2015년 2월
석사학위 논문

80g 이상의 전립선 비대증 환자에서 경요도전립선적출술과 경요도전립선절제술의 비교

조 선 대 학 교 대 학 원

의 학 과

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A clinical trial comparing plasmakinetic transurethral enucleation and resection with plasmakinetic transurethral resection of the prostate in patients with benign prostatic hyperplasia more than 80g

2015년 2월 25일

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이 논문을 의학 석사학위신청 논문으로 제출함

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목 차

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초록

80g 이상의 전립선비대증 환자에서 경요도전립선적출술과 경요도전립선절제술의 비교

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목적: 80g 이상의 전립선비대증 환자에서 경요도전립선적출술과 경요도전립선절제술의 술 중,술 후 임상적 특성을 비교하기 위하여 본 연구를 시행하였다.

대상 및 방법: 2011년 1월부터 2013년 12월 까지 경요도전립선적출술과 경요도전립선절제술을 시행 받은 80g 이상의 전립선비대증 환자에서 양 군의 임상적 효용성을 파악하기 위하여 후향적 조사를 하였다. 양군에서 술 전, 술 후 비교인자는 국제전립선증상점수, 삶의 질, 최대요속, 잔뇨량과 혈색소 및 혈장 나트륨의 변화를 조사하였고 술 후 인자로는 수술시간, 전립선선종 절제량, 절제비율, 도뇨관 유치기간, 재원기간 및 합병증을 비교하였다 환자는 술 후 3 개월째의 임상결과를 추적조사 하였다

결과: 경요도전립선적출술을 시행받은 환자는 37례였고 경요도전립선절제술은 39례에서 시술하였다. 양군에서 술 전 임상특성은 의미있는 차이는 없었다. 양군에서 술 전과 비교하여 술 후 국제전립선증상점수, 삶의 질, 최대요속과 잔뇨량이 유의하게 호전되었다. 경요도전립선절제술과 비교하여 경요도전립선적출술에서 술 후 전립선절제량이 의미있게 많았으며 절제율도 유의하게 높았다. 3개월 추적조사 기간 동안 잔뇨량과 삶의 질 점수는 양군에서 차이가 없었으나 국제전립선증상점수와 최대요속은 경요도전립선적출술에서 유의하게 호전되었다. 술 후 합병증의 발생은 양군에서 차이가 없었다.

결론: 80g 이상의 큰 전립선비대증 환자에서 경요도전립선적출술은 안전하고 효과적인 수술법이다. 경요도전립선적출술이 경요도전립선절제술보다 전립선선종 절제량과 절제율이 유의하게 높아 경요도전립선적출술을 시행 받은 환자가 경요도전립선절제술을 시행 받은 환자보다 배뇨 특히, 요속에 대한 만족도가 더 높을 것으로 생각된다.

Introduction

Monopolar TURP has long been considered the primary surgical option for management of BPH in small to moderately sized prostates, with improvement in IPSS, QOL and Qmax after TURP.[1] However, TURP can be associated with significant morbidity such as TUR syndrome and blood loss and even mortality.[2] Thus, constant efforts are still being made to improve the clinical efficacy after TURP, which include technological advances such as bipolar resection or enucleation and laser therapy for better hemostasis and reduced incidence of complications.[3-5]

Large prostates greater than 80g are often not suitable for monopolar TURP, which is associated with an increased risk of TUR syndrome and blood loss due to the long resection time required.[6] and require open prostatectomy as a standard treatment alternative, despite the perioperative morbidity and extended catheterization and convalescence related to this invasive approach.[1]

In recent years new treatment modalities of large prostate with efficacy comparable to that of open prostatectomy but with fewer complications have been vigorously pursued.

Holmium laser enucleation of the prostate(HoLEP) is one such modality that is highly effective for BPH regardless of gland size.[7-10] However, the long learning curve and the high cost of holmium laser equipment limit the extensive application of HoLEP.[11]

Bipolar TURP, which is the most significant recent modification of monoploar TURP, has been developed in BPH treatment by using normal saline as irrigation fluid, so that the chance of TUR syndrome has been markedly reduced and improved the safety margin during prolonged procedure for large BPE.[3,6,12,13] Because of advantage of bipolar TURP, bipolar TURP was performed for larger prostate with comparable perioperative outcomes and more favorable postoperative results than monopolar TURP.[6,14]

Plasmakinetic TUERP, which is one of bipolar system, was introduced to enucleate the prostate adenoma with the electrode loop and resectoscope tip without supernumerary equipment.[15,16] It is considered an effective alternative to TURP and open prostatectomy, suitable for a prostate of up to 250g.[15]

We compared the perioperative and postoperative clinical efficacy and safety of plasmakinetic TUERP and plasmakinetic TURP in patients with BPH greater than 80ml during 3-month follow up.

PATIENTS AND METHODS

Patients

This retrospective study was performed from January 2011 to December 2013 at a single center. A total of 76 patients with large volume BPH were performed plasmakinetic TUERP or plasmakinetic TURP using the plasmakinetic tissue management system. All patients were preoperatively evaluated with urine analysis, urine culture and sensitivity, digital rectal examination, IPSS, QOL, Qmax, PVR and transrectal ultrasound. Study inclusion criteria were patients with symptomatic BPH more than 80g. Patients with neurogenic bladder, urethral stricture, bladder tumor, prostate cancer or previous prostate, bladder neck or urethral surgery were excluded from analysis.

Surgical Procedures

Under the general or spinal anesthesia, the patients was placed in a lithotomy position. Both procedures(TUERP or TURP) were done by one experienced surgeon(CS Kim). The procedures were done using a 24 Fr resectoscope with the Plasmakinetic system(Gyrus medical, Cardiff, UK) and operated with a cutting power of 130-180 W and a coagulating power of 80-100 W. The surgical techniques was described as follows. Briefly, enucleation was begun by making an incision at the lateral part of the verumontanum from the 5 to the 7 o'clock position and then proximal part of the verumontanum to establish a cleavage plane at the apical region and middle lobe of prostate adenoma, which was identified as a smooth whitish plane with clear vessels. The resectoscope tip was inserted into the cleavage plane. The gland of the mid lobe and the both apical region was dissected from the prostate capsule in retrograde fashion toward the bladder neck by the resectoscope tip and the loop. The detachment area was extended bilaterally and forward. Excellent hemostasis was achieved by immediate electrocauterization with the electrode loop during the detachment process. Finally, the prostate lobes were subtotally enucleated with a narrow pedicle attached to the bladder neck in the 5 or 7 o'clock position. The adenoma was almost devascularized and resected rapidly in pieces by the loop electrode. Plasmakinetic TURP was performed using the same equipment as Plasmakinetic TUERP with the same power settings. The classic surgical steps of TUR were applied according to the well described principles of

endoscopic prostatectomy. Briefly, resection was started at the bladder neck at the 6 o'clock position in antegrade fashion until the surgical capsule was reached. The mid lobe and lateral lobes were resected in turn. Saline was used for irrigation. At the end of each procedure a 18 Fr 3-way Foley catheter was inserted and continuous bladder irrigation was performed. One experienced urologists (CS Kim) was determined bladder irrigation, catheter removal and hospital discharge in all cases. Irrigation was discontinued when catheter drainage became clear and the catheter was removed. All patients were discharged from the hospital the day after catheter removal.

Perioperative Evaluation and Followup

We evaluated operative time, resected adenoma weight, resection rate, changes in hemoglobin and serum sodium, catheterization time, postoperative hospital stay and complications. Serum sodium and hemoglobin was determined perioperatively and on postoperative day 1. All patients were asked to visit the hospital 1 week, 1 month and 3 months after surgery. Assessments included urine analysis, urine culture and sensitivity, IPSS, Qmax, QOL, PVR, prostate weight and complications.

Statistical analysis

Demographic characteristics, preoperative surgical parameters such as total prostate volume and transitional zone volume, preoperative IPSS and preoperative urodynamic parameters were compared using Student's t-test between the two groups as mormality of the data was confirmed by the Shapiro-Wilk test.

In each surgical group, a paired t-test was performed for comparing surgical outcome between before and after the prostate surgery. Improvement in IPSS and PVR was calculated as baseline value minus follow-up value. Improvement in Qmax was calculated as follow-up Qmax minus baseline Qmax. Student's t-tests were also performed for comparing improvement in IPSS and urodynamic parameters following the two surgical methods between the groups. Complications of the prostate surgery were compared between the two groups using Fisher's exact tests.

Statistical analysis was performed using SPSS 18.0 for Windows(SPSS Inc, Chicago, IL, USA) and p-values less than 0.05 were considered statistically significant. Continuous data are presented as means ± standard deviation.

RESULTS

A total of 76 patients with BPH were enrolled in the study. There was no statistically significant difference in preoperative parameters between the 2 groups(Table 1). In each group IPSS, QOL, Qmax and PVR were significantly improved at 3 months followup compared with baseline(Figure 1, 2). No significant difference was observed in operative time between TUERP and TURP groups(120.5±12.4 vs 115.6±18.6 min, p=0.180). Greater resected prostate weight was recorded in the TUERP group(54.5±15.7 g vs 46.3± 15.9 g, p= 0.050), Higher resection ratio(82.0±12.9 % vs 61.5±14.8 %, P<0.001) indicating that TUERP was more efficient within the same operative time(Table 2).

The postoperative catheterization time and postoperative hospital stay was similar in the 2 groups. Perioperative loss of Hb and serum Na was similar between two groups(Table 2).

The postoperative improvement in QOL and PVR was similar in the 2 groups at 3 months. However, improvement in IPSS, Qmax was significantly better in the TUERP group at 3 months (Figure 3). The postoperative complications had no significant difference between the two groups(Table 3). Urinary retention requiring recatheterization developed in 2 patients in the plasmakinetic TURP group, while there was 1 patient in the plasmakinetic TUERP group. Three patient(7.7%) in the plasmakinetic TURP group and 2 patients(5.4%) in the plasmakinetic TUERP group had a postoperative urinary tract infection, which was cured by antibiotic treatment. Postoperative hematuria was developed 1 patient(2.6%) in the plasmakinetic TURP group, 3 patients(8.1%) in the plasmakinetic TUERP group, who kept 3 way catheter with saline irrigation.

DISCUSSION

Monopolar TURP has remained the gold standard minimally invasive treatment for the surgical treatment of bladder outlet obstruction secondary to BPH for almost five decades.[17] However, longer resection time is required for large prostates during monopolar TURP, resulting in increased risks of complication such as bleeding, acute urinary retention, TUR syndrome, urethral stricture, bladder neck stenosis, incontinence, and urinary tract

infection.[1]

HoLEP is regarded as a safe substitute for conventional monopolar TURP regardless of prostate size.[8] For patients with a large prostate, which is traditionally treated with open prostatectomy, HoLEP has a rate of adenoma clearance similar to that of open prostatectomy and it is associated with a therapeutic outcome equivalent to that of open prostatectomy but with less morbidity.[7] On the other hand, HoLEP is associated with some limitations. Resection with a laser fiber in retrograde fashion may be difficult for most surgeons who are accustomed to the antegrade resection during TURP, leading to along learning curve for HoLEP. It was reported that an endourologist inexperienced with the procedure cannot achieve reasonable efficiency with an outcome comparable to that of experts until after about 50 cases.[18] Also, the holmium laser instruments and mechanical tissue morcellator needed for HoLEP are not always accessible to all urologists.

Compared with HoLEP, the main advantage of plasmakinetic TUERP is that no supernumerary equipment is required. Plasmakinetic TUERP differs from HoLEP, which uses a laser fiber to separate the adenoma from the prostate capsule. Instead, plasmakinetic TUERP peels the adenoma off the capsule with the sheath of the resectoscope tip, which may facilitate adenoma enucleation.

Liu et al reported retrospective analysis on 1,100 patients who underwent plasmakinetic TUERP during 6 years and in whom postoperative mean Qmax increased by 250%, mean PVR decreased by 90.8%, mean IPSS decreased by 79.3% and mean QOL decreased by 67.4%, found no significant blood loss and TUR syndrome in any patient. They suggested that plasmakinetic TUERP appeared to be alternative to TURP and open prostatectomy for BPH.[15]

In a prospective, randomized clinical trial, Zhu et al reported 5 years data for BPH larger than 70 ml after comparing plasmakinetic TUERP and Bipolar TURP.[19] Plasmakinetic TUERP was associated with less blood loss, shorter hospital stay and catheterization time than bipolar TURP. Moreover, plasmakinetic TUERP seemed to be superior at long-term follow up with fewer reoperations necessary.[19]

Another prospective study comparing 74 patients of bipolar TUERP with 86 patients of bipolar TURP presented the findings that there was longer operative time(156 vs 87 min), more hemoglobin drop(1.8 vs 1.1 g/dl) but

more prostatic tissue resected(61.4 vs 45.7 g) in the bipolar TUERP group. There was no difference in transfusion requirement and hospital stay between two groups. At 1-year followup bipolar TUERP group had better IPSS, QOL, and Qmax. The postoperative complications had no significant difference between two groups.[20]

Liao et al retrospectively studied 303 patients with BPH, of whom 143 underwent Plasmakinetic TURP and 160 underwent Plasmakinetic TUERP. Results revealed that Plasmakinetic TUERP was significantly superior to Plasmakinetic TURP in terms of blood loss and transient incontinence but operative time, resected tissue weight, catheterization time and hospital stay were similar between two groups.[21]

In our present study, both plasmakinetic TURP and TUERP groups were similar with repect to the postoperative catheterization time, hospital stay, hemoglobin change and serum sodium loss, demonstrating that Plasmakinetic TUERP and TURP had comparative short-term treatment efficacy. However, the resected adenoma weight and resection ratio were significantly more than in the plasmakinetic TUERP group compared with plasmakinetic TURP group, resulting in better urinary stream for the plasmakinetic TUERP group. This may be partly because Plasmakinetic TUERP first stops the blood supply to the prostate adenoma. Thus, there is better visibility during resection of the enucleated adenoma and Another reason of less residual adenoma in the plasmakinetic TUERP group was that first dissection between adenoma and surgical capsule made the speed of adenoma resection faster without fear of capsular perforation.

Durability is one of the most important aspects when evaluating a treatment modality for BPH. Zhu et al reported that the postoperative improvement in IPSS, QOL Qmax and PVR was similar in the plasmakinetic TUERP and bipolar TURP groups at 3, 6, and 12 months, demonstrating that 2 groups had comparative short-term treatment efficacy. However, significant differences were observed between the 2 groups at 12 months postoperatively. Accordingly, no patient in the plasmakinetic TUERP group needed further treatment for recurrent BPH, while re-treatment was required in 2 of 40(5%) in the bipolar TURP group. These results confirmed that plasmakinetic TUERP was a more durable procedure than bipolar TURP.[19]

Complications, including urinary retention, urinary tract infection and hematuria

were comparable between 2 groups in our study. Zhu et al reported that transient incontinence was observed in 10 patients(25%) and 8(20%) for the plasmakinetic TUERP group and bipolar TURP group respectively and All recovered continence within 1 months. Urinary retention developed in 2 patients in the bipolar TURP group and no uriary retention in the plasmakinetic TUERP group. In the 5-year long-term follow up, 1 patient of urethral stricture developed in each group.[19] In the retrospective analysis of 1,100 patients who was done plasmakinetic TUERP, the postoperative complication included urinary tract infection in 85 patients(7.3%), meatal stenosis in 9(0.8%), incontinence in 56(5%), urethral stricture in12(1%) and bladder neck contracture in 10(0.9%).[15]

Our study has several limitations, including its retrospective design, the relatively small sample size, single center trial experience, lack of cost-effectiveness and learning curve analysis and short-term follow up. Prospective, randomized, controlled trials with a longer term followup and a larger pool of patients are needed to further validate the perioperative and postoperative efficacy, and complications of the 2 approaches.

CONCLUSIONS

The results of the this retrograde trial suggest that plasmakinetic TUERP and plasmakinetic TURP are safe, efficient minimally invasive techniques for BPH in patients with a prostate of greater than 80 ml. Plasmakinetic TUERP for large volume benign prostatic hyperplasia is associated with greater resection chip weight and resection ratio, more improvement in IPSS, and Qmax than plasmakinetic TURP. Thus, Patients undergoing plasmakinetic TUERP seems to be more satisfied with urinary stream than patients with plasmakinetic TURP.

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Table 1. Comparison of demographic and clinical characteristics at baseline between the patients treated with transurethral resection of the prostate (TURP) and transurethral enucleation and resection of the prostate (TUERP).

Preoperative parameters	TURP (n = 39)	TUERP (n = 37)	P value
Age	74.5±5.6	73.4±6.2	0.438
Total prostate volume(ml)	107.2±27.4	108.7±27.7	0.813
Transitional zone volume(ml)	76.2±20.3	66.9±22.8	0.064
IPSS	24.6±3.8	25.6±4.0	0.240
QOL score	5.3±0.6	5.1±0.7	0.246
Qmax	6.1±2.6	6.7±1.7	0.271
Post-void residual urine volume	213.3±164.2	150.2±124.3	0.062
Serum hemoglobin level	13.2±1.6	13.8±1.3	0.102
Serum sodium level	142.6±3.0	141.2±2.3	**0.025**

IPSS=International Prostate Symptom Score; Qmax= maximum flow rate
QOL= Quality of life

Table 2. Comparison of postoperative outcomes between transurethral resection of the prostate (TURP) and transurethral enucleation and resection of the prostate (TUERP).

parameters	TURP (n = 39)	TUERP (n = 37)	P value
Operative time (min)	115.6 ± 18.6	120.5 ± 12.4	0.180
Resected weight (g)	46.3 ± 15.9	54.5 ± 15.7	0.050
Resection ratio (%)	61.5 ± 14.8	82.0 ± 12.9	<0.001
Catheterization time (d)	2.4 ± 1.2	2.4 ± 1.6	0.952
Hospital stay (d)	3.3 ± 1.3	3.4 ± 1.6	0.832
Hemoglobin drop (g/dl)	1.2 ± 0.8	1.5 ± 0.8	0.087
Sodium change (mmol/l)	2.1 ± 2.0	2.3 ± 2.0	0.721

Table 3. Comparison of postoperative complications between transurethral resection of the prostate (TURP) and transurethral enucleation and resection of the prostate (TUERP).

Complication	TURP (n = 39)	TUERP (n = 37)	P value
Urinary retention	2 (5.1%)	1 (2.7%)	1.0
Urinary tract infection	3 (7.7%)	2 (5.4%)	1.0
Hematuria	1 (2.6%)	3 (8.1%)	0.352

Figure 1. International prostate symptom score (IPSS) and quality of life score(QoL) before and after TURP and TUERP

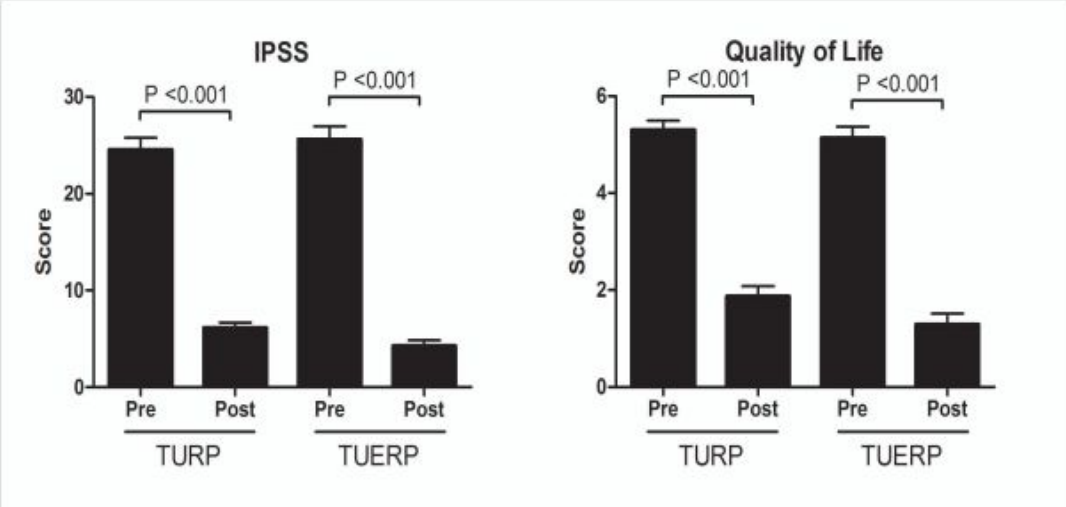

Figure 2. Urodynamic parameters such as maximum flow rate (Qmax) and post-void residual urine volume(PVR) before and after TURP and TUERP

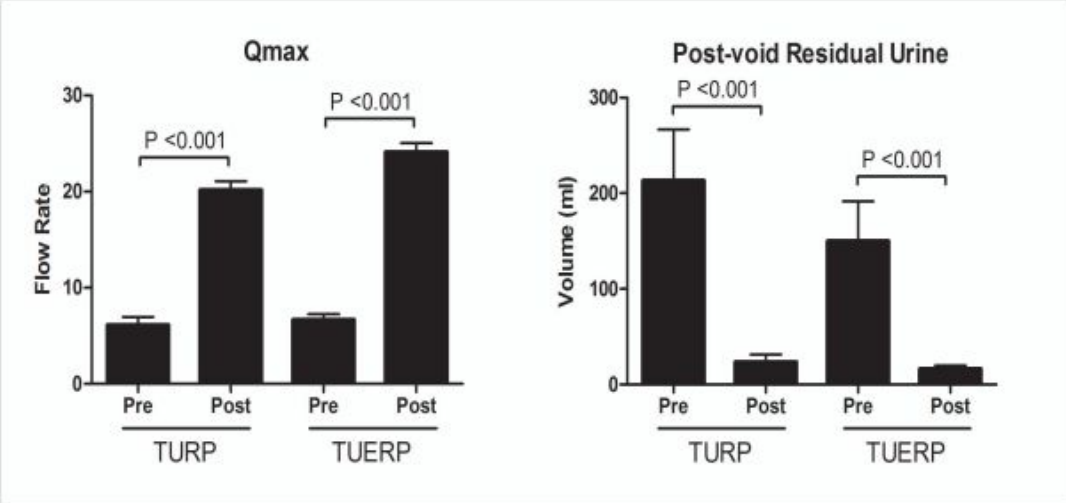

Figure 3. Comparison of surgical outcomes in terms of symptomatic and urodynamic improvement between TURP and TUERP