

# The Effectiveness of Otis Urethrotomy Combined with Six Weeks Urethral Dilations Until 40 Fr in the Treatment of Bladder Outlet Obstruction in Women: A Prospective Study

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**Purpose:** To evaluate the effectiveness of Otis urethrotomy combined with six weekly urethral dilations until 40 French (Fr) in the treatment of women with urodynamic diagnosis of bladder outlet obstruction (BOO).

**Materials and Methods:** Women diagnosed with lower urinary tract symptoms underwent urodynamic evaluation. Severity of symptoms and quality of life were assessed with international prostate symptom score (IPSS) and quality of life (QoL) questionnaires. Bladder outlet obstruction was defined as the presence of two or more of the following: maximum flow rate (Qmax) < 12 mL/s, detrusor pressure at maximum flow (PdetQmax) > 50 cmH<sub>2</sub>O and urethral resistance factor (URF) greater than 0.2. Ten out of 25 women diagnosed with BOO met the criteria. All women underwent Otis urethrotomy to 40 F and six-week urethral dilations until 40 F. After six months all patients underwent free uroflowmetry. Moreover post voiding residual (PVR), IPSS-QoL were recorded.

**Results:** Six months post-operatively there was a significant improvement in all parameters: IPSS = 13.5 vs. 22.5 ( $P = .001$ ), QoL = 3 vs. 5 ( $P = .001$ ), voided volume = 312 mL vs. 216 mL ( $P = .055$ ), Qmax = 27.5 mL/s vs. 12 mL/s ( $P = .001$ ), and PVR = 27.5 mL vs. 170 mL ( $P = .005$ ). Five women had close follow up during an average of 82 months. They maintained improved QoL ( $P < .005$ ) and low PVR ( $P < .002$ ). All other parameters lost their statistical significance.

**Conclusion:** The described therapeutical modality seems to improve all clinical and urodynamic parameters in women with evidence of BOO not related to detrusor sphincter dyssynergia or obvious functional and anatomical pathology.

**Keywords:** urinary bladder neck obstruction; female; urodynamics; quality of life; urination disorders.

## INTRODUCTION

The overall incidence of bladder outlet obstruction (BOO) among women presenting with lower urinary tract symptoms (LUTS) is estimated between 1% and 30%. This great range in incidence could be attributed to the different definitions given for women with BOO which mainly refer to patients symptoms, pressure-flow studies,<sup>(1,2)</sup> imaging results<sup>(3)</sup> or combination methods.<sup>(4)</sup> Causes of BOO in women could be divided into anatomic (pelvic organ prolapse, uterine fibroids, previous stress urinary incontinence surgery, urethral strictures, atrophic vaginitis, urethral diverticula, primary bladder neck obstruction) and functional (detrusor - sphincter dyssynergia, dysfunctional voiding, Fowler syndrome). Literature suggests that treatment of these women could be the anatomical reconstruction of bladder neck, urethral dilations, Otis urethrotomy and intermittent self-catheterizations.<sup>(5)</sup>

Aim of this study is to investigate the therapeutic efficacy of Otis urethrotomy combined with 6-week urethral dilations until 40 Fr in women with urodynamic evidence of BOO correlated with coordinated relaxation of the urethral sphincter in EMG during voiding while no obvious anatomical or functional obstacle exists.

## MATERIALS AND METHODS

This is a prospective study with an enrollment period from October 2001 to October 2006. Candidates to enter this study were women with LUTS due to BOO. Medical history and voiding diary were recorded, while all patients filled IPSS and QoL questionnaires. Clinical assessment included gynecological and neurological examination. Patients with suspected neurological disease were referred for further investigation to a neurologist. All women were submitted to uroflowmetry and PVR measurement.

Urodynamic study was accomplished according to the instructions of the International Continence Society.<sup>(6)</sup> Adhesive skin surface electrodes on the perineum were used to record electromyography of the urethral sphincter, while the patient was in the sitting position. The rate of administration of normal saline was 50 mL/min unless voiding diary showed evidence of small bladder capacity or detrusor overactivity appeared during the examination. In the last two cases the filling rate was reduced to 30 mL/min. We used

the diagnostic algorithm of Massey and Abrams<sup>(5)</sup> to assess BOO in women. Obstruction was defined as the coexistence of at least two of the following criteria: a) maximum urine flow during pressure-flow study ( $Q_{max}$ ) < 12 mL/s, b) detrusor pressure at maximum flow ( $P_{det}Q_{max}$ ) > 50 cmH<sub>2</sub>O and c) Abrams-Griffiths urethral resistance factor (URF) > 0.2. URF is calculated from the equation  $URF = P_{det}Q_{max}/Q_{max}^2$ . The above algorithm helps to avoid overdiagnosis of BOO in women.<sup>(7)</sup> Women excluded from the study were those suffering from neurogenic bladder, pelvic organ prolapse, patients with a history of previous dilatations and pelvic or stress incontinence surgery, those with a large increase in intraabdominal pressure during voiding (intraabdominal pressure increase > 20 cmH<sub>2</sub>O), patients with detrusor-sphincter dyssynergia or poor relaxation of pelvic floor muscles. Those who met the inclusion criteria, i.e. those with BOO and coordinated relaxation of the urethral sphincter in electromyography (EMG), were submitted to Otis urethrotomy and 6-week urethral dilations until 40 Fr. The procedure was as follows: under general anesthesia cystoscopy was performed using a 18 Fr cystoscopy sheath. Subsequently an Otis urethrotome was placed in the urethra, while the bladder was filled with 250 mL 0.9% NaCl. Otis urethrotomy to 40 Fr was performed along the 12 hour of the urethra. At the end of the procedure a 18 Fr Foley catheter was placed. Next morning catheter was removed and after hospital discharge all women underwent 6-week urethral dilations until 40 Fr. Six months after surgery follow up included uroflowmetry, post void residual measurement and IPSS and QoL questionnaires assessment. Data analysis was made with Wilcoxon t test and chi-square test. A *P* value of < .05 was considered statistically significant.

## RESULTS

Ten women fulfilled the entry criteria of the study. The average age was 65.7 years (54-80 years). During cystoscopy the majority of women (90%) were found to have bladder trabeculae. The cystoscope entry was difficult in three women. No patient was diagnosed with urethral stricture. IPSS parameters before and after surgery are shown in Table 1. Patients had severe preoperatively voiding and storage symptoms, with a median IPSS value of 21.5. After Otis urethrotomy and 6-week urethral dilations there was statistically signifi-

cant improvement in total IPSS, straining, urgency and urine flow ( $P = .000$ ;  $P = .000$ ;  $P = .004$ ; and  $P = .000$ , respectively). Table 2 presents preoperatively data along with results at 6 months postoperatively and in August 2011. Median preoperative maximum detrusor pressure was 68 cmH<sub>2</sub>O. All parameters, i.e. urinary flow, post voiding residual, urine volume, IPSS score and QoL were significantly improved 6 months after surgery ( $P = .001$ ;  $P = .005$ ;  $P = .055$ ;  $P = .001$ ; and  $P < .0001$ , respectively). No woman had stress incontinence post-operatively.

In August 2011 only 5 women accepted reevaluation but all of them refused to undergo urodynamic testing. The median post-operative interval period was 82 (55-107) months. Data from Table 2 show that the improvement of quality of life and PVR are maintained, both at statistically significant levels ( $P < .005$  and  $P < .002$ , respectively) compared with preoperative values.

## DISCUSSION

Bladder outlet obstruction in women is a diagnostic challenge because there is no agreed definition.<sup>(8)</sup> Recently its existence as a clinical entity is increasingly confirmed as shown by the number of articles published concerning diagnostic algorithms<sup>(5,7)</sup> or cut-off definition points.<sup>(9-12)</sup> The reproducibility of pressure flow studies seems to be very good in the literature. Nomograms have been described to assess a possible obstruction, but some studies show no correlation between the severity of symptoms of BOO and results on the main nomogram (nomogram of Blaivas).<sup>(13)</sup> We used the diagnostic algorithm of Mossey and Abrams for the diagnosis of BOO in women presenting with lower urinary tract symptoms.<sup>(5)</sup> It was considered the best diagnostic method among

**Table 1.** IPSS parameters and total IPSS score preoperatively and 6 months after surgery.

IPSS	Before Surgery	Six months post-operatively	P
Voiding	2 (0-3)	1 (0-2)	.132
Frequency	3 (1-5)	3 (2-3)	.342
Intermittency	3 (0-5)	2 (1-3)	.095
Urgency	4 (2-4)	3 (2-3)	.004
Weak stream	4 (4-5)	1 (0-2)	.000
Straining	4 (3-5)	1 (0-2)	.000
Nocturia	3 (1-3)	2 (1-3)	.343
Total score	21.5 (17-28)	11 (10-15)	.000

**Key:** IPSS, International Prostate Symptom Score.

the models proposed during the entry year of the study, i.e. 2001. The inclusion of more parameters, i.e. Qmax, PdetQmax and URF ensured greater diagnostic accuracy. In 2006 Akinwala and colleagues<sup>(7)</sup> compared all the suggested methods of BOO diagnosis and concluded that Mossey and Abrams method probably results in underdiagnosis. In 2000 Groutz and colleagues<sup>(14)</sup> was the first who tried to apply men self-assessment questionnaires in women with symptoms suggesting BOO. This study included a group of patients with specific urodynamic characteristics i.e. women who had coordinated urethral sphincter relaxation in EMG during voiding and BOO with no obvious anatomical or functional obstacle. The results were excellent at 6 months but in the long term only the improvements in QoL and PVR were maintained. It is interesting that Qmax appeared to be slightly worse in long term. However this result does not limit the efficacy of our method, since PVR and QoL are considered to be the most important treatment parameters.

The main limitation of this trial was a lack of control group.

**Table 2.** Urodynamic and clinical findings preoperatively at 6 months and 82 months post-operatively.

	Preoperatively	Six months post-operatively	82 (55-107) months post-operatively
IPSS	21.5 ( 17- 28)	11 ( 10-15 ), $P = .001$	22 (18-28), $P = .442$
QoL	5 (5-6)	3 (3-4), $P < .0001$	4, ( $P < .005$ )
Voiding Volume, mL	216 ( 157-762)	312 (205-768), $P = .055$	315.8 (92-1038), $P = .124$
Qmax, mL/s	12 (6-15)	27.5 (11.6-53), $P = .001$	10.3 ( 6-12.4), $P = .645$
P <sub>detQmax</sub> , cmH <sub>2</sub> O	68 (40-87)	NA	NA
PVR, mL	170 (35-610)	27.5 (0-30), $P = .005$	42 (15-80) $P < .002$
URF	0.44 (0.22-0.52)	NA	NA

**Key:** IPSS, international prostate symptom score; QoL, quality of life; Qmax, maximum flow rate; P<sub>detQmax</sub>, detrusor pressure at maximum flow rate; PVR, post voiding residual; URF, urethral resistance factor.

Another drawback of this study is that the imaging evaluation didn't include voiding cystourethrography. We didn't proceed to this diagnostic method because it would not help to the differential diagnosis. It could only help to determine the exact location of the obstacle which in any case would have the same therapeutic approach. Moreover it is well defined that no correlation exists between urethral diameter and urodynamic diagnosis of BOO unless it is  $\leq 10$  Fr.<sup>(15)</sup> No woman needed urethral dilations for the placement of 18 Fr cystoscope. Otis urethrotomy probably results in: temporary partial paralysis of the external sphincter in patients with detrusor-sphincter dyssynergia,<sup>(16)</sup> bladder neck or urethral stricture,<sup>(17)</sup> and urethral denervation due to dilatation.<sup>(18)</sup> Other studies present Otis urethrotomy as an empirical treatment because there are no data which record its effectiveness objectively.<sup>(19)</sup>

Otis urethrotomy has been applied to treat recurrent bladder infections<sup>(20)</sup> and urethral syndrome<sup>(21)</sup> but no therapeutic effectiveness was proved. Urethral overdistension to treat symptoms of lower urinary tract in women showed well short term results.<sup>(22)</sup>

## CONCLUSIONS

Our study showed very good short term results when we combined Otis urethrotomy with 6-week urethral dilations. Surgery resulted in statistically significant reduction in IPSS score, improved QoL, increased Qmax, reduced post voiding residual and increased voided volume. The improvement in quality of life and residual volume seems to be maintained in long term.

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## CONFLICT OF INTEREST

None declared.

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