
ORIGINAL ARTICLE**A Comparative Study between Cystoscopy and Cystography in Detecting Bladder Diverticulae in Patients with Benign Prostatic Hyperplasia***Manish Swarnkar^{1*}, Sheel Chand Jain¹, Siddharth Sahu¹**¹Department of Surgery, Jawaharlal Nehru Medical College, Sawangi, Wardha-442005**(Maharashtra) India*

Abstract:

Background: Bladder diverticulae are mucosal outpunching and majority are acquired and secondary to either benign prostatic hypertrophy or the upper motor type of neurogenic bladder. *Aim & Objectives:* This study was undertaken to increase knowledge and understanding the presumed role of Benign Prostatic Hyperplasia (BPH) in the development of bladder diverticulae and to compare cystoscopy and cystography in detecting bladder diverticulae. *Material and Methods:* During a one year period, 74 patients with BPH, who were admitted in the hospital for surgery, were examined by cystoscopy and cystography to detect bladder diverticulae. *Results:* In this study, prevalence of bladder diverticulae was found to be 61%. There was a slight increase of bladder diverticulae with increasing age. We could not find any statistical difference between cystoscopy and cystography in detecting bladder diverticulae ($\chi^2=1.86, p \text{ value}=.60, \text{NS}, p<0.05$). Malignancy within diverticulae seen in 6.8% of cases. *Conclusion:* This study shows that the prevalence of bladder diverticulae is considerably high. Considering this high prevalence and potential complications, we suggest cystoscopy for the early diagnosis and possible treatment of bladder diverticulae in older patients with lower urinary tract symptoms.

Keywords: Bladder Diverticulae; Cystoscopy; Cystography; Benign Prostatic Hypertrophy, mucosal out pouching.

Introduction:

Bladder diverticulae is a mucosal extravestational sac or saccule which insinuates through the muscle layer of bladder due to high intravesical

pressure (3-5times) [1, 2] diverticulae most commonly occur in area near ureteric orifice as it lacks longitudinal muscle fibers, facilitating out pouching [3, 4]. Since diverticulae lack contractility due to absence of muscle fibers leading to stasis within sac and subsequent lithiasis and growth of bacteria are causing recurrent urinary tract infection [1]. Prolonged stasis also leads to urothelial injury and neoplastic transformation [5]. The reported incidence of malignancy in bladder diverticulae is estimated to be 0.8-10%. The bladder diverticulae affects varied range of patients, congenital diverticulae are mainly due to inherent weakness of muscles [6] but majority of diverticulae are acquired significantly affecting males more than 60years of age suffering from bladder outlet obstruction due to benign prostatic hypertrophy or upper motor type of neurogenic bladder [2,7]. As most of bladder diverticulae are asymptomatic and never detected, this study was undertaken with an aim to determine their prevalence and accuracy of cystoscopy versus cystography in detecting diverticulae in benign prostatic hypertrophy patients.

Material and Methods:

Present study was conducted in Acharya Vinoba Bhave Rural Hospital associated to Jawahar Lal Nehru Medical College from August 2012- July 2013. This was a non-randomised double blind trial, in which 60 Benign Prostatic Hyperplasia (BPH) patient who gave consent were enrolled.

All patients underwent cystoscopy and cystography and both investigation were done by same urologist and radiologist in all cases and neither radiologist nor urologist were aware of the finding of each other. Cystography was done a day before surgery, after emptying bladder with Foleys catheter, 60% diluted urograffin (1:5 dilution with normal saline) was instilled in the bladder till patient felt desire to pass urine. Under fluoroscopic control filling was monitored and images were taken. Cystoscopy was done with 19fr rigid cystoscope and thoroughly bladder was evaluated for presence of any diverticulae.

Statistical Analysis:

All data tabulated and analysed using SPSS software using appropriate tests. Statistical tests significance was indicated by a $p < 0.05$.

Results:

Out of 74 cases of BPH enrolled for study the prevalence of bladder diverticulae was found to be 61% which meant chances of finding diverticulae were in ratio 1:1.6 in BPH cases. There was increase in incidence of bladder diverticulae with increasing age, 100% in $71 \geq 81$ yr age group. On comparing accuracy of cystoscopy and cystography in detecting bladder diverticulae, we found cystoscopy detected bladder diverticulae in 71% of cases while cystography could detect in 87% of cases. We found malignancy in 6.8% of cases. While complication following cystoscopy could not be evaluated as it was immediately followed by surgery, post cystography dysuria was found to be most frequent complication in 11% of cases.

Table 1: Age-wise Distribution of Bladder Diverticulae

Sr. No	Age Group	Cases of BPH	Presence of Bladder Diverticulae
1	50-60	20	2
2	61-70	34	23
3	71-80	16	16
4	≥ 81 yr	4	4
Total		74	45(68%)

Table 2: Prevalence of Bladder Diverticulae on Cystoscopy and Cystography

Sr. No	Age Group	Bladder Diverticulae on Cystoscopy	Bladder Diverticulae on Cystography
1	50-60	0	2
2	61-70	14	18
3	71-80	14	15
4	≥ 81 yr	4	4
Total		32(71%)	39(87%)

$$x^2=1.86, p \text{ value}=.60, NS \text{ at } p<0.05$$

Discussion:

Bladder outlet obstruction due to BPH is highly prevalent in men more than 60yrs of age leading to bladder diverticulosis due to increased intravesical pressure (3-5 times) and diverticulae are often located along the lateral bladder walls [1, 2, 8]. Correction of outlet obstruction in cases of in cases of BPH leads to spontaneous resolution of these diverticulae [3, 4]. Since majority of diverticulae are asymptomatic [10], detailed cystourethroscopy prior to BPH surgery is essential to avoid potential late complication like recurrent urinary tract infection, neoplasia, and sepsis.

Detection of diverticulae on cystoscopy is operator dependent. Orifice and location of diverticulae within bladder are the factors which may cause difficulty in detection. Orifice too small or too large and location on anterior or lateral wall near bladder neck may lead to missing diverticulae on cystoscopy, moreover urologist can only see bladder once or twice during procedure, radiologist can review image many times at different angles claiming superiority of cystography over cystoscopy in detecting bladder diverticulae [11]. To analyse this we designed the study to compare both in detecting bladder diverticulae in BPH cases. Our study shows high prevalence of bladder diverticulae (67%) because majority of patient were in higher age group of 61-80year (68%, mean age 66.21year). Shakeri *et al* 2007 [11] have found 27.4% on cystoscopy and 48.3% on cystography but they performed cystography in 31 randomly selected cases out of 106 enrolled BPH cases. We have found increase in prevalence with increment in age of patient but apparent co-relation could not be established between age and occurrence of diverticulae as duration of onset of symptomatic prostatism in these patient was unknown.

Bladder diverticulae are associated with higher rate of complications, Peterson *et al* [12] have reported only 16% were disease free, and 81% were associated with chronic inflammation. One study concluded that there is propensity for chronic inflammation and high incidence of squamous metaplasia, associated carcinoma in bladder diverticulae [13, 14]. Malignancy in bladder diverticulae are more likely to be found in cases of bladder outlet obstruction confirmed on IVP than in cases who had no obstruction on IVP [15]. In cases of bladder outlet obstruction stasis of carcinogens within bladder diverticulae leads to urothelial dysplasia and subsequent malignancy [5]. Keeping in view various complications associated with bladder diverticulae it is imperative to early diagnose and treat both BPH and diverticulae to avoid these complications. In our study we found malignancy in 6.8% cases .similar incidence(2-7%) have been also reported by Shakeri *et al* [11] and Dondalsky *et al* [16] but some studies reported higher incidence of 14.3% and 51% [1, 17]. The deficiency of muscle fibers in a diverticulum facilitates tumor invasion to proceed rapidly and easily in the perivesical tissue as compared to normal bladder wall with muscle tissues [3]. Tumours arising in the vesical diverticulae has poor prognosis because of early transmural infiltration as compared to the neoplasm originating within the main bladder lumen [11, 16].

On comparing accuracy of cystoscopy and cystography in detecting bladder diverticulae, we could not find any statistical difference between two ($\chi^2=1.86$, p value=0.60, NS, $p<0.05$). so preference to one over other cannot be generalised, moreover cystoscopy in prerequisite investigation prior to BPH surgery. Cystoscopy has no absolute contraindication and complication

so it should be done in every BPH case while cystography cannot be included as routine investigation because of no additional advantage over cystoscopy, increase in cost of treatment and associated complication like dysuria, hematuria and urethral trauma.

Conclusion:

Bladder diverticulae are outpunching of the urothelial lining that project through the muscular wall of the bladder and are caused by congenital or acquired defects of the bladder wall. Although

most bladder diverticulae are small and asymptomatic, a subset of patients develops problems associated with inflammation, calculi, infections, large diverticular size, urinary retention, or malignancy. It is recommended for early diagnosis and management of BPH to prevent formation of diverticulae and its associated complications. Cystography cannot be recommended in every case but can be done in cases where voiding symptom persists after treatment of BPH to detect the presence of missed diverticulae on Cystoscopy.

References

1. Whitefield B. Urinary bladder diverticulum and its association with malignancy: an anatomical study on cadavers. *Rom J Morphol Embryol* 2010; 51:543-5.
2. Gerridzen RG, Futter NG. Ten-year review of vesical diverticula. *Urology* 1982; 20(1):33-5.
3. Haecker A, Riedasch G, Langbein S, Alken P, Michel MS. Diverticular Carcinoma of the Urinary Bladder: Diagnosis and Treatment Problems. *Medical Principles and Practice* 2005; 14(2):121-4.
4. Fox M, Power R, Bruce A. Diverticulum of the bladder—presentation and evaluation of treatment of 115 cases. *British Journal of Urology* 1962; 34(3):286-98.
5. Faysal M, Freiha F. Primary neoplasm in vesical diverticula: a report of 12 cases. *British Journal of Urology* 1981; 53(2):141-3.
6. Alexander RE, Kum JB, Idrees M. Bladder diverticulum: clinicopathologic spectrum in pediatric patients. *Pediatric and Developmental Pathology* 2012; 15(4):281-5.
7. Batista HMT, Mendes GNN, da Silva JC, de Pinho Pessoa LMG, Couto JGCC, Rolim MAB, et al. Bladder Diverticulum and Sepsis. *International Archives of Medicine* 2015; 8.
8. AJ Wein LRK, A. C. Novick Campbell-Walsh, Urology, 9th Edition: W.B. Saunders; 2006.
9. Melekos MD, Asbach HW, Barbalias GA. Vesical diverticula: Etiology, diagnosis, tumorigenesis, and treatment: Analysis of 74 cases. *Urology* 1987; 30(5):453-7.
10. Shakeri S, Rasekhi A, Yazdani M, Kheradpezhoh E. The incidence of diverticula of urinary bladder in patients with benign prostatic hypertrophy and the comparison between cystoscopy and cystography in detecting bladder diverticula. *Iranian Red Crescent Medical Journal* 2007; 9(1):36-41.
11. Peterson L, Paulson D, Glenn J. The histopathology of vesical diverticula. *The Journal of Urology* 1973; 110(1):62.
12. Montague DK, Boltuch RL. Primary neoplasms in vesical diverticula: report of 10 cases. *The Journal of Urology* 1976; 116(1):41-2.
13. Mičić S, Ilić V. Incidence of neoplasm in vesical diverticula. *The Journal of Urology* 1983; 129(4):734-5.
14. Fellows G. The association between vesical carcinoma and urinary obstruction. *European Urology* 1977; 4(3):187-8.
15. Dondalski M, White EM, Ghahremani GG, Patel SK. Carcinoma arising in urinary bladder diverticula: imaging findings in six patients. *American Journal of Roentgenology* 1993; 161(4):817-20.
16. Tamas EF, Stephenson AJ, Campbell SC, Montague DK, Trusty DC, Hansel DE. Histopathologic features and clinical outcomes in 71 cases of bladder diverticula. *Archives of Pathology and Laboratory Medicine* 2009; 133(5):791.

*Author for Correspondence: Dr Manish Swarnkar, M4/F-10, Meghdoot Apartment, Sawangi (meghe), Wardha-

442001 Email: mswarnkar1971@gmail.com Cell: 9763703920