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TREATMENT OF BLADDER OUTLET OBSTRUCTION IN FEMALES -MEDICAL THERAPY VERSUS SURGICAL TREATMENT OUTCOMES

Urology

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ABSTRACT

Background: The availability and increased use of various treatment modalities, as well as new imaging techniques, have recently revived the clinical awareness and interest in bladder outlet obstruction. **Aim:** To compare treatment outcomes of medical versus surgical therapy of female patients with bladder outlet obstruction. **Methods:** Female patients above 18 years with bladder outlet obstruction were included in this study. All the patients underwent detailed clinical history, physical examination, urine analysis, uroflowmetry, ultrasonography as routine. All the patients were subjected to multichannel pressure flow studies. After identification of cause of bladder outlet obstruction as anatomical or functional, appropriate treatment was given to patients ranging from medical treatment to surgical procedure. **Results:** Out of 54 women, 31 (57.4%) had anatomical bladder outlet obstruction and 23 (42.6%) had functional bladder outlet obstruction. The main cause for anatomical obstruction was urethral stricture as seen in 13 patients and the main cause for functional obstruction was dysfunctional voiding as seen in 20 patients. Significantly higher percentage of patients with functional bladder outlet obstruction underwent pelvic floor muscle training as compared to patients with anatomical bladder outlet obstruction ($p<0.05$). Significantly higher percentage of participants with anatomical bladder outlet obstruction underwent surgery as compared to patients with functional bladder outlet obstruction ($p<0.05$). There was no significant difference in percentage of participants receiving alpha blockers or other medicinal treatment when classified according to causes of bladder outlet obstruction ($p>0.05$). **Conclusion:** Because the appropriate treatment for functional obstruction drastically varies according to cause of obstruction, making an accurate diagnosis is paramount. Treatment directed at the cause of the bladder outlet obstruction shows better outcomes (in terms of decrease in CLSS score, QOL score and PVR in ml, and improvement in Qmax in ml/sec), with medical therapy (mainly alpha blockers) being main treatment modality in functional causes and surgical therapy in anatomical causes of obstruction.

KEYWORDS

Bladder outlet obstruction, Medical treatment, Surgical procedure, anatomical BOO and functional BOO.

INTRODUCTION:

The evaluation of BOO in female patients needs thorough clinical evaluation with understanding of symptomology of obstruction, physical examination, frequency volume charting, urine analysis, ultrasonography, uroflowmetry, cystoscopy and/or pressure flow study to define a proper cause obstruction.[1] Treatment of obstruction should hence be directed as per the etiology for the resolution of symptoms in most patients. The causes of BOO can be divided into two main groups; anatomical and functional.[2]

Anatomical obstruction can be either extrinsic or luminal. Functional obstruction is a common cause of BOO in females and can only be found during micturition and in the absence of anatomical abnormalities in the urinary system.

Due to increased life expectancy, there is an increased incidence of bladder outlet obstruction. Early diagnosis is important and can often lead to a simple and effective cure. Categorizing and understanding the anatomical entities is crucial as specific diagnostic modalities may be used to fully delineate the degree of bladder outlet obstruction and any secondary issues.[3]

Although the incidence of BOO is not high, but it can cause bothersome urinary tract symptoms and has negative effects on the overall well-being of female patients. Hence, BOO in female patients must be properly diagnosed and treated. [4,5]

METHODS:

Female patients above 18 years with bladder outlet obstruction were included in this study; excluding female patients with urogenital malignancy, proved neurological illness, active infection or bladder calculus, diagnosed case of interstitial cystitis, history of spine surgery or spine pathology. All the patients underwent detailed clinical history, physical examination, urine analysis, uroflowmetry, ultrasonography as routine. All the patients were subjected to multichannel pressure flow studies. After identification of cause of bladder outlet obstruction as anatomical or functional, appropriate treatment was given to patients ranging from medical treatment to surgical procedure including urethral dilatation, cystoscopy, bladder neck incision, optic internal urethrotomy, urethroplasty, intra-sphincteric botulinum toxin injection, caruncle excision, and anterior colporrhaphy. Patients were followed at 2 weeks, 1month and 3 months and response to treatment was monitored by symptom score questionnaire (CLSS symptom score and QOL), PVR (in ml) and Qmax in ml/sec.

RESULTS:

Mean age of study participants was 52.9±16.5 years. Highest percentage of participants were in the age of 51-60 years and least percentage of participants were <30 years of age. Most common medical issue was diabetes mellitus in 18.5% participants followed by 11.1% suffering from hypertension, 3.7% having IHD and 5.6% suffering from hypothyroidism [Table 1].

Table 1: Age and medical history of study participants

	Frequency (n=54)	Percentage
	Age	
< 30 years	6	11.1
31 – 40 years	8	14.8
41 – 50 years	8	14.8

51 – 60 years	15	27.8
61 – 70 years	8	14.8
>71 years	9	16.7
	Medical history	
Diabetes mellitus	10	18.5
Hypertension	6	11.1
IHD	2	3.7
Hypothyroidism	3	5.6

Out of 54 women, 31 (57.4%) had anatomical BOO and 23 (42.6%) had functional BOO. The main cause for anatomical obstruction was urethral stricture as seen in 13 patients and the main cause for functional obstruction was dysfunctional voiding as seen in 20 patients [Table 2].

Table 2: Causes of bladder outlet obstruction

variables	Frequency (n=54)	Percentage
Anatomical	31	57.4
Urethral Stricture	13	41.9
Cystocele	5	16.1
Meatal Stenosis	4	12.9
Atropic Urethritis	3	9.7
Bladder Neck Stenosis	3	9.7
Urethral Caruncle	2	6.5
Cystocele with Senile Urethritis	1	3.2
Functional	23	42.6
Dysfunctional Voiding	20	87.0
Primary Bladder Neck Obstruction	3	13.0

From 54 patients, 27 underwent pelvic floor muscle training, 51 were on alpha blockers, 13 were on other medicinal treatment and 27 underwent surgery. Significantly higher percentage of patients with functional BOO underwent pelvic floor muscle training as compared to patients with anatomical BOO ($p<0.05$). Significantly higher percentage of participants with anatomical BOO underwent surgery as compared to patients with functional BOO ($p<0.05$). There was no significant difference in percentage of participants receiving alpha blockers or other medicinal treatment when classified according to causes of BOO ($p>0.05$)[Table3].

Table 3: Treatment received by patients

	Anatomical (n=31)		Functional (n=23)		Total (n=54)		P value
	Freq	%	Freq	%	Freq	%	
Pelvic floor muscle training	4	12.9	23	100	27	50	0.001
Alpha blockers	28	90.3	23	100	51	94.4	0.253
Other medicinal treatment	7	22.6	6	26.1	13	24.1	1.000
Surgery	26	83.9	1	4.3	27	50	0.001

PVR decreased significantly from baseline to 2 weeks, 2 weeks to 1 month in all patients and when classified according to line of treatment ($p<0.05$). PVR did not change significantly from 1 month to 3 months ($p>0.05$) [Table4].

Table 4: PVR when classified according to line of treatment

	Non- surgical (n=27)	Surgical (n=27)	Total (n=54)	P value
Baseline (ml)	76±40	90±64	83±54	0.782
Week 2 follow-up (ml)	49±30*	41±29*	45±29*	0.353
Month 1 follow-up (ml)	29±16*	25±20*	27±18*	0.293
Month 3 follow-up (ml)	25.8±16	22±14	24±15	0.241

***Significantly different from the previous/baseline reading p<0.05**

Qmax increased significantly from baseline to 2 weeks, 2 weeks to 1 month and 1 month to 3 months in all patients and in patients who underwent surgical treatment ($p<0.05$).

In patients with non-surgical treatment, Qmax increased significantly from baseline to 2 weeks and 1 month to 3 months ($p<0.05$). In patients with surgical treatment, Qmax did not change significantly from 2 weeks to 1 month ($p>0.05$) [Table 5].

Table 5: Qmax when classified according to line of treatment

	Non- surgical (n=27)	Surgical (n=27)	Total (n=54)	P value
Baseline (ml/s)	6.9±2.9	6.8±3.2	6.8±3.0	0.586
Week 2 follow-up (ml/s)	11.6±4.9*	11.9±4.1*	11.8±4.5*	0.633
Month 1 follow-up (ml/s)	12.9±3.9	15.3±3.5*	14.1±3.9*	0.016
Month 3 follow-up (ml/s)	15.2±3*	16.5±2.7*	15.8±2.9*	0.091

***Significantly different from the previous(baseline) reading p<0.05**

CLSS decreased significantly from baseline to 2 weeks, 2 weeks to 1 month and 1 month to 3 months in all patients and also when classified according to causes of BOO ($p<0.05$)[Fig1].

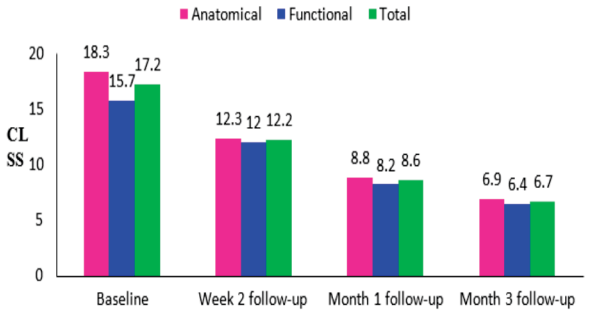

Fig. 1: CLSS when classified according to cause of BOO

An average decrease of 10.4±4.2 was observed. There was no significant difference in change in CLSS when classified according to causes of BOO or line of treatment ($p>0.05$)[Fig2].

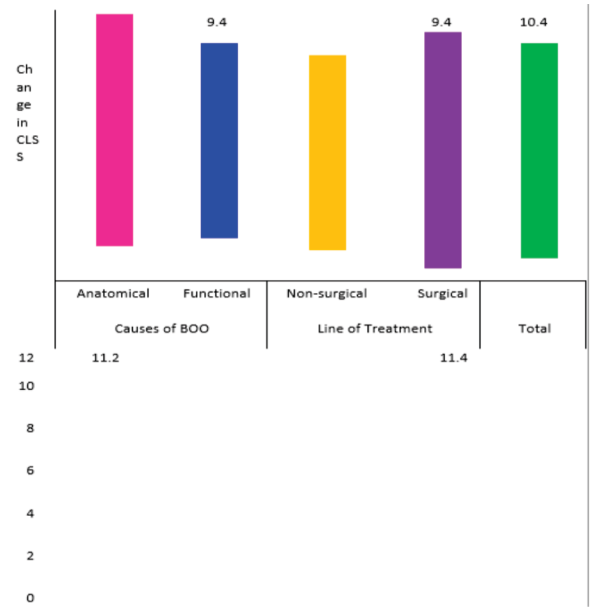

Fig. 2: Decrease in CLSS after 3 months

QOL was significantly higher in patients with anatomical BOO as compared to functional BOO at baseline ($p<0.05$). However, there was no significant difference in CLSS between anatomical and functional BOO at 2 weeks, 1 month and 3 months ($p>0.05$).

QOL decreased significantly from baseline to 2 weeks, 2 weeks to 1 month and 1 month to 3 months in all patients and in patients with anatomical BOO ($p<0.05$). In patients with functional BOO, QOL decreased significantly from baseline to 2 weeks, 2 weeks to 1 month ($p<0.05$) [Fig 3].

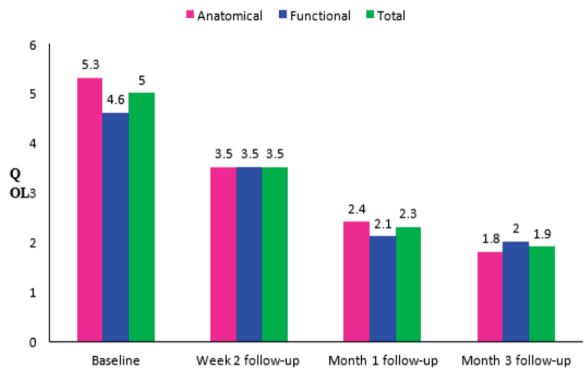

Fig. 3: Quality of life when classified according to cause of BOO

DISCUSSION:

The cause of obstruction can be anatomical or functional [3] and the treatment is guided as per the underlying cause and treatment options can range from medical to appropriate surgical interventions. In our study after the evaluation of cause of BOO (whether anatomical or functional cause) treatment was given (medical or surgical or both) and response to treatment was monitored with CLSS and QOL score, PVR (ml) and Qmax (ml/s) before the treatment and then at 2 weeks, 1month and 3 months.

In our study, anatomical group out of 54 subjects, 13 patients (24%) were found to have urethral stricture, 5 (11.5%) had cystocele, 4 (7.4%) had meatal stenosis, 3(5.5%) had bladder neck stenosis, 3 (5.5%) had atrophic urethritis and 2 (3.7%) had caruncle as the cause of bladder outlet obstruction. Brucker et al[6] reported urethral stricture in 16.6% (n=26/81), pelvic organ prolapses in 13.4% (n=21/86), anti-incontinence surgery in 19.7% and 7% other causes. Sachin Malde et al [7] reported stricture in 20%, cystocele in 12%, anti-incontinence surgery in 21% of cases (n=122 in the anatomical group) and 20% other anatomical causes.

In our study, the functional group (n=23), 20 (37%) patients had dysfunctional voiding (DV) and 3 (5.5%) patients had primary bladder neck obstruction (PBNO). Brucker et al [6] reported dysfunctional voiding (DV) in 21.7%, 10.2% as primary bladder neck obstruction (PBNO) and 14% as sphincter obstruction. In literature the incidence of dysfunctional voiding (DV) ranges from 10.5-36.3%, [8] primary bladder neck obstruction (PBNO) in 5-8.7%. [9] Treatment Outcomes: Fifty percent of the patients underwent surgical treatment and rest were managed by medical therapy and/or physiotherapy.

In the non-surgical group (alpha blockers &/or PFMT &/or other medicines) i.e 27 patients, after a follow of 3 months there was significant decrease of 9.4±4.3 and 2.7±1.6 in CLSS and QOL score respectively. PVR decreased from baseline of 76±40 ml to 25.8±16ml with average decrease of 48.4±42.3; Qmax improved from 6.9±2.9 ml/sec to 15.2±3 ml/sec with an average improvement in the Qmax of 8.3±3.8. There was no significant difference in these parameters between anatomical obstruction and functional obstruction groups.

Ahmad et al, [10] in 2014 did a study on 94 patients with LUTS taking Tamsulosin 0.4mg and recorded decrease in mean IPSS score from 23.5 to 7.6, decrease in PVR from 120ml to 18ml and improvement in Qmax from 8.2 to 15.6 ml/sec after 6 weeks of medical treatment. Mean IPSS score <8, PVR <18ml and mean Qmax >15ml/sec were considered efficacious. They concluded that Tamsulosin significantly decreased IPSS, PVR and improved Qmax, so should be used as first line of treatment for moderate to severe LUTS in women. Several other studies in the literature concluded the same like, Lee et al, [11] studied 106 women with voiding dysfunction and categorized them based on urodynamic assessment. 76 had urodynamically proven BOO (based on Blaivas-Groutz nomogram). Mean reduction in IPSS (23.9±6.09 to 16.1±8.17), PVR (69.13±85.45 to 39.88±48.39ml) and improvement in Qmax 110.15±2.79 to 13.47±5.65 ml/sec) were observed.

In the surgical group after a follow up of 3 months there was a significant average decrease in the CLSS and QOL score after the surgical procedure by 11.4±4 and 3.5±1.4 respectively. PVR (ml) decreased from baseline of 90±64 ml to 22±14ml with average decrease of 68.3±65.9. There was significant improvement in Qmax from 6.8±3.2 to 16.5±2.7 with an average improvement of 9.7±4. There was no significant difference in CLSS score, quality of life (QOL), post-void residual (PVR) and Qmax between anatomical obstruction and functional obstruction groups. In the surgical group Urethral dilatation was the main cornerstone of treatment in patients with urethral stricture. Most (n=10) patients underwent urethral dilatation with intermittent self-calibration followed by Otis Urethrotomy in 5 patients and endoscopic dilatation in 3 patients.

Romman et al (2012), [12] have shown only a 51% success rate for initial dilatation 41F. Prior urethral dilatation (UD) was a statistically significant predictor of failure in this cohort study. Heidari et al in 2014, [13] performed a review of 86 patients without previous dilation at a single centre and reported a success rate of 100% with dilation to 24 French; however, the study had a short follow up time with a mean of 6 months. The mean PVR and maximum urinary flow speed changes, before and after on demand dilatation, were higher than in the intermittent self-calibration group. These results demonstrate that urethral dilation has potential to treat urethral strictures with low complication rates; however, repeat endoscopic treatment have higher failure rates. A success rate of 57% was reported by Smith et al [14] in several women after dilatation to 30F at a median follow up of 21 months. AUA symptom score improved in all women by a mean of 10.7 points. Significant decrease in PVR and increase in Qmax was recorded on follow up of 3 months.

In our study one patient with urethral stricture in anatomical group underwent urethroplasty. In literature maximum studies have shown a higher success rate (80-94%) than urethral dilatation (50%) although with shorter mean follow up [Osman et al [15]]. In recent study by Shidharta K et al (2021), [16] while studying a total of 16 patients who underwent surgical management of female urethral stricture disease. 13 out of 16 patients had successful calibration with 14F catheter on the initial presentation. These 13 patients on VUDS demonstrated significant BOO and had variable stigmata of stricture on urethroscopy. The mean IPSS and Post void residue(ml) decreased from 23.88±4.95 and 117.06±74.46 ml at presentation to 3.50±3.44 and 12.50±8.50mL after urethroplasty. Qmax improved from 7.72±4.25ml/s to 22.34±4.80 ml/s after urethroplasty($p<0.05$).

In our study 5 patients underwent Otis urethrotomy. These patients were followed for 3 months without any follow up urethral dilatation. There was significant decrease in CLSS and QOL score, decrease in PVR (ml) and significant improvement in Qmax on follow up. Grivas et al [17] diagnosed 10 out of 25 women with bladder outlet obstruction (BOO) who underwent Otis urethrotomy to 40F and 6 weeks urethral dilatation until 40 Fr. 6 months postoperatively there was a significant improvement in all parameters. IPSS decreased from 22.5 to 13.5; QOL decreased from 5 to 3; voided volume increased from 216ml to 312ml; PVR decreased from 170 ml to 27.5ml and Qmax improved from 12ml/sec to 27.5ml/sec.

6 patients in our study were diagnosed with BOO secondary to cystocele. 3 were managed with medical and PFMT/PFME and 3 underwent anterior colporrhaphy. On follow up, there was significant decrease in CLSS score and PVR with significant improvement in Qmax in both groups. Romanzi et al [18] studied the effect of prolapse on the voiding function by using a pessary or vaginal pack to reduce the prolapse. They found obstruction in 4% of grade 1 and 2 cystocele and 58% of grade 3 and 4 cystoceles and after reduction of prolapse there was relief of obstruction in 94 % population.

In the functional group 1 patient with dysfunctional voiding underwent intra-sphincteric BOTOX injection and there was significant decrease in CLSS score, QOL and PVR (ml) with improvement in Qmax on follow up. Apostolidis A et al [19] in 2009 reviewed various articles regarding primary and secondary outcomes after BOTOX injection. In most of the studies injection of Botulinum toxin A into the sphincter has been used for treatment of dysfunctional voiding with outcomes showing improvement of flow rates and decrease in PVR and urethral pressures.

CONCLUSION:

Because the appropriate treatment for functional obstruction drastically varies according to cause of obstruction, making an accurate diagnosis is paramount.Treatment directed at the cause of the BOO shows better outcomes (in terms of decrease in CLSS score, QOL score and PVR in ml, and improvement in Qmax in ml/sec), with

medical therapy (mainly alpha blockers) being main treatment modality in functional causes and surgical therapy in anatomical causes of obstruction.

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