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Original Article

Effects of Bladder Diverticulum on Storage and Emptying Phase of the Lower Urinary System: Urodynamic and Clinical Evaluation

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ABSTRACT

Objective: Although bladder diverticulum is a disease that has been known and treated for a long time, there are not enough urodynamic studies about patients with bladder diverticulum in the literature. In this study, it was aimed to describe the urodynamic findings in the storage and voiding phases of the lower urinary tract in patients.

Methods: Patients who applied to the urology clinic with lower urinary tract symptoms between February 2010 and August 2020 and who were found to have bladder diverticulum were evaluated retrospectively. Fifty patients who met the study inclusion criteria were considered. The medical histories, physical examinations, laboratory tests, imaging results, urodynamic study results, and the surgery reports of all the patients were reviewed retrospectively.

Results: Of the patients included in the study, 18% were women and 82% were men. Fifty-four percent of the patients applied to the polyclinic with voiding symptoms. Four percent of the patients with bladder diverticulum were asymptomatic. It was determined that 60% of the male patients with a history of urological operation were treated for infravesical obstruction. Of the total patients, 22% were followed up without any surgical treatment. A urodynamic study was performed in 50% of the patients. The most common urodynamic finding was detrusor overactivity, followed by obstructed outflow function.

Conclusion: As most of the patients with bladder diverticulum are asymptomatic, diverticulectomy is not indicated in every patient. First of all, patients should be investigated for the pathology causing diverticulum formation, and then the follow-up or the treatment options should be considered. Therefore, it could be argued that all patients with bladder diverticulum should be evaluated urodynamically. Further research is needed to explore this issue.

INTRODUCTION

An acquired (secondary) bladder diverticulum is mostly caused by bladder outlet obstruction or neurogenic lower urinary tract dysfunction. Bladder outlet obstruction may be caused by prostate (benign prostatic hypertrophy [BPH] and prostate adenocarcinoma), bladder neck (bladder neck hypertrophy and bladder neck contracture), or urethra (urethral stricture). An acquired bladder diverticulum is generally asymptomatic and is detected in men presenting with nonspecific lower urinary tract symptoms (LUTS) after the sixth and seventh decades. It was observed that 70% of the male patients with bladder diverticulum had underlying BPH. It is less common in women than in men, and its etiology includes dysfunctional voiding, pelvic organ prolapse, urethral stricture, and obstructions due to anti-incontinence surgery.

Patients with bladder diverticulum are usually asymptomatic and detected incidentally (radiologically or endoscopically) or present with nonspecific LUTS or hematuria, acute urinary retention (AUR), and urinary tract infection (UTI). Premalignant or malignant lesions can be seen in 1%–10% of the patients with bladder diverticulum due to chronic stasis and chronic inflammation. As most patients with acquired bladder diverticulum are asymptomatic, there is no indication for diverticulectomy in all patients. First of all, specific treatment should be performed for the pathology that caused the formation of the diverticulum. Diverticulectomy is indicated in the presence of chronic UTI, bladder stone, premalignant, or malignant lesion, and if the upper urinary system is affected due to obstruction or reflux. Endoscopic diverticulum neck resection, diverticulum fulguration, and open/laparoscopic/robotic diverticulectomy are among the treatment options.

Although acquired bladder diverticulum is a disease that has been known and treated for a long time, there are not many urodynamic studies in patients with bladder diverticulum in the literature. Celebi et al.[1] showed that large or multiple bladder diverticulum can change the bladder filling and emptying function, reduce the capacity of the bladder, and reduce its elasticity in the rabbit model. They suggested that large or multiple bladder diverticulum may cause voiding dysfunction by leading to involuntary bladder contractions.[1] The result of the urodynamic analysis of 91 male patients by Adot Zurbano et al.[2] showed that detrusor contraction time was the only contractility parameter that was significantly affected in the bladder diverticulum, and there was a significant relationship with the use of abdominal pressure during emptying the bladder. They concluded that diverticulectomy provided improvement in bladder contractility.

In a urodynamic study of the patients with acquired bladder diverticulum, decreased bladder capacity, detrusor overactivity (DOA), and decreased compliance in the storage phase, detrusor underactivity (DUA) and outlet obstruction were found to be more common in the voiding phase.[1] When viewed from this aspect, preoperative urodynamic analysis can also be used to predict postoperative outcomes.

In this study, it was aimed to describe the urodynamic disorders that exist in the storage and voiding phase of the lower urinary tract in patients with bladder diverticulum.

MATERIALS AND METHODS

Patients who applied to the urology outpatient clinic of our hospital between February 2010 and August 2020 with lower urinary system symptoms (LUTS) and who were found to have bladder diverticulum after the examinations were evaluated retrospectively. Patients with a history of spinal cord trauma or injury, congenital bladder diverticulum, and active urinary infection, patients who had undergone previous surgery for pelvic malignancy and received radiotherapy or chemotherapy, and those in the pediatric age group were excluded from the study. Fifty patients who met the criteria were included in the study.

Medical history, physical and neurological examination, laboratory tests (complete urinalysis, urine culture, prostate-specific antigen, urea, creatinine, and uroflowmetry), imaging results (urinary ultrasonography and abdominal computed tomography), urodynamic study results, and surgical notes of the patients who had had surgery were reviewed. The Charlson comorbidity index (CI) was calculated based on the medical history of the patients.

The urodynamic study of the patients was performed in accordance with International Continence Society standards.[3] Pressure measurements were made using an air-charged 7 F double-lumen bladder catheter and a 7 F rectal catheter (T-doc, Laborie, Canada). Free flow uroflowmetry was performed in all patients before the invasive urodynamic procedure. At the beginning of the procedure, the residual urine volume of the patients was recorded. In cystometry (MMS Solar, The Netherlands), the bladder (body weight/4 mL/min) was filled with sterile saline at room temperature with the patient in a sitting position. Simultaneously, bladder, abdominal, and detrusor pressures, urine flow rate, superficial electromyography (EMG), were recorded. The senses, bladder volume, compliance, detrusor activity, and outlet function of the patients were evaluated. Abdominal leak point presure (ALPP) was evaluated with the patients in sitting or standing position, and the bladder was filled with 150 cc of urine. If urinary incontinence did not occur, the Valsalva maneuver was repeated until incontinence was observed at each subsequent 100 mL. In the meantime, attention was paid to the presence of DOA. The abdominal leak point pressure (ALPP) value was accepted as the minimum intra-abdominal pressure that caused urine to leak from the external meatus without voluntary detrusor contraction when the Valsalva maneuver was performed. ALPP <60 cmH_2O was considered an intrinsic sphincter defect, whereas ALPP >90 cmH_2O was evaluated as an anatomical stress urinary incontinence.[4] Moreover, DOA was considered involuntary detrusor contraction at any pressure that could occur spontaneously or with stimulation during the filling phase in cystometry.

Pressure flow study (PFS) was performed after reaching the maximum cystometric capacity when the patient was in the sitting position. Primarily the patient was asked to micturition and then he/she was left alone in the urodynamic laboratory. In the meantime, bladder, abdominal and detrusor pressures, urine flow rate, superficial EMG, were also recorded. The amount of urine remaining in the bladder after PFS was recorded.

While pdetQmax value was >25 cmH_2O in female patients, patients with Qmax value <12 mL/s were considered to have outlet obstruction.[4] Those with a maximum Watts factor of <7 W/m^2, which was calculated from the relevant nomogram, were accepted as detrusor failure cases.[5] In male patients, outlet obstruction was evaluated with bladder outlet obstruction index (BOOI = pdetQmax – 2Qmax), and detrusor contractility was evaluated with bladder contractility index (BCI = pdetQmax + 5Qmax). BOOI >40 was considered an outlet obstruction, and BCI <100 was considered a DUA.[6] The voiding, which was characterized by an intermittent or staccato flow pattern due to involuntary and intermittent pelvic floor contractions, was considered dysfunctional voiding.

The data were given as mean±standard deviation. In our study, descriptive statistical methods were used. Statistical analysis of the data was performed with GraphPad Prizm5.0 statistical program by using Chi-squared and Mann–Whitney tests. $P<0.05$ was considered statistically significant.

RESULTS

Between February 2010 and August 2020, among the patients who applied to the urology outpatient clinic of our hospital with LUTS and who were found to have bladder

diverticulum after the examinations, 50 patients who met the criteria were included in the study.

Of the patients included in the study, 18% were females and 82% were males. The mean age of the patients was 54.88±18.31 years. The mean age of women was 44.56±20.99 years, and the mean age of men was 57.15±17.13 years (p=0.093). It was observed that the male patients were older than the female patients.

The complaints of the patients with bladder diverticulum are given according to the gender in Table 1. Most of the patients applied to the clinic with urological complaints such as excretory symptoms, acute urinary retention (AUR), dysuria, hematuria, incontinence, flank pain, and urinary tract infection (UTI) symptoms, and some patients were found incidentally during routine outpatient controls. Of the patients, 54% applied to the outpatient clinic with emptying symptoms, and a transurethral catheter was inserted into 10% of them due to the development of AUR. Although excretory symptoms were the most common reason for admission to the outpatient clinic, it was observed that 12% of the patients presented with dysuria, 14% with hematuria, 10% with incontinence, 10% with flank pain, and 2% with chronic UTI. Four percent of the patients with bladder diverticulum were found to be asymptomatic (Table 1).

The history of the patients with bladder diverticulum by gender is shown in Table 2. The mean CI of the patients was 0.66±1.1. The mean CI of women was 0.44±0.73, while that of men was 0.71±1.1 (p=0.7231). Eighteen percent of the patients had neurological diseases such as cerebrovascular disease, polyneuropathy, meningomyelocele, and diabetes mellitus. There was a history of previous urological surgery in 22% of the patients. It was determined that 60% of the male patients with a history of urological operation underwent procedure due to infravesical obstruction, cystolithotripsy was performed for bladder stone secondary to infravesical obstruction in 10% of the male patients, and procedure for bladder cancer was performed in 30% of the male patients. Of these male patients, 36% underwent operations for diseases other than urological operations.

It was found that 10% of the patients were taking alpha-blockers or combined therapy (alpha-blocker + dutasteride) for BPH. In addition, 4% of the patients used anticholinergic drugs, while 50% of the patients used drugs due to other systemic diseases (Table 2).

The diverticulum characteristics of the patients by gender are presented in Table 3. According to the imaging methods (urinary ultrasonography or abdominal computed tomography), the mean diverticulum size was 58±30 mm. While it was 29±26 mm in women, it was 64±27 mm in men. Diverticulum size was found to be statistically different between men and women (p=0.005). The median diverticulum was found to be 1 (1–5) in the patients. It was

Table 1. Admission complaints of the patients with bladder diverticulum by gender

Urological complaint	Female	Male	Total
	n (%)	n (%)	n (%)
Emptying symptoms	3 (33.3)	24 (58.5)	27 (54)
AUR	0 (0)	5 (12.1)	5 (10)
Dysuria	2 (22.2)	4 (9.7)	6 (12)
Hematuria	0 (0)	7 (17.0)	7 (14)
Incontinence	3 (33.3)	0 (0)	3 (6)
Flank pain	2 (22.2)	3 (7.3)	5 (10)
UTI symptoms	0 (0)	1 (2.4)	1 (2)
Asymptomatic	0 (0)	2 (4.8)	2 (4)
Total	9 (100)	41 (100)	50 (100)

AUR: Acute urinary retention; UTI: Urinary tract infection.

Table 2. History of patients with bladder diverticulum by gender

	Female (n=9)	Male (n=41)	Total (n=50)
History of neurological disease	2	7	9
Previous urological operations	1	10	11
TUR-P	–	4	
TUR-Bt	–	3	
Internal urethrotomy	–	2	
Cystolithotripsy	0	1	
Cystocele repair and TOT	1	–	
Other previous operations	2	16	18
Drugs used			
Alpha blocker	–	3	
Combined therapy (alpha-blocker and dutasteride)	–	2	
Anticholinergic	2	0	
Other drugs	5	20	25

TUR-P: Transurethral resection-prostatectomy; TUR-Bt: Transurethral resection-bladder tumor; TOT: Transobturator tape.

Table 3. Diverticulum characteristics of patients with bladder diverticulum by gender

	Female	Male
	n (%)	n (%)
Diverticulum size		
<5 cm	8 (88.8)	15 (36.5)
5–10 cm	1 (11.1)	21 (51.2)
>10 cm	0	5 (12.1)
Number of diverticulum		
Solitary	7 (77.7)	29 (70.7)
Multiple	2 (22.2)	12 (29.2)
Diverticulum localization		
Lateral walls	9 (100.0)	34 (82.9)
Posterior wall	0	6 (14.6)
Dome	0	1 (2.4)
Anterior wall	0	0

observed that the diverticulum was mostly solitary in all genders. The median value of diverticulum was found to be 1 (1–3) in women and 1 (1–5) in men (p=0.930). It was determined that the bladder diverticulum was localized not only in the lateral wall of the bladder but also in the posterior wall and dome (Table 3).

Prostate volumes of 41 male patients with bladder diverticulum were found to be 49.30 cc (15–166 cc) on average. Bladder stones were found in 4.8% of the male patients, and bladder tumor was found in 4.8% of the male patients as additional pathology. A biopsy was taken from the suspicious area in the diverticulum in one of the patients with suspected tumor in his cystoscopies and the pathology result was Ta low-grade transitional cell carcinoma. In another patient, a 2 cm tumor was resected lateral to the diverticulum orifice, and it was interpreted by the pathologist as suspicious of carcinoma in situ. No additional pathology was detected in female patients.

The treatments applied to patients with bladder diverticulum and their distribution by gender are given in Table 4. Of the patients included in the study, 22% were followed without surgical treatment. Of the patients who were followed up, 72.7% were women. Various urological surgical treatments were applied to 78% of the patients. It was determined that only 2.5% of the patients who needed surgical treatment were women. The endoscopic intervention was performed in 25.6% of the patients and open or laparoscopic operations were performed in the others. Diverticulectomy was performed in 71.7% of the surgically treated patients and laparoscopic diverticulectomy was performed in 3.5% of them, while open diverticulectomy was performed in the remaining group of the patients. It was determined that 25% of the patients who underwent diverticulectomy had simultaneous ureteroneocystostomy operation because diverticulum was close to the ureteral orifice or that the diverticulum also held the ureteral orifice. It was found that 17.5% of the male patients underwent open prostatectomy in addition to diverticulectomy, while 2.6% of them performed only open prostatectomy. While it was determined that 36.8% of the male patients had an open or endoscopic surgical procedure for infravesical obstruction, none of the female patients were treated for infravesical obstruction. TUR-P operation was performed in 50% of the endoscopic operations performed for male patients due to infravesical obstruction, and internal urethrotomy was performed in 30%. Internal urethrotomy was performed in addition to 20% of the patients who underwent TUR-P and cystolithotripsy was performed in 20% of the patients (Table 4).

The distribution of urodynamic findings by gender is shown in Table 5. Urodynamics was performed in 50% of the patients who were included in the study. It was observed that 36% of the patients who underwent urodynamic analysis were females and 64% were males. The findings in the filling phase and voiding phase of the urodynamic examination are given in Table 5. The most common urodynamic finding of the patients who were included in the study was DOA, followed by obstructed outlet function in the voiding phase. In the filling phase, 84% of the patients had DOA and 20% of the patients had urodynamic stress incontinence. In addition, mixed urinary incontinence was found in 16% of the patients. In the voiding phase, DUA was detected in 16% of the patients and outlet obstruction in 64%. No pathology was detected in 12% of the patients in the filling phase and 20% of the patients in the voiding phase (Table 5).

Table 4. Treatments applied to patients with bladder diverticulum and their distribution by gender

	Female	Male	Total
	n (%)	n (%)	n (%)
Follow-up	8 (72.7)	3 (27.2)	11 (22)
Surgical intervention	1 (2.5)	38 (97.4)	39 (78)
Diverticulectomy and cystolithotomy	–	1 (2.6)	
Diverticulectomy	1	14 (36.8)	
Diverticulectomy and UNC	–	7 (18.4)	
Diverticulectomy and TVP	–	5 (13.1)	
Open prostatectomy	–	1 (2.6)	
TUR-P	–	3 (7.8)	
TUR-P and Internal ureterostomy	–	1 (2.6)	
TUR-P and cystolithotripsy	–	1 (2.6)	
Internal ureterostomy	–	3 (7.8)	
TUR-biopsy	–	2 (5.2)	
	9 (100)	41 (100)	50 (100)

UNC: Ureteroneocystostomy; TVP: Transvesical prostatectomy; TUR-P: Transurethral resection-prostatectomy, TUR-biopsy: Transurethral resection-biopsy.

Table 5. Distribution of urodynamic findings by gender in patients with bladder diverticulum

	Female	Male	Total
	n (%)	n (%)	n (%)
Filling phase	9	16	25
Normal	0	3 (18.7)	3 (12.0)
Detrusor overactivity	7 (77.7)	10 (62.5)	17 (68.0)
Stress urinary incontinence	0	1 (6.2)	1 (4.0)
Mixed urinary incontinence	2 (22.2)	2 (12.5)	4 (16.0)
Voiding phase	9	16	25
Normal	2 (22.2)	3 (18.8)	5 (20.0)
Detrusor underactivity	1 (11.1)	2 (12.5)	3 (12.0)
Obstructed outlet function	6 (66.6)	10 (62.5)	16 (64.0)
Not voiding	0	1 (6.2)	1 (4.0)

DISCUSSION

Bladder diverticulum is the herniation of the bladder urothelium (mucosa and submucosa) through the muscu-

laris propria from congenital or acquired weak points of the bladder muscle.[7] The outer wall of the bladder diverticulum usually contains scattered smooth muscle fibers; however, they are not functional.[8] Emptying dysfunction occurs due to the sparse or absence of muscle layer covering the diverticulum and noncontractile diverticulum mucosa, thus resulting in diverticular hypotonia that contributes to urinary stasis.[1]

In the literature, bladder diverticulum is more common in men than in women, and this ratio is approximately 9:1.[8] In our study, the male–female ratio of the patients was found to be 4.5:1. The higher number of female patients in our study may be due to the increased use of imaging modalities and the inclusion of asymptomatic patients. In our study, the mean age of the patients was found to be 54.88±18.31 years, and the age of the male patients was found to be more advanced. In our study, the patients with bladder diverticulum were usually detected in the sixth and seventh decades.[9]

According to studies, most bladder diverticula are asymptomatic and are detected incidentally during the evaluation for hematuria, bladder outlet obstruction, or UTI. As a result of the large size of the diverticulum, recurrent UTI may be manifested with the development of bladder stones, urinary retention, and malignancy due to chronic irritation of the urine.[7,10,11] In our study, 54% of the patients showed voiding symptoms and 10% of the patients underwent transurethral catheterization due to AUR. Although emptying symptoms were the most common reasons for admission, 12% of the patients presented with dysuria, 14% with hematuria, 10% with incontinence, 10% with flank pain, and 2% with chronic UTI. In our study, only 4.8% of the patients with bladder diverticulum were found to be asymptomatic. In the literature, 90% of adults with bladder diverticulum are asymptomatic.[8] In our study, the rate of asymptomatic patients was found to be very low compared with the literature. We think that the patient group included in our study was not chosen from the community and who applied to the urology outpatient clinic with any urological complaint.

According to the study of Van Arsdalen and Wein, acquired bladder diverticula are mostly caused by bladder outlet obstruction or neurogenic vesicourethral dysfunction.[8] An acquired bladder diverticulum is common in the case of bladder outlet obstruction.[8] Common causes of bladder outlet obstruction in men include benign/malignant prostate disease and urethral stricture. Less common causes include primary bladder neck obstruction, vesicourethral anastomotic stenosis after prostatectomy, and functional obstruction as a result of neurogenic vesicourethral dysfunction.[8] According to a study, approximately 70% of bladder diverticulum was found to be associated with BPH.[12] In women, pathologies that cause outlet obstruction such as dysfunctional voiding, vaginal prolapse, bladder neck hypertrophy, urethral stricture, and iatrogenic obstruction due to anti-incontinence surgery were identified as bladder diverticulum etiology.[12] In addition, it has been shown in some studies that acquired bladder diverticula can also be found in children and young adults secondary to some conditions such as posterior urethral valve, prune belly syndrome, neurogenic vesicourethral dysfunction, and genetic connective tissue disorders (e.g., Ehlers-Danlos or Williams syndrome).[12] In our study, 18% of the patients had neurological diseases such as cerebrovascular disease, polyneuropathy, meningomyelocele, and diabetes mellitus that could cause bladder contraction disorders. There was a history of previous urological surgery in 22% of the patients. It was determined that 60% of the male patients with a history of urological operation were operated due to infravesical obstruction, 10% of them underwent cystolithotripsy for bladder stone secondary to infravesical obstruction, and 30% of them underwent TUR-Bt operation for bladder cancer. In addition, it was found that 10% of the patients were receiving alpha-blocker or combined treatment (alpha-blocker + dutasteride) for BPH.

Acquired bladder diverticula, similar to the congenital type, are most commonly detected in the ureterovesical junction, but they can also occur in other localizations of the bladder.[12] In our study, we found out that diverticula were located not only in the lateral wall of the bladder but also in the posterior wall and dome.

As a result of the large size of the bladder diverticulum, recurrent urinary infection, bladder stones, urinary retention, and the development of malignancy due to chronic irritation of the urine may occur.[7,10,11] Small bladder diverticula are mostly asymptomatic. Although the behavior of large or multiple small diverticulum is not known exactly, they may exhibit different behaviors such as voiding dysfunction, detrusor contraction disorders, or DOA.[1] To our knowledge, there is no study in the literature that determines or classifies the size of the bladder diverticulum. In our study, we classified bladder diverticula according to their size and solitary or multiple. In our research, the mean diverticulum size was determined as 58±30 mm by imaging methods. It was 29±26 mm in women and 64±27 mm in men (p=0.005). According to our findings, diverticulum sizes were found to be higher in men than in women, which proves that infravesical obstruction is more common in men. The median diverticulum was found to be 1 (1–5) in the patients. The median value of the diverticulum was found to be 1 (1–3) in women and 1 (1–5) in men (p=0.930). In our study, although a significant value was found for the diverticulum size in female and male patients, no significant value was obtained in terms of the number of diverticula. In addition, bladder tumors were detected in 4.8% of the male patients included in our study. In the literature, the malignancy development rate in the bladder secondary to bladder diverticulum was found to be between 0.8% and 13%.[10,13]

Observation is the least invasive treatment option for diverticulum management.[13] In our study, 22% of the patients were followed up without surgical treatment as stated in the literature. Of the patients who were followed

up, 72.7% were females. Follow-up recommended in adult patients with minimal symptoms and no complicating factors, but patients should be informed about the increased risk of malignancy and the need for periodic examination, as well as the potentially aggressive nature of malignancy that may develop. In addition, the optimal timing and type of surveillance for those who choose surveillance are not well defined, but a periodic reassessment of symptoms should consist of urine studies (including cytology) and endoscopic examination of the lower urinary tract.[8] There is no consensus in the literature about the best approach for the treatment of bladder diverticulum.[7,14] First of all, the etiology of bladder diverticulum should be investigated and a treatment plan should be drawn after the patients are examined in detail in terms of intervention with diverticulum with or without this etiology.

Since Czerny's first description of diverticulectomy in 1897, the surgical treatment of bladder diverticulum has evolved from open surgery to endoscopic procedures, laparoscopic, and robotically assisted laparoscopic techniques. The choice of surgical technique for bladder diverticulectomy depends on many factors, including the number and location of the diverticulum, the proximity of the diverticulum to the ureter, and the need for concomitant ureteral or bladder outlet surgery.[12] In our study, 25.6% of the patients underwent endoscopic surgery, 80% of them were operated on infravesical obstruction such as TUR-P, internal urethrotomy, and cystolithotripsy, and 20% were TUR-Bt for bladder tumors. None of the patients included in our study underwent endoscopic procedures such as diverticulum fulguration or diverticulum neck incision. Diverticulectomy operation was performed in 71.7% of the surgically treated patients, laparoscopic diverticulectomy was performed in 3.5% of them, and open diverticulectomy operation was performed on the rest of the patients. Only the diverticulectomy procedure was performed in 38.4% of the patients who were operated on for bladder diverticulum and just 6.6% of these patients were women. The percentage of operations for simultaneous outlet obstruction was found to be 12.8% in patients who underwent surgery for diverticulum (open or laparoscopic diverticulectomy). Simultaneous ureteroneocystostomy was performed in 25% of the patients who underwent diverticulectomy because the diverticulum was close to the ureteral orifice or the diverticulum also included the ureteral orifice. In addition, it was determined that 36.8% of the male patients were treated with open or endoscopic surgery for only infravesical obstruction without intervening diverticulum. Compared with the literature, this supports the existence of bladder outlet obstruction in the etiology of the diverticulum.

Bladder outlet obstruction, impaired contractility, increased postvoid residual urine, and DOA are seen as some of the urodynamic findings associated with bladder diverticulum.[8] Urodynamics was performed in 50% of the patients included in our study, and 36% of the patients who underwent urodynamic analysis were females and 64% were males. The most common urodynamic finding in patients in the storage phase is DOA, followed by outlet obstruction in the emptying phase. Apart from these findings, urodynamic stress incontinence was found in 20% of the patients, mixed urinary incontinence in 16%, and DUA in 16% of the patients in our study. In addition, although bladder diverticulum was present, no urodynamic pathology was detected in 12% of the patients in the filling phase and 20% of the patients in the voiding phase. When compared with the literature, similar urodynamic findings (DOA, obstructed outlet function, and DUA) were found in our study as well. There are also studies in the literature showing that bladder contractility improves after diverticulectomy.[1] In the study conducted by Zurbano et al.,[2] a decrease in bladder contractility time was found after diverticulectomy.

In conclusion, as most of the patients with acquired bladder diverticulum are asymptomatic, there is no indication for diverticulectomy in all patients. First of all, patients should be investigated for the pathology causing diverticulum formation and then follow-up or treatment options should be taken into consideration. In our opinion, an operation or follow-up decision can be made as a result of urodynamic examination, and preoperative urodynamic examination can also be used to predict postoperative results. Therefore, all of the patients with bladder diverticulum should be evaluated urodynamically. Further research is needed to fully elucidate this issue.

Ethics Committee Approval

This study approved by the Kartal Dr. Lütfi Kırdar Training and Research Hospital Clinical Research Ethics Committee (Date: 06.12.2019, Decision No: 2019/514/167/21).

Informed Consent

Retrospective study.

Peer-review

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Authorship Contributions

Concept: B.H.S., F.T.; Design: B.H.S., F.T.; Supervision: F.T.; Data: B.H.S., A.H.S.; Analysis: B.H.S., A.H.S., F.T.; Literature search: B.H.S., A.H.S., F.T.; Writing: B.H.S., F.T.; Critical revision: B.H.S., A.H.S., F.T.

Conflict of Interest

None declared.

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Mesane Divertikülünün Alt Üriner Sistemin Depolama ve Boşaltım Fazlarına Etkileri: Ürodinamik ve Klinik Değerlendirme

Amaç: Mesane divertikülü uzun zamandır bilinen ve tedavi edilen bir hastalık olmasına rağmen, literatürde mesane divertiküllü hastalarda yapılmış ürodinamik çalışmalar yeteri kadar mevcut değildir. Çalışmamızda mesane divertikülü olan hastalarda alt üriner sistemin depolama ve boşaltım fazında var olan ürodinamik bozuklukların tanımlaması amaçlanmıştır.

Gereç ve Yöntem: Şubat 2010 ile Ağustos 2020 tarihleri arasında üroloji polikliniğine alt üriner sistem semptomları (AÜSS) ile başvurmuş ve incelemeleri sonrasında mesane divertikülü tespit edilmiş olan hastalar geriye dönük olarak değerlendirildi. Çalışma ölçütlerine uyan 50 hasta çalışmaya alındı. Tüm hastaların öyküsü, fizik muayenesi, laboratuvar tetkikleri, görüntüleme sonuçları, ürodinamik inceleme sonuçları ve ameliyat olan hastalarda ameliyat notları değerlendirildi.

Bulgular: Çalışmaya alınan hastaların %18'i kadın, %82'si erkekti. Hastaların %54'ü boşaltım semptomları ile polikliniğe başvurdu. Mesane divertikülü olan %4 hastanın ise asemptomatik olduğu tespit edildi. Ürolojik operasyon öyküsü olan erkek hastaların %60'ında infravezikal obstrüksiyon nedenli işlem uygulandığı saptandı. Çalışmaya dahil edilen hastaların %22'si cerrahi tedavi uygulanmadan takip edilmiştir. Çalışmaya dahil edilen hastaların %50'sine ürodinami yapılmış olup en fazla tespit edilen ürodinamik bulgu detrüsör aşırı aktivitesi (DAA) olarak saptanmıştır, bunu çıkım obstrüksiyonu izlemektedir.

Sonuç: Edinsel mesane divertikülü saptanmış olan hastaların çoğu asemptomatik olduğu için tüm hastalarda divertikülektomi endikasyonu yoktur. Öncelikle hastalar divertikül oluşumuna neden olan patolojiye yönelik araştırılmalı ve ona yönelik takip ya da tedavi seçenekleri düşünülmelidir. Bizim görüşümüze göre ürodinamik inceleme tedavi kararını ve seçimini etkilemekte ve tedavinin sonuçlarının tahmininde yol gösterici olabilmektedir. Bu nedenle mesane divertikülü olan her hastanın ürodinamik olarak değerlendirilmesi gereklidir. Bu konunun tam olarak aydınlatılması için ileri araştırmalara gerek vardır.

Anahtar Sözcükler: Divertikül; mesane; ürodinami.