A Comparative Study between Cystoscopy and Cystography in Detecting Bladder Diverticulae in Patients with Benign Prostatic Hyperplasia

Manish Swarnkar, Sheel Chand Jain, Siddharth Sahu

Department 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 (χ²=1.86, p value=.60, 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 extravastional 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 60 years 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 Jawaharlal 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.
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 ≥ 81yr 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.

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

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

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Age Group</th>
<th>Bladder Diverticulae on Cystoscopy</th>
<th>Bladder Diverticulae on Cystography</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50-60</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>61-70</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>71-80</td>
<td>14</td>
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</tr>
<tr>
<td>4</td>
<td>≥81yr</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>32(71%)</td>
<td>39(87%)</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 1.86, \ p \text{ value} = .60, \ NS \text{ at } p < 0.05 \]
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...
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.

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 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.

References

*Author for Correspondence: Dr Manish Swarnkar; M4/F-10, Meghdoot Apartment, Sawangi (meghe), Wardha-442001 Email: mswarnkar1971@gmail.com Cell: 9763703920*