 0/20(0)

Note. PSA — prostate-specific antigen; IIEF — the International Index of Erectile Function.

Table 2

Perioperative and Postoperative Outcomes

No. of patients	20
Perioperative outcomes	
EBL, ml, mean (range)	129.8 (75–500)
Operative time, min, mean (range)	105.0 (75–180)
Intraoperative complications	0
Conversion to traditional LRP	0
Additional ports	0
Nerve-sparing procedures	20
Postoperative outcomes	
Pathological T stage No. (%) pT2a pT2b pT2c	 7/20 (35.0) 10/20 (50.0) 3/20 (15.0)
Pathologic Gleason score, No. (%) 2+2 3+2 3+3	 3/20 (15.0) 7/20 (35.0) 10/20 (50.0)
Nodes removed, mean (range)	0
Positive nodes, No.	0
Positive margins, No. (%)	0
Follow-up, mo, mean (range)	12.5 (6–15)
Catheterization time, d, mean (range)	12.1 (9–16)
In-hospital stay	14.7 (12–25)
Continent, No. (%)	20 (100.0)
Postoperative Penile Erection	12/20 (60.0)
Biochemical recurrence, No.	0

Note. EBL — estimated blood loss; LRP — laparoscopic radical prostatectomy.

demonstrated that continence-relevant nerves are abundant in the peri-prostatic and prevesical space. There is a wide variety of nerve distribution around the prostate and the continence nerves are much more than previously expected [18; 19]. The transvesical approach for RP excludes the need for mobilizing the bladder and dissecting the prevesical space, and might further reduce the risk of incontinence after surgery, which was in accordant with our results that all 20 cases were with good early functional results. Secondly, there is no need for pneumoperitoneum with transvesical approach. The pneumovesicum confines CO_2 to the bladder and eliminates the need for any bowel retraction, and might also potentially reduce the chance of bowel adhesions and port site complications. Lastly, the gas-insufflated bladder acts as a self-retaining retractor, which may contribute to reduce the number of retracting instruments and trocars required for laparoscopic RP. Herein, the transvesical approach might enable single-port RP to be performed effectively and efficiently [13].

A major challenge arising from this approach is the vesico-urethral anastomosis. Although the oncologic outcome of radical prostatectomy is not compromised, the periprostatic and prevesical fascia adhesion is intact. Tension is present between the bladder neck and urethra when we attempt to peform the vesico-urethral anastomosis. Additionally, recent studies demonstrated that a lot of nerve endings are distributed around periprostatic and prevesical fascia which are relevant to function of continence [20–23]. Thus, the vesico-urethral end to end suturing with tension would impair those nerve endings, compromising postoperative urinary continence. Free dorsal onlay forskin graft was used to repair urethral stricture and patch urethroplasty or augmented anastomotic urethroplasty with foreskin or buccal mucosal graft are considered as good options for the treatment of urethral stricture [22–24]. In the present study, we used the stripe of foreskin to quilt onto ventral fossa of prostate during urethro-vesical anastomosis. The catheter was withdrawn on postoperative day 12. No case in our series had urination difficulty and urethral stricture during a median of 6 months follow-up. A fiber-cystoscope examination showed that the epithelium covered vesico-urethral fossa on postoperative day 40.

What would be emphasized is that transvesical single-port laparoscopic RP is still in its infancy and must be performed by surgeons who have experience in laparoscopic RP. The next step is to conduct randomized controlled trials to compare the oncological and functional results of different approaches for RP, and thus establish evidence-based guidelines.

Conclusions

Transvesical single-port laparoscopic radical prostatectomy is technically feasible for cases with organ-confined prostate cancer. Longer survival and functional data in a larger cohort of patients are necessary to determine the proper place for transvesical single-port laparoscopic RP in patients with low risk organ-confined prostate cancer.

REFERENCES

1. Gettman MT, Box G, Averch T, et al. Consensus statement on natural orifice transluminal endoscopic surgery and single-incision laparoscopic surgery: heralding a new era in urology? Eur Urol 2008;53:1117-20.

2. Raman JD, Bensalah K, Bagrodia A, et al. Laboratory and clinical development of single keyhole umbilical nephrectomy. Urology 2007;70:1039-42.

3. Desai MM, Rao PP, Aron M, et al. Scarless single port transumbilical nephrectomy and pyeloplasty: first clinical report. BJU Int 2008;101:83-8.

4. Kaouk JH, Haber GP, Goel RK, et al. Single-port laparoscopic surgery in urology: initial experience. Urology 2008;71:3-6.

5. Sotelo Noguera RJ, Astigueta JC, Carmona O, et al. Laparoscopic augmentation enterocystoplasty through a single trocar. Urology 2009;73:1371-4.

6. Ponsky LE, Cherullo EE, Sawyer M, et al. Single access site radical nephrectomy: initial clinical experience. J Endourol 2008;22:663-6.

7. Stolzenburg J-U, Kallidonis P, Hellawell G, et al. Technique of laparoscopic-endoscopic single-site surgery radical nephrectomy. Eur Urol 2009;56:644-50.

8. Raman JD, Caddedu JA, Rao P, et al. Single incision laparoscopic surgery: initial urological experience and comparison with naturalorifice transluminal endoscopic surgery. BJU Int 2008;101:1493-6.

9. Rane A, Rao P, Rao P. Single port access nephrectomy and other laparoscopic urologic procedures using a novel laparoscopic port (R-Port). Urology 2008;72:260-3.

10. Msezane LP, Mushtaq I, Gundeti MS. An update on experience with the single instrument port laparoscopic nephrectomy. BJU Int 2009;103:1406-9.

11. WhiteWM, Haber GP, Goel RK, et al. Single-port urological surgery: single-center experience with the first 100 cases. Urology 2009;74:801-4.

12. Desai MM, Berger AK, Brandina R, et al. Laparoendoscopic singlesite surgery: initial hundred patients. Urology 2009;74:805-13.

13. Desai MM, Aron M, Berger A, et al. Transvesical robotic radical prostatectomy. BJU Int 2008;102:1666-9.

14. Tsimoyiannis EC, Tsimogiannis KE, Pappas-Gogos G, et al. Different pain scores in single transumbilical incision laparoscopic cholecystectomy versus classic laparoscopic cholecystectomy: a randomized controlled trial. Surg Endosc. In press. DOI:10.1007/s00464-010-0887-3.

15. Canes D, Berger A, Aron M, et al. Laparo-endoscopic single site (LESS) versus standard laparoscopic left donor nephrectomy:matched-pair comparison. Eur Urol 2010;57:95-101.

16. Raman JD, Bagrodia A, Caddedu JA. Single-incision, umbilical laparoscopic versus conventional laparoscopic nephrectomy: a comparison of perioperative outcomes and short-term measures of convalescence. Eur Urol 2009;55:1198-206.

17. Park YH, Park JH, Jeong CW, Kim HH. Comparison of laparoendoscopic single-site radical nephrectomy with conventional laparoscopic radical nephrectomy for localized renal-cell carcinoma. J Endourol 2010;24:997-1003.

18. Ganzer R, Blana A, Gaumann A, et al. Topographical anatomy of periprostatic and capsular nerves:

quantification and computerized planimetry. Eur. Urol. 2008;54:353-61.

19. Lunacek A, Schwentner C, Fritsch H, Bartsch G, Strasser H. Anatomical radical retropubic prostatectomy: "curtain dissection" of the neurovascular bundle. BJU Int 2005;95:1226-31.

20. Kaiho Y, Nakagawa H, Saito H, Ito A, Ishidoya S, Saito S, et al. Nerves at the Ventral Prostatic Capsule Contribute to Erectile Function: Initial Electrophysiological Assessment in Humans. Eur. Urol. 2009;55:148-55.

21. Alsaid B, Bessede T, Diallo D, Moszkowicz D, Karam I, Benoit G, et al. Division of Autonomic Nerves Within the Neurovascular Bundles Distally into Corpora Cavernosa and Corpus Spongiosum Components: Immunohistochemical Confirmation with Three-Dimensional Reconstruction. Eur. Urol. 2011;59:902-9.

22. Schreiter F, Noll F. Mesh graft urethroplasty using split thickness skin graft or foreskin. J Urol. 1989;142:1223-6.

23. Barbagli G, Palminteri E, Rizzo M. Dorsal onlay graft urethroplasty using penile skin or buccal mucosa in adult bulbourethral strictures. J Urol. 1998;160:1307-9.

24. Andrich DE, Mundy AR. What is the best technique for urethroplasty? Eur. Urol. 2008;54:1031-41.

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CHOICE OF ORGAN PRESERVING TREATMENT OF SUBMUCOUS UTERINE MYOMA BASED ON RATIONAL DIAGNOSTIC CRITERIA

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ОРГАНОСОХРАНЯЮЩЕЕ ОПЕРАТИВНОЕ ЛЕЧЕНИЕ СУБМУКОЗНОЙ МИОМЫ МАТКИ, ОСНОВАННОЕ НА РАЦИОНАЛЬНОМ ВЫБОРЕ ДИАГНОСТИЧЕСКИХ КРИТЕРИЕВ

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Субмукозная миома матки — вариант лейкомиомы матки, который отличается высокой частотой осложнений, среди них ведущую роль играют менометроррагии, бесплодие и невынашивание беременности.

Стремительное развитие малоинвазивной хирургии требует усовершенствования подходов диагностики доброкачественных процессов полости матки. Это касается и диагностического алгоритма у больных с субмукозной миомой матки.

Мы предлагаем расширить перечень обязательных критериев оценки субмукозных узлов. Это даст возможность хирургу иметь более четкое представление об особенностях оперативного лечения, а значит, повысить эффективность пред- и интраоперационных мероприятий, а также реабилитации в раннем и позднем послеоперационном периоде.

В основу созданных критериев закладывались такие анатомические особенности миоматозных узлов: степень пенетрации в миометрий, размеры узлов и их количество, высота расположения узла в полости матки, величина площади узла, которая непосредственно контактирует с миометрием, расположение относительно стенок матки, васкуляризация. Основываясь на субъективной оценке сложности гистероскопической миомэктомии для хирурга, в каждом из критериев мы выделили параметры в балах от 0 до 3.

Для анализа эффективности предложенной системы оценки субмукозной миомы матки (СОС) мы провели ретроспективное исследование 64 случаев гистероскопических миомэктомий.

Проанализировав полученные данные, мы пришли к выводу, что предложенная СОС представляет собой рациональную, эффективную и понятную оценку анатомических особенностей субмукозных миоматозных узлов, а также является простым и быстрым способом оценки сложности запланированного оперативного лечения.

Ключевые слова: субмукозная миома матки, гистероскопия, диагностические критерии.

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CHOICE OF ORGAN PRESERVING TREATMENT OF SUBMUCOUS UTERINE MYOMA BASED ON RATIONAL DIAGNOSTIC CRITERIA

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Submucous uterine myoma differs from the other types of myoma with a high rate of complications. Among them menorrhagia, infertility and loss of pregnancy.

Impetuous progress of minimal invasive surgery demands the improvement of the diagnostic algorithms for patient with uterine benign tumors especially submucous myoma.

Widen criteria for submucous nodules assessment using ultrasound were offered in this study. It may give surgeons the opportunity to have clearer view about features of the operative treatment and