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# URETERIC STONES MANAGEMENT BY URETERORENOSCOPE - OUR INITIAL EXPERIENCE

MS ISLAM<sup>1</sup>, S JAHAN<sup>2</sup>, KH SALIM<sup>1</sup>, M HOSSAIN<sup>1</sup>, S ISLAM<sup>1</sup>, IA SHAMEEM<sup>1</sup>, AKMK ALAM<sup>1</sup>, AKMA ISLAM<sup>1</sup>, SAMG KIBRIA<sup>1</sup>

### Summary

*Objective:* To evaluate our experience in the management of ureteric stone by ureterorenoscope.

*Patients & Methods:* A hospital based prospective study was carried out in the department of urology, Bangabandhu Sheikh Mujib Medical University (BSMMU) hospital from July 2001 to June 2006. A total of 280 patients were selected from urology outpatient department of Bangabandhu Sheikh Mujib Medical University (BSMMU) with ureteric stones for ureteroscopic management according to the selection criteria. A pre-operative evaluation was done for all patients, which included haematological and biochemical investigations and routine urine examination and urine culture, USG of kidney ureter and bladder region with post void residue and intravenous urography (IVU). After initial cystoscopy localization of the ureteric orifice and negotiation of a 0.035" guide wire was done and kept in situ. Then ureteroscopy was performed with 34 cm 8 Fr rigid ureterorenoscope (Storz). After entering the ureter localization of the stone was ensured. Small stones removed with Dormia basket under direct vision if possible. If the stone could not be removed by this procedure then intracorporeal pneumatic lithotripsy (ICPL) was done using a 1 mm probe through the central working channel of rigid ureterorenoscope. On completion of lithotripsy, stone fragments were removed by stone grasping forceps. Very small gravel was just left behind keeping a D-J stent in the ureter. Patients were followed up after six weeks with plain x-ray of kidney ureter and bladder region.

*Results:* In this study 280 patients with ureteric stone were enrolled for ureteroscopic management of which 215 (76.78%) patients were male and 65 (23.22%) were female. The mean±SD age were 32.76 ± 10.76 and age range was 16-60 years. The stone size was 7-19 mm (mean±SD 10.7 ± 2.69). The ratio of involvement of right ureter was 187 and left ureter was 93. In 32 patients stone were located in upper ureter, 120 in midureter and 138 in lower ureter. Out of 280 patients with ureteric stone 18 (6.43%) were failed to clear stone with ureterorenoscopic maneuver because of either distal

migration or failure to reach up by ureteroscopy. Rest of the 262 (93.57%) ureteric stone cases were cleared off by stone crushed with pneumatic lithotripter 242 (86.42%) cases, Dormia basket removal 14 (5%) cases and 6 (2.14%) cases of stones impacted in vesicoureteric junction removed with cold knife incision in upper lip of ureteric orifices

*Conclusion:* Ureterorenoscopic maneuver with intracorporeal pneumatic lithotripsy (ICPL) and/or with use of Dormia basket is an established option for the management of ureteric stone.

### Introduction

Management of ureteric stone diseases varies from least invasive extracorporeal shock wave lithotripsy (ESWL) to open surgery. Minimal invasive percutaneous nephrolithotomy (PCNL) and ureterorenoscopy (URS) are in between the two extreme treatment options<sup>1</sup>. In 1980 first successful visualization of the renal pelvis was performed with a specially designed ureteroscopy and in 1981 first successful ureteral stone manipulation performed under direct vision<sup>2</sup>. In Bangladesh, MF Islam et al reported their first experience in ureterorenoscopy in private sector<sup>3</sup>. Recent advancement in ureteroscopic management for ureteric stones with the application of laser lithotripsy and in situ extracorporeal shock wave lithotripsy (ESWL) has made the open surgery infrequent for the treatment of ureteral stone<sup>4</sup>. In a study in Chittagong, it was reported about 94.73% clearance rate of mid and distal ureteric stone by ureteroscopic management<sup>5</sup>.

In this study we have reported our experience in ureteroscopic management for ureteric stone involving upper, mid & distal ureter in Bangabandhu Sheikh Mujib Medical University (BSMMU) hospital.

### Patients & Methods:

A hospital based prospective study was carried out in the department of urology, Bangabandhu Sheikh Mujib Medical University (BSMMU) hospital from July 2001 to June 2006. A total of 280 patients were selected from urology outpatient department of Bangabandhu Sheikh

Mujib Medical University (BSMMU) with ureteric stones for ureteroscopic management according to the selection criteria and exclusion criteria. The selection criteria were- (a) stone less than or equal to 20 mm size, (b) no or partial distal obstruction and (c) sterile urine. The exclusion criteria were - bladder Outlet obstruction, UTI, pregnant women, history of lower abdominal surgery, coagulation disorder and multiple ureteric stone and associated renal stone. Relevant ethical aspects were covered and an informed written consent was taken from each patient. Detail history and findings of clinical examinations were recorded in a predesigned form.

A pre URS evaluation was done for anesthesia. Under anesthesia, the patient was placed in a modified lithotomy position with the leg opposite the involved ureter adducted while the ipsilateral leg abducted. Initial cystoscopy was done to locate the ureteric orifice and to negotiate a 0.035" guide wire above the stone by moving to and fro and pushed up to renal pelvis and kept in situ. After removing the cystoscope a 10 Fr. baby feeding tube was introduced to urinary bladder for continuous drainage. Then both long and short. (43cm & 34 cm 8-13 Fr.-rigid) ureteroscope (Storz) was introduced to the ureter. After entering the ureter the stone was localized and if the stone was small, slightly pushed back to the dilated segment of the ureter above the zone of impaction and it was then removed with Dormia basket. If the stone could not be removed by this procedure, then ICPL was done using a 1 cm probe through the central working channel of rigid ureterorenoscope. The stone fragments were removed by stone grasping forceps. Stones impacted in ureteric orifice were removed by incision with cold knife if necessary. Very small gravel was left behind keeping a D-J stent in the ureter. All the patients were catheterized with a biluminal 14-16 Fr. Foley catheters for 24 hrs. The

patients were aimed to discharge on 3<sup>rd</sup> post operative day with an advice to come after 15 days with a plain X-ray KUB region. If the patient was found stone free the stent kept in situ was then removed under local anesthesia. The patients were then observed up to 90 days for at least 3 follow up sessions. Patients suffered from any post procedure complications were evaluated properly and managed accordingly. Statistical analysis was done using SPSS WIN 7.5.11 versions as well as manually. Probability (P) value <0.05 were considered as significant.

**Results**

In this study 280 patients with ureteric stone were enrolled for ureteroscopic management of which 215 (76.78%) patients were male and 65(23.22%) were female. The mean±SD age were 32.76 ± 10.76 and age range was 16-60 years. The stone size was 7-19 mm (mean ± SD 10.7 ± 2.69). The number of involvement of right ureter was 187 and left ureter was 93. In 32 patients stone were located in upper ureter, 120 in mid ureter and 138 in distal ureter. Out of 280 patients with ureteric stone, 18(6.43%) were failed to clear stone with ureterorenoscopic maneuver because of either distal migration or failure to reach them by ureteroscope. These failed cases were later managed either by ESWL or open operation. Rest of the 262(93.57%) ureteric stone cases were cleared off by stone crushed with pneumatic lithotripter 242(86.42%) cases, Dormia basket removal 14(5%) cases and 6(2.14%) cases of stones impacted in vesicoureteric junction removed with cold knife incision in upper lip of ureteric orifice ( Table-I).

Post procedure complications were pain, haematuria, fever, lower urinary tract symptoms. All these were managed conservatively with antibiotics and analgesic (Table-II).

**Table-I**  
*Size, Location and clearance distribution of stone*

No. of case	Stone size mean ±SD mm	Ureter involved		Part of Ureter involved			Clearance total (%)	Clearance by (%)			Fail to clear (%)
		Rt.	Lt.	Upper	mid	lower		ICPL	Dormia Basket	Cold Knife	
280	10.7 ± 2.69	187	93	32	120	138	262 (93.57)	242 (86.42)	14 (5)	6 (2.14)	18 (6.43)



**Table-II**  
*Post Procedure complications.*

Loin pain	93.33%
Fever	70%
Haematuria	80%
Lower urinary tract symptoms	80%

**Discussion**

Ureteric stone usually secondary to renal stone. The passage of the stone through the ureter depends upon the size, configuration of the stone and the state of the ureteric lumen. Usually less than 7mm size of the stone with normal ureteric lumen passes through the ureter with mild to severe ureteric colic and haematuria<sup>6</sup>.

With the advancement and development of rigid and flexible ureterorenoscope of different size management procedure of ureteric stone have changed. Least invasive ESWL and minimum invasive ureteroscopic maneuver is preferred than open surgery.

About 75% of the ureteric stone can be managed by ESWL. In the rest 25% of cases ureteroscopic extraction is preferred particularly in those where ESWL failed<sup>1</sup>.

In this study, the male female ratio was 3.3:1. This result agrees well with reports of others, where it was 3.47:1, and 4.13:1<sup>8,9</sup>. In some other study the ratio was between 1.3:1 to 2.3:1<sup>10,11,12</sup>. The mean±SD of age in this study were 32.76 ± 10.76 years and age range was 16-60 years. This figures same alike other study where it is 34±1.5 years<sup>5</sup>. The stone size was 7-19 mm (mean ± SD 10.7 ± 2.69). The number of involvement of right ureter was 187 and left ureter was 93 which coincide with that reported by other authors<sup>9</sup>, where the average stone size was reported 9.7 mm. In this study, the size of stones was larger than that observed in a few studies where it was 6 mm<sup>12</sup>.

In this study the major post operative complications were pain, haematuria, fever, lower urinary tract symptoms which were same like other similar study performed by different authors<sup>9,13</sup>.

In this study the stone clearance rate is 93.57%. But the clearance rate in other study were 94.73%, 98%<sup>5,3</sup>. The low clearance rate in this study is because here we have selected stone from whole length of ureter but in other study they had selected stones of mid & distal ureter only. In another study they included proximal ureter along with mid and distal ureter; their clearance rate was 91.6%<sup>14</sup>.

The failure rate of this study is 6.43%. The maximum failure occur in case of stone in proximal ureter where ureter proximal to stone were dilated and the stone were migrated proximally. The force of migration was either for force of irrigation fluid or for the force of the pneumatic lithotripter. In very small number of cases we failed to negotiate the guide wire and thus failed to localize the stone.

**Conclusion:**

Though the ESWL is the better option for the management of the ureteric stone but the ureteroscopic maneuver can also clear the significantly higher no of ureteric stone if the well selected cases can be handled with skill surgical hand.

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# TREATMENT OF LOWER URETERIC STONES BY ESWL

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## Summary

*Objective:* This study was carried out to observe the effectiveness of treatment option for lower ureteric stones by extracorporeal shock wave lithotripsy (ESWL).

*Patients & Methods:* A hospital based prospective study was carried out in the department of urology, Bangabandhu Sheikh Mujib Medical University (BSMMU) hospital situated in Dhaka City from July 2001 to June 2005. A total of 130 patients were selected from urology outpatient department of Bangabandhu Sheikh Mujib Medical University (BSMMU) with lower ureteric stones for treatment with extracorporeal shock wave lithotripsy (ESWL) according to the selection criteria. A pre ESWL evaluation was done for all patients, which included total blood count, blood urea, serum creatinine, fasting blood sugar and blood sugar 2 hrs. after breakfast, coagulation profile, routine urine examination and urine culture, USG of kidney ureter and bladder region with post void residue and intravenous urography (IVU) were done in all patients. Electrocardiography (ECG) was also done. Pre ESWL urine was sterile in all cases. ESWL monotherapy with Siemens Lithostar plus (3rd generation) lithotripter was used to treat ureteric calculi for ESWL. Average number of shock wave was 3550: for all levels with a mean kv 17.2. All post operative complications were managed conservatively. Patients were followed up after three months. Statistical analysis was done using SPSS WIN 7.5.1 versions as well as manually. Probability (P) value <0.05 were considered as significant.

*Results:* In this study 63.33% of patients were male and 36.67% were female and the mean  $\pm$  SD age were 36.23 $\pm$ 13.67. The stone size was 8-14 mm (mean 9.9 mm). The ratio of involvement of right to left ureter was 1.5:1. The post procedure loin pain, fever, haematuria and lower urinary tract symptoms (LUTS) were 70%, 10%, 83.33%, and 43.33% respectively. The mean post procedure hospital stay was 1.57  $\pm$  0.531 days. In this study 11.33% of patients failed to clear stones after maximum 3 sessions of ESWL and their stone size were 10 mm to 14 mm. Of the 15 cases, 12 were treated with Ureterorenoscopy and intracorporeal pneumatic lithotripsy (URS+ICPL) and 3 with open operation. The stone free rate 88.67% of patients after three months of follow-up.

## Introduction

Urinary stone disease is a common urological problem through out the world including Bangladesh<sup>1,2,3</sup>. Management of urological stone disease is a problem in both surgical and medical practices. Stone management may be invasive open surgical treatment or least invasive extracorporeal shock wave lithotripsy (ESWL) therapy and minimal invasive percutaneous nephrolithotomy (PCNL) and ureterorenoscopy (URS) are in between the two extreme treatment options. Three months stone free rate were 91% after insitu ESWL without manipulation and it is a safe and effective for ureteric calculi not more than 1.5 cm. in diameter. It neither affects female fertility nor has teratogenic risk.

## Patients and Methods

This is a hospital based prospective study carried out in the department of urology, BSMMU hospital situated in Dhaka City from July 2001 to June 2005. Patients attending the hospital were selected according to the selection and exclusion criteria included in this study. One hundred thirty patients with lower ureteric stone cases treated with ESWL. The selection criteria were: (a) stone less than or equal to 20 mm size, (b) no distal obstruction, (c) sterile urine and (d) unilateral lower ureteric stone. The exclusion criteria were bladder outlet obstruction, UTI, pregnant women, history of lower abdominal surgery, coagulation disorder and multiple ureteric stone and associated renal stone. Relevant ethical aspects were covered and an informed written consent was taken from each patient. Detail history and findings of clinical examinations were recorded in a predesigned form.

A pre-ESWL evaluation was done for all patients, which included total blood count, blood urea, serum creatinine, fasting blood sugar and blood sugar 2 hrs. after breakfast, coagulation profile, routine urine examination and urine culture, USG of kidney ureter and bladder region with post void residue and intravenous urography (IVU). Electrocardiography (ECG) was also done. Pre ESWL urine was sterile in all cases.

ESWL procedure: patients were instructed to take mild laxative for a night with ultra carbon tablet. Stones below sacroiliac joint down to bladder were selected as lower ureteric stones. All the patients were over night fasting

and were given intravenous fluid with diclofenac sodium suppository half an hour prior to procedure. ESWL monotherapy with Siemens Lithostar plus (3<sup>rd</sup> generation) lithotripter was used to treat 30 ureteric calculi for ESWL. Average number of shock wave was 3550 for all levels with a mean kV 17.2. All patients were given I.V. analgesia and sedation and were under antibiotic prophylaxis during the procedure. The patients were discharged from lithotripsy unit on the same day if no post procedure complications were noted. The patients were advised to come after 7 days with a plain X-ray KUB region. A second, sometimes a third session of ESWL was given at one-week interval if needed. If the stones were failed to be cleared off even after 3<sup>rd</sup> session of ESWL, the patients were observed up to 90 days to see total stone clearance.

Statistical analysis was done using SPSS WIN 7.5.1 versions as well as manually. Probability (P) value <0.05 were considered as significant.

**Results**

In this study 63.33% of patients were male and 36.67% were female and the mean±SD age were 36.23±13.67. The mean stone size in mm±SD were 9.9 ± 1.97 and minimum sizes were 8 mm maximum size was 14 mm. The ratio of involvement of right to left ureter was 1.5:1. The post procedure loin pain, fever and haematuria, lower urinary tract symptoms- (LUTS) were 70%, 10%, 83.33% and 43.33% respectively (Table-I). The mean post procedure hospital stay was 1.57 ± 0.531 days. In this

study 11.33% of patients failed to clear stones after maximum 3 sessions of ES WL and their stone size were 10 mm to 14 mm. Of the 15 cases, 12 were treated with Ureterorenoscopy and intracorporeal pneumatic lithotripsy (URS+ICPL) and 3 with open operation. The stone free rate were 88.67% and the retreatment rate was 3.38% after three months of follow-up (Table-II).

**Discussion:**

Urinary stone disease is the third most common problems in urological practice. In Bangladesh the exact incidence of the disease is not known but is regarded as an endemic zone of the disease. It is more common in northern part of the country affecting predominantly male over female with a ratio of 3:1<sup>3</sup>.

Bangladesh is a developing country with 140 million populations. For that reason there is always a long waiting list of patients for admission. A patient now has to wait for 1-2 months for getting a bed. Moreover, patients usually prefer noninvasive treatment with minimum pain. All but ESWL procedures of treatment for ureteric stone diseases are invasive and painful and require at least 7 days of hospitalization and needs anesthesia. The objective of this study was to determine the effectiveness of treatment for lower ureteric stones by ESWL in the perspective of Bangladesh so that maximum service can be given with minimum bed occupation time with minimum postoperative complications. In this study, there was no difference in age (P> 0.05) among the study population which were

**Table-I**  
*Post Procedure morbidity in two groups.*

Post procedure Morbidity	Present	Absent
Loin pain	91(70)	39(30)
Fever	13(10)	117(90)
Haematuria	109(83.33)	21(16.67)
Lower urinary tract symptoms	56(43.33)	73(56.67)

Figure in parentheses indicates percentage

**Table-II**  
*Results*

Stone no, wave	Side involved		Average stone size	Re-treatment(%)	Average shock	Mean kV	Clearance
	Right	Left rate					
130	87	43	9.9 mm	46(3.38)	3550	17.2	88.67%

in accordance with a few other studies carried out in Bangladesh<sup>2,8</sup>, but the mean age in this study was lower than other studies carried out elsewhere<sup>9,10</sup>. So relatively younger patients develop stone diseases in Bangladesh. Dietary habit and hot weather might have some influence in formation of urinary tract stones at the early age in our country. In this study, the male female ratio was 1.6:1. This result agrees well with reports<sup>9-11</sup>, where it was between 1.3:1 to 2.3:1. On the contrary, the male female ratio was reported 3.47:1 and 4.13:1 in other studies<sup>8,12</sup>. There was no significant difference ( $P>0.05$ ) of involved side of ureter and size of stones between the two groups in this study. The mean size of stone in this study were 9.9mm which coincides with that reported by other authors<sup>12</sup>, where the average stone size was reported 9.7 mm. In this study, the size of stones was larger than that observed in a few studies where it was 6 mm<sup>11</sup>. Though the pre procedural urine was sterile and prophylactic antibiotic was given to all the patients, 43.33% patients developed LUTS and the LUTS persists for 3-7 days even after removal of urethral catheter.

In this study, post procedure loin pain was present only for 1-2 days. The post procedure haematuria was microscopic to macroscopic. All the patients with haematuria were managed conservatively. Post procedure fever was significantly less ( $P<0.001$ ) which was 10% of patients. Only 13 patients had high fever. The high fever among patients might be due to release of micro organism from broken stone by ESWL.

The patients were declared stone free when a plain X-ray of KUB region shows no radio opaque shadow. On post procedure day 90, no stone was found in 88.67% of patients. In this study 11:33% of patients failed to clear stones after maximum 3 sessions of ESWL and their stone size were 10 mm to 14 mm; 12 were treated with URS and 3 with open operation and the retreatment rate was 35.38%. In a study it was shown that 88.8% of lower ureteric stones were cleared by ESWL with average stone size of 9.7 mm and the re treatment rate was 33.3%<sup>12</sup>.

Now a day, outpatient anesthesia free effective treatment is attractive to most patients. But other procedure than ESWL requires anesthesia and thus hospitalization. Recent report states that URS+ICPL can sometimes

be performed for lower ureteric stone as an anesthesia free day care procedure but post procedure hospital stay usually more in these procedure<sup>13</sup>. ESWL is done by anesthesia free day care basis. Although exact cost was not calculated in this study, due to less hospital stay and less morbidity in ESWL, it is apparently more cost effective than other procedure.

### Conclusion:

After analyzing data of this study it is found that ESWL is safer and effective method having minimum post procedure complications. As ESWL can be done as day case basis, it can reduce the patient load in inpatient department. Based on these observations it may be concluded that ESWL may be the first line treatment option for lower ureteric stones in select group of patients.

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## CASE REPORTS

# BLADDER DIVERTICULECTOMY : A SIMPLE METHOD OF IN-SITU INFLATED FOLEY BALLOON CATHETER

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### Summary:

A case of giant vesical diverticulum is reported. A 36 year-old man was admitted with difficulty in micturition and incomplete urination for last 5 years. Abdominal sonogram and MRI cystogram demonstrated a giant solitary diverticulum extended posteriorly, which was secondary to bladder neck stenosis and associated with distal penile hypospadias. On cystoscopy, the neck of the diverticulum was narrow and located on posterior bladder wall. There was bladder neck stenosis with vesical trabeculation. Bladder neck incision and resection was done first. After six months, open diverticuclectomy was carried out by combined approach with the aid of in-situ inflated Foley balloon catheter in the diverticulum. The patient had no difficulty in voiding after the operation.

Bladder diverticula are herniations of the bladder mucosa through the bladder wall musculature. Depending on the size and location, bladder diverticula may cause ureteral obstruction, bladder outlet obstruction or vesicoureteral reflux. Congenital bladder diverticula most commonly occur lateral and superior to the ureteral orifices<sup>1</sup>. Secondary diverticula of the bladder develop in patients who also have bladder outlet obstruction. Treatment of the cause of the outlet obstruction usually an obstructing prostate gland, bladder neck hypertrophy and stricture urethra should precede or accompany vesical diverticuclectomy. Most small vesical diverticula do not require treatment; merely relieving the obstruction will suffice. Large diverticula with resultant significant residual urine, however may cause chronic urinary infection and an unsatisfactory voiding pattern, do require excision.

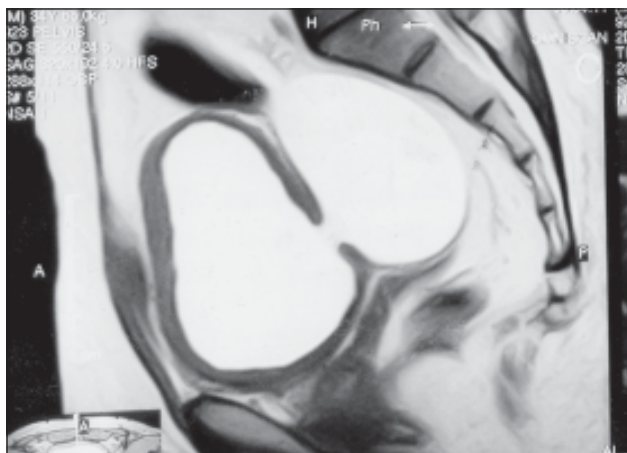
Many techniques for bladder diverticuclectomy have been described, including transperitoneal<sup>2,3</sup> and extraperitoneal laparoscopic bladder diverticuclectomy<sup>4</sup>, as well as open<sup>5-7</sup> and transurethral techniques<sup>8</sup>. Less common, larger diverticula have not typically been treated using a laparoscopic technique or transurethral approach. The chance of ureteral injury increases because the normal anatomic relationship of the ureter to the bladder may be severely distorted by the diverticulum. Here we report our experience of open large

vesical diverticuclectomy by combined approach with the aid of inflated Foley balloon catheter inside the diverticulum.

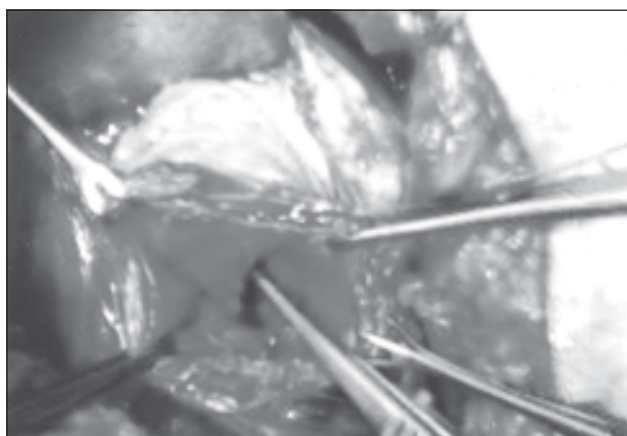
**Case presentation:** A 36-year-old male patient presented with difficulty in micturition, narrow urinary stream and incomplete voiding for last 5 years. Abdominal sonography and MRI Cystogram revealed a giant posterior diverticulum (Figure-1). Cystoscopy revealed marked urinary bladder trabeculation, and a large diverticulum in the posterior wall. The bladder neck was stenotic and appeared to be obstructed. The prostatic urethra appeared normal. The patient underwent transurethral bladder neck incision (BNI) and resection. After removal of the catheter patient had no difficulty in micturition, but had high post void residue due to large diverticula. Therefore, decision was taken for diverticuclectomy.

### Operative Technique (Balloon diverticuclectomy):

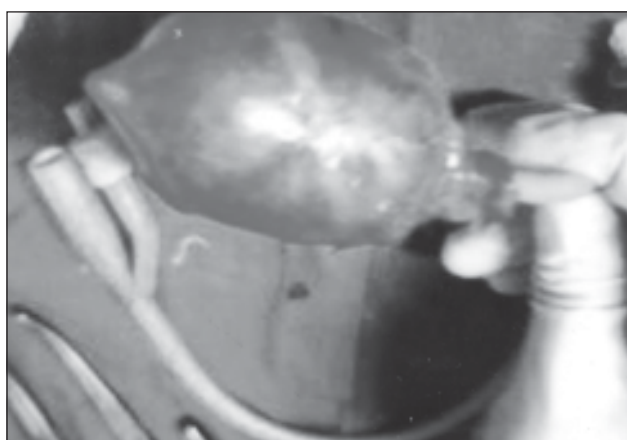
Preoperatively, the patient underwent mechanical and antibiotic bowel preparation. After induction of general anesthesia patient was placed in supine position. A lower midline abdominal incision was given. The bladder was exposed and opened through its anterior wall transversely. Initially the ureteric orifices were identified and the narrow diverticular opening was detected in the posterior wall. A 20Fr Foley catheter was introduced into the diverticulum and balloon was inflated upto 50cc (Figure-2). Four stay sutures were given at the diverticular neck. A mucosal incision was given around the diverticular neck. After careful dissection the diverticular wall was clearly demarcated outside the bladder and easily dissected off from the surrounding structure by blunt dissection keeping a gentle constant pull over the catheter (Figure-3). The bladder wall was then repaired with 2-0 vicryl in single layer continuous suture. The anterior cystostomy was closed with continuous suture with 2-0 vicryl and leaving a three way Foley urethral catheter. Finally a drain was left in the retropubic space and abdominal wall was closed in layers. The drain was removed on 3rd post operative day and urethral catheter removed on 7th post operative day. Patient was discharged on the next day without any complication.



**Fig.-1:** MRI cystogram: showing posterior bladder diverticulum with a narrow stalk



**Fig.-2 :** Anterior cystostomy: showing the opening of posterior bladder wall after diverticulectomy



**Fig.-3:** After diverticulectomy: the inflated balloon with excised diverticulum

**Discussion:**

Bladder diverticula are herniations of the bladder mucosa through the bladder wall musculature. Diverticula can

be wide-or narrow-mouthed, according to the size of the musculature defect. The size of diverticular openings has functional implications because narrow-mouthed diverticula often empty poorly. Stasis of urine within diverticula can also lead to stone formation or epithelial dysplasia. Depending on the size and location, bladder diverticula may cause ureteral obstruction, bladder outlet obstruction or vesicoureteral reflux<sup>1</sup>. This anatomic location, close to the insertion of the ureter in the bladder is important because large diverticula can impinge upon or distort the ureteral orifices. Many small size diverticula that are related to obstruction spontaneously resolve after relief or correction of the obstruction. In our case, the large diverticula persisted after transurethral incision and resection of the bladder neck and caused symptoms of urinary tract infection and high post void residue as the diverticular neck was narrow and it lacks muscular coat, emptying of the diverticulum was poor.

The goal of bladder diverticulectomy is successful excision of the bladder diverticulum without harming surrounding organs. Until recently, open extravesical, transvesical or combined approaches, have been most widely accepted, although transurethral techniques have also been described<sup>5-9</sup>. Transurethral approaches to excise or fulgurate bladder diverticulum replace open surgery with endoscopy, facilitating concurrent endoscopic resection or incision of the prostate<sup>8</sup>. However, these procedures are commonly limited to diverticula that are no larger than 200 ml. Recently laparoscopic technique has been widely used to treat many urologic diseases, including bladder diverticulum. Laparoscopic diverticulectomy can be performed transperitoneally<sup>2,3</sup> or extraperitoneally<sup>4</sup>. The most critical step in laparoscopic diverticulectomy is the initial highlighting of the diverticulum. Several approaches have been described that can help in the laparoscopic identification of the diverticulum and its dissection. Transillumination is effective in guiding laparoscopic dissection, but it is not easy to maintain the cystoscope in place<sup>10</sup>. It requires a great learning curve. But in this case we used combined open transvesical approach with the aid of inflated balloon Foley catheter in the diverticulum, which was reported by Esho JO and Cass AS<sup>7</sup>. In our case as well as others, inflated balloon catheter help to demarcate the periphery of the diverticulum because the diverticular wall is very thin<sup>7,11</sup>. In collapsed condition it is difficult to separate the diverticular wall from the surrounding structure. After inflation of the balloon the diverticular wall can easily separated from the surrounding structure. Esho JO as



well as Kaneti J reported that inflated in situ balloon catheter is superior to other conventional open diverticulectomy because diverticular neck can be identified easily and separated from the bladder wall by sharp incision over the mucosa around the diverticular neck<sup>6-7</sup>. On the other hand, operating time is short and less operative complication. Nevertheless, we believe that inflated balloon catheter permits better orientation and dissection of posterior diverticula. These advantages result in shorter operative times. Our experience with open inflated balloon diverticulectomy for large posterior diverticulum demonstrates that this method can be an attractive alternative to laparoscopic excision of a simple diverticulum. This is completely an extraperitoneal approach. On the other hand laparoscopic technique is an intraperitoneal approach and moreover identification of diverticulum has limitation.

### Conclusion:

For the symptomatic patient with a large bladder diverticulum, treatment can be chosen from a wide range of procedures, including open diverticulectomy, endoscopic transurethral resection and fulguration, and laparoscopic bladder diverticulectomy. From our experience, open inflated balloon diverticulectomy is a safe, effective and easy procedure for large diverticulum.

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# IS TOLTERODINE ANY BETTER THAN OXYBUTYNYN IN THE TREATMENT OF OVERACTIVE BLADDER IN BANGLADESHI POPULATION ?

KMM KARIM, AKMK ALAM, KR ABEDIN, P SHAHA, ME HAQUE, MA SALAM

## Summary:

*A randomized, prospective, open label, comparative study was done between July 2002 to June 2004 at BSMMU, Dhaka to find out and compare the efficacy and safety of oxybutynin, a receptor-subtype (M3) specific mixed function anticholinergic drug and tolterodine, a bladder selective anticholinergic drug, in symptomatic overactive bladder (OAB). Eighty-three adult patients with symptomatic overactive bladder were randomized. Forty-three patients were given Oxybutynin 5 mg twice daily orally and 40 patients were given tolterodine 2 mg twice daily orally. After 8 weeks of therapy, bladder diary variables were assessed and the side effects of the drugs were recorded. In addition, patients' perception of treatment benefit was also evaluated. A statistical analysis package program SPSS- WIN 11.5 version was used for statistical analyses. Appropriate tests of significance (Student's 't' test, Pearson's Chi-square test or Fisher's exact test) were performed to detect statistical significance of the study.*

*The mean ( $\pm$  SD) number of micturitions/24 hours reduced by  $2.92 \pm 1.16$  (-24.91%) with oxybutynin and by  $3.07 \pm 1.48$  (-26.07%) with tolterodine (both  $p < 0.0001$  vs baseline). The mean number of incontinence episodes/24 hours decreased by  $1.22 \pm 0.90$  (-56.09%) in the oxybutynin group and by  $1.25 \pm 1.02$  (-69.76%) in the tolterodine group (both  $p = 0.0001$  vs baseline). The amount of urine voided in each micturition increased  $42.76 \pm 18.54$  ml (+29.83%) after giving oxybutynin and  $43.77 \pm 22.23$  ml (+28.25%) after giving tolterodine (both  $p < 0.0001$  vs baseline). But no between-group difference is noted regarding any of these efficacy parameters ( $p > 0.05$ ). Patients' perception of benefit from treatment was 76.7% with oxybutynin and 75% with tolterodine. Dry mouth was reported by significantly fewer patients on tolterodine, compared with oxybutynin (45% vs 74%);  $P < 0.001$ .*

## Introduction:

Patients having lower urinary tract symptoms (LUTS) constitute the major workload of any Urological

outpatient department anywhere in the world and Bangladesh is no exception. Among them a good number of patients present with frequency, urgency, with or without incontinence in the absence of local pathological or generalized metabolic factors that would account for these symptoms. Based on clinical symptoms, these patients are categorized as having overactive bladder (OAB) and characterized by involuntary detrusor contraction during the filling phase<sup>1</sup>. Though no data are available in Bangladesh, previous estimates of the number of people suffering from OAB have been on the order of 17 million in the United States<sup>2</sup> and between 50 and 100 million worldwide<sup>3</sup>.

OAB frequently follows chronic courses that necessitate life long treatment. When compared to other conditions known to negatively affect quality of life such as diabetes, major depression and multiple sclerosis, the impact of OAB is comparable or even higher. Furthermore there is financial burden on individuals, families and the government. In the USA alone, urinary incontinence and OAB accounted for \$28.9 billion in health care costs in the year 1998<sup>4</sup>. Not only do OAB and associated incontinence diminish overall quality of life, but their presence can also create additional health problems for the sufferer. These include an increased risk of falls and fractures, urinary tract and skin infections; sleep disturbances, and depression<sup>5</sup>. Drug therapy is considered for patients who have persistent symptoms despite behavioral therapy. Anticholinergic drugs are recommended as first line with oxybutynin and tolterodine being the two most commonly recommended drugs. Older pharmacological agents such as propenthenelene, dicyclomine, and tricyclic antidepressants like imipramine, have been used but have become alternatives due to poor patient tolerability and lack of strong evidence from clinical trials<sup>6,7,8</sup>. Oxybutynin is being used in this country for last few years, but tolterodine has recently become available in our local market. This study attempted evaluate and compare efficacy and clinical safety of both the drugs in Bangladeshi population.

### Materials and Methods:

From July 2002 to June 2004, patients of no less than 18 years suggestive of having overactive bladder were screened by detailed history and physical examination and after excluding the local and metabolic causes of irritative lower urinary tract symptoms (e.g. urinary tract infection, malignant and pre-malignant conditions of bladder, calculi, interstitial cystitis, diabetes, polydipsia, diuretics, pregnancy) were included in this study consecutively. Pre-study baseline investigations included Urinalysis (including culture), complete blood count, serum creatinine and random blood sugar to exclude hematuria, UTI, glycosuria or renal failure. Plain x-ray of kidney, ureter & bladder region was done to exclude urinary stone disease and any lesion in the vertebral column. Trans-abdominal USG was done to detect any hydronephrotic change in the kidneys, hydroureter, bladder neoplasm; to measure bladder wall thickness, maximum cystometric capacity (MCC), postvoidal residual urine (PVR), prostate size and to see the echotexture with presence of any hypoechoic lesion in the prostate. Uroflowmetry was considered reliable when voided volume was more than 150ml. ECG was done to exclude ischemic heart disease. A formal urodynamic study was done at a medium rate filling of normal saline (0.9%NaCl) at a rate of 50 ml/min to confirm the diagnosis of overactive bladder and record maximum cystometric capacity and maximum filling pressure.

All the patients were provided with a bladder diary (either Bangla or English Version) and were well explained and helped to record fluid intake, urinary frequency & volume, urgency and urge incontinence (if any). From the appropriately filled sheets, and a week's baseline data was collected.

After completion of baseline clinical evaluation and investigation, participants were divided into two groups; one group was given oxybutynin 5 mg twice daily orally and the other group was given tolterodine 2 mg twice daily orally for 8 weeks. Patients were explained well about the possible side effects of the drugs and precaution to be taken. If there were any intolerable adverse effects, patients were requested to report to urology OPD. Each patient was advised to complete the bladder diary for 1-week period just before coming to urology OPD for follow up after 4 and 8 weeks of initiation of therapy. During this follow up visits, bladder diary variables were assessed and the side effects of the drugs were recorded. In addition, during the final follow up visit, at 8 weeks' time, patients' perception of treatment benefit

was also evaluated. Patients who answered 'yes' to the question 'Have you had any benefit from your treatment?' were subsequently asked to evaluate the benefit as either 'little' or much'.

Clinical safety was evaluated in terms of adverse events that were spontaneously reported or directly observed during the 8-week treatment period and during 1 week of follow up. Adverse events were recorded and categorized by intensity ('mild' - does not interfere with patient's usual function; 'moderate' - interferes to some extent with patient's usual function; or 'severe'-interferes significantly with patient's usual function) and the likelihood of causal relationship to study treatment. Patients experiencing adverse events were withdrawn from the study if it was deemed medically necessary or at the patient's request.

### Results:

Baseline demographic and 'bladder diary' variables:

A total of 90 patients were selected initially for the study, but two cases of oxybutynin group and five cases of tolterodine group did not come back for follow-up. So 43 cases in oxybutynin group and 40 cases in tolterodine group were followed-up and the study is completed. There were no statistically significant differences between the two treatment groups with respect to baseline demographic and clinical characteristics (Table 1). The mean age was 47 years and female patients predominated in both treatment groups (>65%). Baseline number of micturition per day in oxybutynin group was 11.58 and in tolterodine group was 11.24. Twenty patients had history of incontinence of urine with a mean 1.70 episodes of incontinence per day in oxybutynin group and a mean 1.59 episodes of incontinence per day in tolterodine group. Oxybutynin group had mean voided volume/micturition of 156.86 ml and tolterodine group had mean voided volume per micturition of 169.31 ml.

### Efficacy:

Bladder diary variables collected after pharmacotherapies are compared with the variables at the baseline. Patients of oxybutynin group showed a mean decrease of 2.92 in number of micturitions per day with an improvement of 24.91% from the baseline; a mean decrease of 1.22 in number of incontinence episodes per day with an improvement of 56.09% from the baseline and a mean increase of 42.76 ml in amount of urine voided during each micturition with an improvement of 29.83% from the baseline. Changes in the bladder variables after giving oxybutynin are significantly different from the baseline

study ( $p < .001$ ) [Table 2].

In the tolterodine group, a mean decrease of 3.07 in number of micturitions per day, a mean decrease of 1.25 in number of incontinence episodes per day and a mean increase of 43.77 ml in amount of urine voided during each micturition with an improvement of 26.07%, 69.76% and 28.25% from the baseline respectively. Patients of tolterodine group also showed significant improvement in all three variables ( $p < .001$ ) [Table 2].

Overall, 63(75.9%) patients out of total 83, reported benefit from treatment. Among them, 25(58.1%) and 21(52.5%) patients in the oxybutynin and tolterodine groups respectively reported 'much' benefit. 'Little' benefit was noted by 8(18.6%) and 9(22.5%) patients in the oxybutynin and tolterodine groups respectively. No

statistically significant between-group differences were apparent [Table 3].

#### Safety:

In this study, xerostomia is the most commonly observed adverse effect in both oxybutynin and tolterodine groups, with 32 (74.4%) patients of oxybutynin group and 18(45%) patients of tolterodine group reported of having dry mouth. This complaint is significantly higher in oxybutynin group ( $p < .001$ ). Other adverse effects observed in any frequency include dizziness, headache, dysuria, dyspepsia, fatigue, visual disturbance, abdominal pain, constipation and were 7%, 9.31/0, 13.9%, 11.6%, 9.3%, 4.6%, 7%, 9.3% in oxybutynin group and 5%, 5%, 10%, 7.5%, 5%, 5%, 5%, 7.5% in tolterodine group respectively [Table-4].

**Table-I**  
*Demographic and clinical characteristics at baseline*

Characteristics	Treatment group	
	Oxybutynin 5mg bid (n= 43)	Tolterodine 2mg bid (n=40)
Mean age, years (range)	47.37 (28-79)	46.65 (22-78)
Male : female [ n (%)]	12 : 31 (28: 72)	14: 31 (35 :65)
Mean no. of micturition /24h( $\pm$ SD)	11.58 $\pm$ 2.05	11.24 $\pm$ 2.52
Mean no. of incontinence/24h( $\pm$ SD)	1.70 $\pm$ 1.29	1.59 $\pm$ 1.38
Mean urinary volume/micturition ( $\pm$ SD)	156.36 $\pm$ 39.38	169.31 $\pm$ 38.93

**Table-II**  
*Effect of 8-week treatment with either tolterodine or oxybutynin on 'bladder diary' variables:*

Variables	Treatment group	
	Oxybutynin 5mg bid (n=43)	Tolterodine 2mg bid (n=40)
No. of micturition /24h		
Mean (SD) change from baseline	-2.92 (1.16)	-3.07 (1.48)
Improvement ratio (SD) °%	24.91 (6.62)	26.07 (8.82)
No. of incontinence/24h		
Mean (SD) change from baseline	-1.22 (0.90)	-1.25 (1.02)
Improvement ratio. (SD) %	56.09 (35.86)	69.76 (35.09)
Urinary volume/micturition		
Mean (SD) change from baseline	+42.76 (18.54)	+43.77 (22.23)
Improvement ratio (SD)	29.83 (17.37)	28.25 (17.38)

**Table -III**  
*Perception of treatment benefit after drug:*

Patient group	No benefit (%)	Little benefit (%)	Much benefit (%)
Oxybutynin (n=43)	10(23.3)	8(18.6)	25(58.1)
Tolterodine (n=40)	10(25)	9(22.5)	21 (52.5)

**Table-IV**  
*Distribution and comparison of adverse effect of oxybutynin and tolterodine group:*

Adverse effects	Severity n(%)	Oxybutynin n(%)	Tolterodine n(%)	Total	p-value
Dry mouth	Mild	14 (32.6%)	18 (45%)	32 (38.6%)	<.001
	Moderate	17 (39.5%)	0(0%)	17(20.5%)	
	Severe	1 (2.3%)	0(0%)	1 (1.2%)	
Headache	Mild	4 (9.3)	2 (5%)	6(7.2%)	>.05
	Moderate	0(0%)	0(0%)	0(0%)	
	Severe	0(0%)	0(0%)	0(0%)	
Fatigue	Mild	4(9%)	22.(5%)	6(7.2%)	>.05
	Moderate	0(0%)	0(0%)	0(0%)	
	Severe	0(0%)	0(0%)	0(0%)	
Dizziness	Mild	2 (4.7%)	2 (5%)	4(4.8%)	>.05
	Moderate	1 (2.3%)	0(0%)	1(1.2%)	
	Severe	0 (0%)	0(0%)	0(0%)	
Constipation	Mild	4 (9.0%)	3 (7.5%)	7(8.4%)	>.05
	Moderate	0 (0%)	0(0%)	0(0%)	
	Severe	0(0%)	0(0%)	0(0%)	
Abdominal pain	Mild	1(7%)	2 (5%)	5(6.0%)	>.05
	Moderate	0 (0%)	0(0%)	0(0%)	
	Severe	0 (0%)	0(0%)	0(0%)	
Dyspepsia	Mild	5 (11.6%)	(75%)	8(9.6%)	>.05
	Moderate	0 (0%)	0(0%)	0 (0%)	
	Severe	0 (0%)	0 (0%)	0(0%)	
Visual disturbance	Mild	1 (2.3%)	2 (5%)	3 (3.6%)	>.05
	Moderate	1 (2.3%)	0 (0%)	1 (1.2%)	
	Severe	0(0%)	0(0%)	0(0%)	
Somnolence	Mild	1 (2.3%)	0(0%)	1(1.2%)	>.05
	Moderate	0(0%)	0(0%)	0(0%)	
	Severe	0(0%)	0(0%)	0(0%)	
Dysuria	Mild	5 (11.6%)	4(10%)	9(10.8%)	>.05
	Moderate	1(2.33%)	0(0%)	1(1.2%)	
	Severe	0(0%)	0 (0%)	0(0%)	

**Discussion:**

Overactive bladder is characterized by the urinary symptoms of frequency, urgency, and urge incontinence as a result of involuntary detrusor contractions during bladder filling. Such contractions are predominantly under the control of parasympathetic nervous system. Acetylcholine released from the parasympathetic nerve endings activates the M3 muscarinic receptors on detrusor smooth muscles and modulates bladder contractility. Antimuscarinic agents inhibit the binding of acetylcholine to muscarinic receptors and suppress the involuntary detrusor contraction<sup>9</sup>.

The impact of incontinence has been well documented; however, recent studies using validated questionnaires have confirmed that OAB without incontinence also influences quality of life in a negative way<sup>10,11</sup>.

Oxybutynin was the gold standard in the pharmacologic treatment of OAB for almost three decades. Originally identified in the 1960s as a potential treatment for gastrointestinal hyper-motility, oxybutynin is found to be effective in inhibiting involuntary detrusor contractions. It is receptor subtype-specific that binds with high affinity with M3 muscarinic receptors than to the other receptor subtypes. Oxybutynin also has direct spasmolytic and local anesthetic effect on the detrusor. Its antimuscarinic (M3) activity is nonselective for the urinary bladder; resulting in significant systemic side effects, particularly dry mouth, that limits its clinical utility<sup>12</sup>. Even though alternative routes of administration of oxybutynin such as intravesical instillation, intravesical implant, and rectal suppositories are available, oral agents remain the mainstays of treatment of OAB. Newer pharmacologic agents, such as tolterodine, revolutionized the treatment of OAB. New drugs are always compared not only to placebo but also to oxybutynin, because of its long history and established efficacy<sup>13</sup>. Tolterodine was the first drug developed specifically for the treatment of OAB. It is a competitive muscarinic antagonist that exhibits similar affinities for muscarinic receptor subtypes M1 to M4. Unlike oxybutynin, which is a receptor subtype specific agent (for M3), tolterodine may be a more target specific drug that possesses stronger selectivity for the urinary bladder than for the salivary glands.

Since its introduction, clinical efficacy and safety of tolterodine were studied extensively mostly in Caucasian patients. Comparative studies are also conducted among Chinese and Korean population in Asia, '41' but little is known in terms-of efficacy and tolerability of antimuscarinic agents in treating overactive bladder in ethnic group that Bangladeshi population belong to.

Overall, the present study demonstrates that tolterodine 2 mg bid is equally effective as oxybutynin 5 mg bid in Bangladeshi population. Tolterodine significantly reduces the mean number of micturition/24h (26%), as does oxybutynin (25%) after, an 8-week treatment period. The mean number of incontinence episodes/24h was decreased by 70% with tolterodine after 8-week period, compared with a 56% reduction with oxybutynin. The amount of urine voided in each micturition increased by 29.83% after giving oxybutynin and, 28.25% after giving tolterodine. These observations were in accordance with earlier findings established for other ethnic groups<sup>14-18</sup>.

Tolterodine was well tolerated in the present study, and was significantly better tolerated than oxybutynin. Dry mouth was the most common adverse effect in both groups, although its incidence and severity were greater in patients getting oxybutynin. These findings were comparable with previous reports<sup>14-18</sup>.

In conclusion, the present study demonstrates the efficacy and favorable tolerability of tolterodine 2 mg bid in Bangladeshi population with symptomatic overactive bladder. Moreover, tolterodine was found to be equally effective as oxybutynin 5 mg bid with significantly better tolerability.

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# MANAGEMENT OF RENAL STONES WITH PERCUTANEOUS NEPHROLITHOTOMY (PCNL) AS MONOTHERAPY

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## Abstract

*Introduction: Now-a-days percutaneous nephrolithotomy (PCNL) is considered the standard treatment for large (> 2 cm size) and complex renal stones (partial staghorn, complete staghorn calculus, pelvic stones with associated calyceal stones). Aim of this study was to evaluate the results of PCNL as monotherapy done at Apollo Hospitals Dhaka.*

*Materials and Methods: Seventy five patients with three bilateral renal stones (total 78 renal units) that underwent PCNL at Apollo Hospitals Dhaka from May 15, 2005 to November 15, 2006 were included in this study. Selected patients had renal stones more than 2 cm in size (average stone size 35 mm and surface area 750 mm<sup>2</sup>), partial staghorn calculi and complete staghorn calculi along with stones in the diverticulum. Ultrasonogram, intravenous urogram and in some selected cases CT scan were done to detect the location and size of the stone. Urologist performed percutaneous punctures in prone position under fluoroscopic guidance and general anaesthesia were employed in all cases. Stones were fragmented and removed using a pneumatic lithotripsy (Swiss master lithoclast) and suction. A few special per-operative techniques like intraprocedural calyceal irrigation, manipulation etc. were done for achievement of complete stone clearance. Post-operative stone clearance was documented on plain X-ray KUB and ultrasonogram KUB.*

*Results: PCNL was successfully (complete stone clearance and insignificant residue) carried out in 68 patients (69 renal units). Average stone clearance was 88.46% and clearance of pelvic stones was highest (100%). Three patients had associated PUJ obstruction and antegrade endopyelotomy also done simultaneously. No second look procedure needed. Residual stones in 9 renal units in our series were managed by extracorporeal shock wave lithotripsy in 6 cases and the remaining 3 renal units passed stones spontaneously on follow up. Uro-sepsis was the main complication occurred in 9 renal units (11.53%) while urinary leakage/fistula in 6.41% and significant bleeding in 6 renal units (7.69%). Mean blood transfusion was 1.2 units and mean hospital stay was 67 hours.*

*Conclusion: Monotherapy with PCNL is highly effective in the treatment of large volume renal calculi and staghorn calculi. As a minimally invasive procedure, it is quite safe in experienced hand.*

## Introduction :

Percutaneous nephrolithotomy (PCNL) and extracorporeal shock wave lithotripsy (ESWL) are considered the treatment of choice for upper urinary tract calculi now-a-days<sup>1</sup>. Almost all renal stones can be managed with these two minimally invasive (PCNL) or non-invasive (ESWL) techniques either as monotherapy or in combination form<sup>2</sup>. Results of PCNL is better than ESWL for renal stones more than 2 cm size<sup>3,4</sup>. Presence of residual fragments along with post-treatment ancillary procedures (cystoscopy, stone manipulation and percutaneous nephrostomy) are more frequently needed with ESWL monotherapy for larger stones and inferior calyceal stones than PCNL<sup>1</sup>. At present, PCNL is done successfully even in pelvic ectopic kidney, horse shoe kidney, malrotated kidney, pediatric patients, morbid obese patients, calyceal diverticular calculi, upper calyceal calculi with infundibular stenosis, lower calyceal calculi (>10 mm) which cannot be cleared with ESWL<sup>4-7</sup>.

PCNL is safe and less invasive than pyelolithotomy or nephrolithotomy and is now recommended for complete staghorn calculus as monotherapy or along with ESWL as sandwich therapy<sup>8-10</sup>. Purpose of this study is to evaluate the results of PCNL at Apollo Hospitals Dhaka and also to discuss the intraoperative procedures to increase stone clearance rate.

## Materials & Methods:

From May 15, 2005 to November 15, 2006, seventy eight renal units with 3 bilateral cases (75 patients) with mean age 39 ± 15 years (53 males and 22 females) were subjected to PCNL in our unit. Renal stones > 20 mm size, post-ESWL residual stones, partial staghorn, complete staghorn and stones in calyceal diverticula were selected for the purpose. Ultrasonogram, IVU (Figure 2) and CT scan were done to detect stone size and location along with all routine investigations and



urine C/S. All punctures were performed in prone position after retrograde ureteric catheterization under general anaesthesia. Fluoroscopic guided punctures were made by urologist and there after tract dilation done with metallic dilators upto 30 Fr followed by insertion of an amplatz sheath through which rigid nephroscope was passed. Stones were fragmented and removed using pneumatic lithotripter ( Swiss master lithoclast) and suction. Depending on stone size and location, puncture was made superior or middle or inferior calices but for complete staghorn calculi superior calyceal punctures were always done. Where multiple punctures needed, we tried to avoid unnecessary tract dilation and complication. Rather we concentrated to manipulate the stone to a suitable position by pushing with a needle under C-arm guidance. To retrieve small migrated fragments from difficult access calices we used intraprocedural suction, calyceal irrigation, manipulation and flexible nephroscope. Antegrade stenting was done in all cases after PCNL (Figure 3). If the procedure was more than 30 minutes, 14 Fr. nephrostomy tubes were placed. Nephrostomy tube was usually taken out on the first postoperative day after clamping for a few hours. Patients were usually discharged 48-72 hours after the procedure and D-J stent was removed after 4-6 weeks. Post-operative stone clearance was documented on X-ray KUB and ultrasonogram KUB. Stone analysis, urine C/S and metabolic work up were done in selected cases in follow up visits.

**Results :**

In this study, 78 renal units ( 75 patients with 3 bilateral cases) were included. Average stone size was 35 mm (average surface area 750 mm<sup>2</sup>) and 24 patients had multiple stones. PCNL was successfully carried out (complete stone clearance with insignificant residue) in 69 renal units (68 patients). Clearance was 88.46 % of renal units and 11.54 % renal units had residual stones more than 5 mm size. Clearance of stone was highly dependent on stone location rather than size. Stone clearance in renal pelvis was 100%, stone in pelvis and one calyx was 92.85%, stone in pelvis and two calyx was 73.33 % and stone in pelvis and all three calyx was 75 % (Table 1). Among 9 residual stones, 3 passed spontaneously and 6 needed ESWL. Simultaneous endo-pyelotomy was done in 3 cases for associated PUJ obstruction. None of the patients required open exploration or pyelolithotomy.

Twenty two renal units required two or more punctures. Average blood loss was 1.2 units and average hospital

stay was 67 hours. In our series, we did tubeless PCNL in 15 cases (19.23 %). All cases of complete staghorn calculus (Figure 1), superior calyceal puncture was made along with other accessory punctures.

Main complications were urosepsis in 9 renal units (11.53 %), urinary leakage/ fistula from puncture site in 5 renal units ( 6.41%), significant haemorrhage in 6 renal units (7.69 %) and wound infection in 2 renal units (2.56%). All these complications were managed conservatively. No hydrothorax or chest complication reported in our series in supracostal access. Eighteen percent patients complaint of bothersome stent related symptoms, of which 77 % needed analgesics or anti-spasmodics. Stone analysis revealed calcium oxalate in 61 % cases, calcium phosphate 19 % cases, mixed (oxalate + phosphate) 12 % cases and uric acid in 8 % cases. There was no. deterioration in renal function after either single or multiple tracts PCNL.

**Table-I**  
*Stone location with average stone clearance rate*

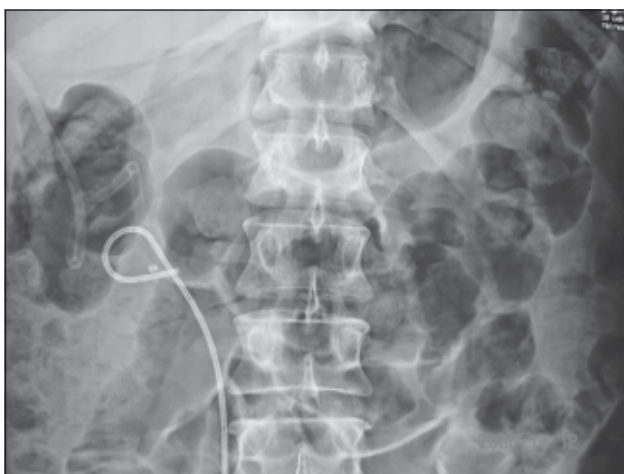
Stone location	Pelvis only	Pelvis and one calyx	Pelvis and two calices	Pelvis and three calices
No. of renal units	23	28	15	12
Average stone clearance	23 (100%)	26 (92.85%)	11 ( 73.33%)	9 ( 75 %)



**Fig-1:** X-ray KUB showing radio-opaque shadow in right renal region.



**Fig.- 2:** Intravenous urogram showing staghorn calculus in right kidney.



**Fig.-3:** X-ray KUB showing complete clearance of stone with double J stent and nephrostomy tube.

### Discussion :

Maximum stone clearance with minimum morbidity should be the goal of stone management<sup>11</sup>. Though PCNL alone has a good success rate, for larger stone burden, ESWL may be used with PCNL ( Sandwich therapy) for complete clearance in some cases<sup>12</sup>. PCNL is preferred to ESWL for larger stones, cystine stones and large inferior calyceal stones. PCNL is less invasive and even less expensive than anatomic nephrolithotomy because of short hospital stay<sup>12</sup>.

In our series, 23 were renal pelvic stones with 100 % clearance rate, 28 pelvis and one calyceal stone with 92.85 % clearance, pelvis and two calices stones were 15 with 73.33 % clearance, pelvis and three calices 12 stones with 75 % clearance rate. Overall stone clearance

was 88.46 % and 7.69 % renal units needed ESWL for complete stone clearance which can be compared to some of the studies in good centres<sup>2,3,11,13,14</sup>. Urosepsis 9 (11.53 %), urine leakage from the tract site 6.41 % and significant hemorrhage 7.69% which were managed conservatively. These complication rates are also compatible to other studies<sup>3,14</sup>. Follow up period was 4 to 19 months.

Multi-tract PCNL, supracostal puncture and tubeless PCNL were done safely and these are now well established<sup>3,14,15</sup>. Average hospital stay of our patients was 67 hours which was also comparable<sup>3,6</sup>. In our series, three bilateral PCNL and one PCNL in a malrotated kidney were also done successfully.

Although multi-tract PCNL is safe, complication rate is higher than single tract procedure<sup>15,16</sup>. In our series, we tried to overcome multiple tract dilation even after second or third puncture; rather we successfully manipulated the stones ( like push back the stone in the pelvis with puncture needle under fluoroscopy guidance) in a suitable position for extraction. Stones with extension into calyces were difficult to remove in some cases but with the help of various techniques like intraprocedural suction, calyceal irrigation and with flexible nephroscope residual stone incidence can be reduced significantly. Decreased reliance on ESWL after PCNL and liberal use of secondary PCNL (can be done with local infiltration) may be also a good option to ensure stone free status<sup>3</sup>.

So, monotherapy with PCNL utilizing single or multiple tract is safe and highly effective for the treatment of large-volume renal calculi in a single hospital stay. Percutaneous nephrolithotomy has significantly reduced the morbidity of open surgical procedures previously used for renal stones.

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# SUCCESSFUL SURGICAL REMOVAL OF ADRENAL PHEOCHROMOCYTOMA - A CASE REPORT

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## Summary

*Pheochromocytoma is an uncommon benign or malignant tumor originates from chromaffin cells of the adrenal medulla. This tumor causes fluctuating blood pressure due to increase secretion of catecholamine in circulation, as a result of which causes many disorders. Clinical suspicion and the results of ultrasound, abdominal CT scan, urinary excretion of vanillylmandelic acid (VMA), a case of pheochromocytoma is diagnosed. When diagnosis is confirmed, the main treatment is surgery. During surgery, manipulation of the tumor causes sudden rise of blood pressure and ligation of the adrenal vein causes sudden fall of blood pressure. Therefore, operation procedure requires meticulous attention and expertise.*

*Herein, we report a case of right adrenal pheochromocytoma, which was suggested by diagnostic imaging procedures and urinary VMA excretion. We successfully removed the tumor and gained blood pressure stability, volume expansion, control of arrhythmia during pre and postoperative period. Histopathology confirmed the diagnosis.*

## Introduction

Tumors of the adrenal glands are not rare but pheochromocytoma is an uncommon tumor. However, when present, they can cause multiple disorders by excessive secretion of catecholamines and other adrenal hormones in circulation<sup>1</sup>. Adrenal tumors are symptomatic but asymptomatic tumors are also reported in literatures<sup>2</sup>. One type of symptomatic tumor is called pheochromocytoma. It is a benign tumor, sometimes malignant, arises from the chromaffin cells of the adrenal medulla and causes excessive secretion of catecholamines, producing systemic disorders<sup>3,4</sup>. When excessive secretion occurs, as in case of pheochromocytoma, fluctuating blood pressure occurs. Handling of the tumor is very difficult because of sudden rise of blood pressure during operation or sudden fall of blood pressure in postoperative period.

The tumor is often called the "ten percent tumor": Because, 10% case malignant, 10% bilateral, 10% extra adrenal, 10% in children, 10% familial, 10% recur, 10% in children with MEN syndrome and 10% present with stroke.

Herein, we precisely report a case of right adrenal pheochromocytoma that was removed successfully with surgery.

## Case Report

A 45-year-old male referred to urology department with an adrenal mass. The patient had high blood pressure with sign of left ventricular failure. Past history and family history of the patient was unremarkable. Biochemical examination revealed mildly elevated serum creatinine level. An ultrasound and CT scan of the abdomen revealed right adrenal mass with suspected pheochromocytoma. (Fig. 1). Urinary excretion of VMA was significantly elevated. Past history and family history of the patient were unremarkable.

We planned for surgical intervention. Before going to surgery we stabilized the patient with alpha and beta adrenoreceptor blockade for weeks and volume expander to stabilize fluctuating blood pressure and orthostatic hypotension respectively.

A surgery was done with a right paramedian incision. The right adrenal gland was reached transperitoneally. The tumor was located retroperitoneally and above the right kidney. A tumor of 6.5cm x 4.5cm x 3cm in size was resected out carefully. It was well encapsulated. (Fig. 2). Histopathological study of the specimen revealed a pheochromocytoma. The tumor cells were arranged in "Zellballen" pattern with stromal deposit of hemosiderin-pigmented foci of hemorrhage (Fig. 3). Postoperative period was uneventful. Patient has been enjoying a symptom free life there after.

## Discussion

Pheochromocytoma is a rare tumor generally arises from adrenal medulla and may be ectopic and familial as reported in world literatures<sup>6</sup>. Blood pressure always fluctuates in these cases due to sudden release of catecholamine in circulation from the tumor. The major problem for a patient with pheochromocytoma is obviously cardiovascular due to catecholamine secretion<sup>7</sup>. Our patient had always high blood pressure when came for treatment.

Once the diagnosis of pheochromocytoma is established, the patient should be prepared for surgery to reduce the incidence of intraoperative complications and postoperative hypotension. The greatest experience is with the long-acting alpha-adrenergic blocker and its use minimized surgical mortality and morbidity.

After hospitalization, intravenous fluids may be required to overcome orthostatic hypotension that occurs in most patients. The dose of alpha and beta blockade may then be titrated over several weeks until blood pressure is less than 160/90 mm Hg and symptoms are abolished. We admitted our case two weeks before surgery and blood pressure controlled with alpha and beta-blocker until blood pressure came down to a satisfactory level. Patient volume expansion with one liter of crystalloid per day to overcome orthostatic hypotension postoperatively<sup>5</sup>.

It is critical that the anesthesiologists are totally informed about the case. They must also be familiar with the anesthetic management of these particular patients<sup>8,9,10</sup>. Both high and low extremes of blood pressure are not uncommon during the procedure. The surgical approaches also differ. The transabdominal approach is commonly selected for patients with pheochromocytoma. The concept is to have the ability for complete abdominal exploration to identify either multiple pheochromocytomas or adrenal metastases. We utilized the transabdominal right paramedian incision for better approach to the right adrenal. The anesthesiologist was specially cautious when we ligated the right adrenal vein because a precipitous fall in blood pressure can occur at this point, requiring volume expansion or even vasopressors<sup>11</sup>. We had successful performance with minimum risk to the patients. Following tumor removal, we preferred to maintain blood pressure and with fluid expansion. No postoperative intensive care monitoring was required. We followed the patient for 4 months and his blood pressure is within normal limit. The level of urinary vanillyl mandelic acid is yet mild elevated but less than the level of preoperative estimation. So, we think that there is ectopic pheochromocytoma, though MIBG is ideal in this situation. To observe the recurrence of the tumor, the patient is under follow-up.

### Conclusion

Surgical exploration and removal of pheochromocytoma after weeks of adequate receptor blockade and good blood pressure control is essential, which requires joint effort between surgeon, internist, cardiologist, anesthesiologist also. Postoperative blood pressure monitoring and follow-up for recurrence is also essential.

### Acknowledgement

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## **EDITORIAL**

# **PEDIATRIC UROLOGY SERVICES IN BANGLADESH**

Urology is a fast expanding subject in context of modern therapy with advent of high class instrumentation. Services of urology are expanding and sub-speciality created. Pediatric Urology is not new but is a young sub-speciality, thus there are many who feel ownership of the patients including pediatrician. Importantly there is a wide range of specialities that provide care for children with conditions that a pediatric urologist might treat, including Pediatrician, Obstetricians, General Surgeon, Pediatric Surgeons and Urologists. Expertise is also provided by Radiologist, Nuclear Medicine Physician and Ultrasonologists. A medical man with training in disease of the adult genito-urinary tract will have a greater understanding and experience with tumors, endoscopy, stone disease and strictures<sup>1</sup>. In Bangladesh Pediatric urological diseases are managed both by the Pediatric surgeons and the Urologists. This has an adverse effect on the growth of pediatric urology as sub-speciality. Pediatric surgeon have given up long ago Cardiac and Neurosurgery because of extensive technical and scientific development in these fields. Urology is no exception. Development of endourology, urodynamics, laparoscopy and renal transplantation work requires specialized training and skills which cannot be learnt during a pediatric general surgical training. Like Uro-Oncology, Female Urology, Andrology, Pediatric Urology has also started to render services as a sub-

speciality in Bangladesh. Since the introduction of pediatric urology section at the National Institute of Kidney diseases and urology (NIKDU) in November 2003 its services as a sub-speciality also started at BSMMU in August 2006. Since then services are expanding & improving in this field day by day.

American Academy of Pediatrics classifies that Pediatric Urologists are medical doctors who have had-

At least 4 years of medical school;

One year of surgical internship;

At least 3 additional years of residency training in general urology;

At least 1 additional year of fellowship training in pediatric urology.

A pediatric urologist must devote a minimum of 50% of his or her practice to the urologic problems of infants, children and adolescents.

Although services of pediatric urology is in its initial stage it requires strong support and interest from the young urologists to carry this super-speciality further. Hope this issue will help generate interest in this wonderful sub-speciality.

At the same time Bangladesh Association of Urological Surgeons has a very definite and strong role to play for this sub-speciality of urology.

## REVIEW ARTICLE

# TREATMENT OF STRESS URINARY INCONTINENCE IN FEMALE- AN UPDATE

K NAHAR<sup>1</sup>, H BEGUM<sup>1</sup>, ABM MONIRUDDIN<sup>2</sup>, SAM GOLAM KIBRIA<sup>3</sup>

### Summary:

*Stress urinary incontinence is a very much distressing and embarrassing condition for an individual. Incontinence results from the weakness in the urethral sphincter mechanism. Although it is a multifactorial disorder, vaginal delivery, specially difficult or instrumental one is thought to be an important factor which results in denervation of urethral sphincter. It is an easily demonstrable condition but some specific urodynamic studies are useful specially to assess the feasibility and utility of surgical treatment. Primary treatment option is always conservative which includes behavioral changes, specific exercises and few drugs. As surgery is the most effective way of treating SUI there is on-going research activities to obtain maximum benefit. Numerous techniques of operation have been described in medical literature. The Burch colposuspension has long been recognized as the best primary operation though tension-free vaginal tape is now the most commonly performed continence surgery. Transobturator tape procedures are becoming increasingly popular at present. There are few unfortunate women in whom neither conventional nor even the newer forms of continence surgery produce an effective cure. In such cases, injection of urethral bulking agents or use of artificial urinary sphincter may be a satisfactory solution.*

### Introduction:

The international Continence Society defines stress urinary incontinence as the complaint of involuntary leakage of urine on effort or exertion or on coughing or sneezing<sup>1</sup>. Urinary incontinence can have a major negative impact on a woman's quality of life. The exact prevalence of urinary incontinence is difficult to determine because the definition can be variable and due to the nature of the disease, is likely to be underreported or under diagnosed<sup>2</sup>. Female urinary continence depends on multiple factors. It depends on intact neurologic, muscular, vascular and fascial support components. The pelvic floor muscles include both smooth and striated muscles, which are innervated by sympathetic, parasympathetic or somatic nerves that must be functional for contraction and relaxation to occur. Proper

muscle function is facilitated by intact ligaments and fascia. Stress urinary incontinence (SUI) occurs when a deficiency exists in any of the above components and the pressure in the bladder is greater than the resting urethral pressure, allowing passive flow of urine. Multiple risk factors are associated with stress urinary incontinence. The most commonly cited are age, obesity, and vaginal delivery<sup>3,4</sup>. Petros and Ulmsten described the mid-urethral theory or integral theory which proposes that damage to the pubo-urethral ligaments supporting the urethra, impaired support of the anterior vaginal wall to the mid urethra and weakened function of the pubococcygeal muscle are responsible for causing stress urinary incontinence<sup>5</sup>.

### Diagnosis of SUI:

A thorough history of voiding symptoms and gynecological examination should be included in the basic evaluation of incontinent women. Though, in a study, Hording et. al. found that 15% of incontinent women had normal gynecological examination findings.<sup>6</sup>

Physical examination must include both neurological and pelvic examinations with an attempt to reproduce the incontinence. Pelvic examination should include Q-tip cotton swab test and stress provocation tests. Q-tip cotton swab test is useful to identify the hypermobility of the urethro-vesical junction. Stress provocation test is performed by asking the patient to cough vigorously while the examiner observes for leakage of urine from the urethra. The Bonney test and pessary test have been advocated as an adjunct to the stress provocation test to assess the benefits from surgery. Urine analysis and culture should be done.

The diagnostic studies may include urodynamics and cystoscopy. Basic urodynamics include uroflowmetry, cystometry and video cystourethrography. Uroflowmetry measures the urine flow rate. Reduced flow rate in a woman would suggest that there is chance of developing voiding difficulties post-operatively if she undergoes incontinent surgery. Cystometry measures the pressure-volume relationship within the bladder and differentiate stress incontinence and detrusor overactivity. Video cystourethrography combines cystometry, uroflowmetry

and radiological screening of the bladder & urethra, is the single most informative investigation. Here bladder is filled with a radiological contrast medium, then the patient is tilted erect on the X-ray table and the image intensifier is used to visualize the bladder and urethra. The patient is asked to cough with a full bladder and the extent of bladder base descent and any leakage of contrast medium is recorded. The whole investigation can be recorded on video tape for later replay. Cystourethroscopy is particularly important to exclude any internal lesion and frequently used during certain surgeries of SUI.

### Treatment of SUI

Understanding of physiology, pathophysiology and pharmacology of the lower urinary tract is important to identify the various etiologies of SUI and the rationale behind therapy. General treatment options are conservative measures, surgery, periurethral injection of bulking agents, artificial urinary sphincter and the adjustable continence therapy.

#### A. Conservative measures include:

- Behavioral therapy
- Pelvic floor muscle exercise
- Biofeedback
- Maximum electrical stimulation
- Vaginal or urethral devices
- Pharmacological agents

#### *Behavioral therapy:*

Behavioral therapy is often used as the initial step in the treatment of SUI because of its non-invasive nature. The aim of this is to reduce the magnitude of stress on the bladder. This can be achieved by health education, dietary measures, weight reduction, fluid restriction and specific exercise. Consumption of caffeinated beverages & alcohol should be reduced. Timed voiding to prevent filling the bladder to a capacity that causes urine loss should be undertaken with the use of a voiding diary. This documentation helps to recommend fluid restriction in appropriate cases.

#### *Pelvic floor muscle exercise:*

In 1948 Arnold Kegel described pelvic floor exercise as a treatment of stress incontinence<sup>7</sup>. It has been found to be extremely helpful in patients with mild to moderate forms of incontinence. The purpose of this exercise is to increase the muscle volume and to develop stronger reflex contractions following quick rise in intra-abdominal

pressure. Contraction of pelvic floor muscle can increase urethral resistance and improves support of the bladder neck. Kegel exercise may cause synergistic contraction of urethral sphincter and can produce a significant increase in maximum urethral resting pressure. The subjective cure rate may vary from 60% to 75%<sup>8</sup>.

#### *Bio-feedback:*

Biofeedback is an adjunct to pelvic floor exercise that is used to facilitate the patient's comprehension of the proper muscles to contract. Using surface electromyography (EMG) on the perineum to measure levator contraction and a pressure monitor in the vagina or rectum to indicate intra-abdominal pressure, the patient can be instructed to preferentially contract the pelvic floor without concomitant abdominal contraction. The efficacy of this modality is highly dependent on patient compliance. Studies demonstrate a 54-95% cure rate or improvement in SUI<sup>9</sup>.

#### *Maximum electrical stimulation:*

Electrical stimulation of the levator muscles via small electrical currents can be used to contract the muscle. By using intra-vaginal or trans-rectal electrodes with stimulators the pelvic muscles automatically contract. When used long term, weakened muscles are strengthened and innervation is re-established. A recent meta-analysis has shown that it is as effective as pelvic floor muscle exercise for the treatment of SUI<sup>10</sup>.

#### *Vaginal or urethral devices:*

Various intravaginal devices like perineometer, vaginal cone and pessaries have been used to treat SUI. Perineometer, a cylindrical vaginal device can be used to stimulate the pelvic floor muscle to contract appropriately and to assess the strength of contraction. Vaginal cones of different weight (20-90 g), when inserted into the vagina stimulate the pelvic floor to contract.

Traditional pessaries which are used for genital prolapse, have also been shown to have a potential role in supporting the bladder neck & urethra and preventing SUI.

Certain external & internal occlusive devices are commercially available. External device like urethral plugs are placed over the external urethral meatus and the internal devices are placed trans-urethrally with an internal balloon.

#### *Pharmacological agents:*

The bladder neck & proximal urethra contain alpha & beta receptors, those when stimulated augment urethral



tone in normal individual. Theoretically, manipulation of these receptors should alter outlet resistance. Traditionally a variety of drugs including  $\alpha$  &  $\beta$  adrenergic agonists, oestrogens & tricyclic antidepressants have been used to treat SUI. But none of these drugs have obtained FDA approval. Although some of those drugs like ephedrine, pseudoephedrine, phenylpropanolamine, midodrine have been shown to reduce frequency and amount of urinary incontinence in patients with mild to moderate symptoms, their use is discontinued due to their side effects.

Duloxetine is the first drug specifically developed and licensed for the treatment of SUI. It is a potent & balanced serotonin & nor-adrenaline re-uptake inhibitor which enhances urethral striated sphincter activity via a centrally mediated pathway<sup>11</sup>. The efficacy and safety of duloxetine has been evaluated in few double-blind randomized placebo controlled studies<sup>12,13,14</sup>. Overall there was a significant improvement in incontinence episodes & frequency and quality of life in those women taking duloxetine.

### **B. Surgery:**

Surgery is usually the most effective way of treating SUI. Over 200 procedures designed to treat SUI have been described in medical literature<sup>15</sup>. The most commonly utilized surgical procedure for SUI include :

- Retropubic suspensions (abdominal open and laparoscopic)
- Suburethral sling procedures
- Needle suspension procedure
- Anterior colporrhaphy
- Periurethral injections<sup>16</sup>.

### **Abdominal retropubic procedures:**

The most commonly performed retropubic procedures include the Burch retropubic urethropexy and the Marshall-Marchetti-Krantz (MMK) procedures.<sup>15</sup> In both the procedures the periurethral and paravaginal tissues are suspended at the level of the urethra-vesical junction by using a firm point of attachment for fixation of suspension sutures. The sutures are fixed with the periosteum of pubic bones in MMK procedure and the iliopectineal ligaments (Cooper's ligaments) in Burch procedure. The Burch procedure has become the first choice for the treatment of patients having hypermobility of bladder neck with genuine SUI. In both longitudinal and randomized comparative trials against other

procedures, the Burch procedure maintains the highest objective & subjective cure rate of 80% after 5 years and 68% after 10 years of follow-up<sup>9</sup>.

### *Laparoscopic colposuspension:*

Laparoscopic approach to Burch colposuspension was introduced in the early 1990s. It has the advantage of being minimally invasive procedure and has been shown to reduce the duration of the post-operative recovery period, hospital stay & the degree of pain<sup>17,18</sup>.

### **Sub- urethral sling procedures:**

Sub-urethral sling procedures were developed to treat the patients who were experiencing either recurrent or severe type of SUI. Recently these have been advocated as the primary surgical treatment for SUI<sup>19</sup>. The operation involves the placement of a sling of either artificial or autologous tissue beneath the urethra and the suspension of the sling to various structures in the abdominal wall or retropubic space. The sling is used to elevate and support the bladder neck & proximal urethra. The sling procedures are associated with the risk of infection and erosion of urethra or vagina by the sling. The sling may be inserted either abdominally, vaginally or by a combination of both. Tension-free vaginal tape (TVT) procedure and transobturator tape (TOT) procedures are the two important recent approaches for the placement of sub-urethral sling.

- TVT procedure: This procedure was developed as a minimally invasive sub-urethral sling procedure by Ulmsten & colleagues. Here, a 11 mm×40 cm polypropylene mesh tape is inserted transvaginally at the level of mid urethra, using two trocars. The procedure may be performed under local, spinal or general anaesthesia. There have been a number of observational trials of this technique reporting cure rates of 74% to 85% in patients undergoing surgery for primary or secondary SUI<sup>20-23</sup>.
- TOT procedure: The TOT route for the placement of synthetic mid urethral slings was first described in 2001<sup>24</sup>. This procedure also may be done under local, spinal or general anaesthesia. One randomized clinical trial of TVT versus TOT found comparable (84% vs 90%) success rates at the first follow-up visit<sup>25</sup>.

Other reviews and meta-analyses comparing the effectiveness and complications of TOT with TVT by retropubic route revealed that, when compared by subjective cure TOT was no better than TVT<sup>26,27</sup>. Adverse events like bladder injury and voiding difficulties

were less common, whereas groin & thigh pain, vaginal injuries or erosion of mesh were more common after tape insertion by the transobturator route.<sup>26</sup>

#### **Bladder neck needle suspension or needle urethropexy:**

In these operations a long needle is used to insert a loop of nylon on each side of the bladder neck and this is tied over the rectus sheath to elevate the urethrovesical junction. These operations are done under the guidance of cystoscope to ensure accurate placement of sutures and to avoid bladder injury. There are three principal types e.g. Pereyra, Stamey and Raz with many modifications<sup>15</sup>.

#### **Anterior colporrhaphy:**

Anterior colporrhaphy with Kelly plication is one of the oldest method of surgical correction of SUI. The technique involves vaginal dissection of epithelium below the bladder and bladder neck, identifying the perivesical & pubocervical fascia, and then plicating each side over the midline. Long-term analysis does not support this method as an effective one for SUI, with greater than 60% failure rates over 5 years<sup>9</sup>.

#### **C. Periurethral injections of bulking agents:**

This is a minimally invasive surgical procedure and may be useful in the elderly and those women who have undergone previous operations and have a fixed, scarred, fibrosed urethra. Periurethral injections of bulking agents are thought to promote continence by causing coaptation of the urethral mucosa and by increasing functional urethral length<sup>28,29</sup>. Materials injected include autologous fat, Teflon, collagen and silicon<sup>30</sup>. It can be done on an outpatient basis most women require 2 or 3 injections<sup>31</sup>. Bulking agents are injected either periurethrally or transurethrally on either side of the bladder neck under cystoscopic control.

In a multicenter randomized clinical trial three surgical techniques e.g. retropubic bladder neck suspension (Burch or modified Burch procedure), sling procedure and transvaginal endoscopic bladder neck suspension (Raz procedure) were compared with intraurethral submucosal collagen injection under local anaesthesia for treatment of female SUI. One year after intervention, the success rate of collagen injection was about 19% lower than that after surgery, but the severity of complications were much greater after surgery than after collagen injection<sup>32</sup>.

In another multicenter prospective randomized trial efficacy and safety of Calcium hydroxylapatite (CaHA),

a new bulking agent was compared with collagen injection. CaHA is a principal constituent of human bone & teeth, is available as sterile, non-pyrogenic injectable Coaptite consisting of spherical CaHA particles in a gel carrier. Animal experiments had previously shown that when CaHA particles are placed in a soft tissue, it causes fibroblast infiltration and the gel carrier degrades slowly and suspends the particles for several months and provides most of the initial bulking effect. That study revealed that safety profile of CaHA is equivalent to that of collagen. The total volume of material injected was significantly less for CaHA patients than collagen patients<sup>33</sup>.

#### **D. Artificial urinary sphincter:**

An artificial sphincter is a device which may be employed when conventional surgeries fail. This is implantable and consists of a fluid-filled inflatable cuff which is surgically placed around the bladder neck, a fluid containing reservoir is placed in the peritoneal cavity and a small finger-operated pump is placed in the left labia majora. These three major components are connected via a control valve. Normally cuff is kept inflated to obstruct the urethra, when voiding is desired the pump is used to empty the cuff and the fluid is allowed to go back into the reservoir so that the voiding may occur. The cuff will automatically refill to maintain continence. It is expensive and require complicated surgery to insert the parts. Reported success rates are up to 91%, but complication rates are high, with 21% of patients requiring surgical replacement of the parts or the entire sphincter<sup>9</sup>. This is typically not a widely used option. Potential drawbacks include infection, mechanical failure and erosion. However, this may be a valuable for the patients who have failed all other treatments<sup>34</sup>.

#### **E. The adjustable continence therapy (ACT):**

The adjustable continence therapy is a new method for treating female SUI due to intrinsic sphincter deficiency. The ACT device consists of two silicon balloons attached via conduits to a titanium and silicon port. The balloons are placed under fluoroscopic imaging in the periurethral space at bladder neck with the aim of increasing urethral resistance and supporting the bladder neck. The ports are positioned in the subcutaneous tissue of the labia majora and enable post-operative adjustment of balloon, if needed. This device allows post-operative adjustment in the volume of saline in the balloon by increasing or decreasing the pressure that is placed periurethrally. The occurrence of urethral atrophy over time and subsequent placement of a smaller-diameter urethral

cuff is certainly a potential risk for artificial urinary sphincter. This ACT system allows a much easier response to urethral atrophy with percutaneous access to balloon via the port, which allows the surgeons to increase the balloon size as needed.

### Conclusion:

SUI is a prevalent condition that may have a significant negative impact on a woman's quality of life. With improved awareness and research, new conservative and surgical management are being developed. Conservative measures should be considered before surgical treatment. There is continuing research activities to improve the efficacy of the management options, especially in the field of surgery. There are many modifications in the surgical techniques to improve the quality of life of the patient, as well as to reduce the degree of invasiveness and hospital stay. Pharmacological agents are also under continuous research activities to obtain the most accurate result, without any adverse effect. Management should therefore be individualized according to the facilities available or affordable. At all the levels, management should be multidisciplinary and protocols should be set to provide maximum benefit to the patients.

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## ABSTRACT FROM CURRENT LITERATURE

### Female Sexual Dysfunction Following Vaginal Surgery: A Review

*Hari S.G.R. Tunuguntla, Angelo E. Gousse*

**Purpose:** Depending on age it has been estimated that up to 40% of women have complaints of sexual problems, including decreased libido, vaginal dryness, pain with intercourse, decreased genital sensation and difficulty or inability to achieve orgasm. In this review we address the etiologies and incidence, evaluation and treatment of female sexual dysfunction following vaginal surgery for indications such as stress urinary incontinence and pelvic organ prolapse; anterior/posterior colporrhaphy, perineoplasty and vaginal vault prolapse.

**Materials and Methods:** Literature on the mechanisms by which vaginal surgery affects female sexual function are discussed along with related pathophysiology to potential causes. The anatomy, neurovascular supply of the clitoris and introitus, and intrapelvic nerve supply are discussed as related to vaginal surgery. Techniques to avoid neurovascular damage during pelvic floor surgery were corroborated by supporting literature. Literature regarding female sexual dysfunction following other procedures, such as vaginal hysterectomy, Martius flap interposition, and vesicovaginal and rectovaginal fistula repair were also discussed.

**Results:** Current literature does not support an association between vaginal length following vaginal surgery and sexual function. The proportion of women who are sexually active does not appear to be affected by vaginal surgery. Sling surgery for urinary incontinence does not appear to adversely affect overall sexual function, although individual parameters of sexual function scores may vary, eg a significant percent of women report pain during intercourse. Some patients experience improved overall sexual function due to complete relief from coital incontinence

**Conclusions:** Symptomatic vaginal narrowing is rare even in women undergoing simultaneous posterior repair. Overall sexual satisfaction appears to be independent of therapy for urinary incontinence or prolapse. Data indicate that defect specific posterior colporrhaphy with the avoidance of levator ani plication may improve sexual function. The possible etiological factors for sexual dysfunction following vaginal surgery deserve further investigations.

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### Open Partial Nephrectomy for Tumor in a Solitary Kidney: Experience With 400 Cases

*Amr F. Fergany, Ismail R. Saad, Lynn Woo, Andrew C. Novick*

**Purpose:** We present a series of 400 patients with tumor in a solitary kidney who underwent open surgical partial nephrectomy performed by a single surgeon (ACN) with a primary focus on postoperative long-term kidney function.

**Materials and Methods:** A total of 400 patients with sporadic nonfamilial kidney tumors in a solitary kidney underwent open partial nephrectomy between 1980 and 2002. In 323 patients (81%) the contralateral kidney had been surgically removed, while the remaining 77 (19%) had a congenital solitary kidney. Renal insufficiency was present preoperatively in 184 patients (46%). Adverse risk factors for partial nephrectomy were present in a large percent of patients. Intraoperative and postoperative parameters were evaluated at a mean followup of 44 months.

**Results:** In the overall series 5 and 10-year cancer specific survival was 89% and 82%, respectively. Surgical complications occurred in 52 patients (13%), most commonly urinary leakage. Early postoperative renal function was achieved in 398 patients (99.5%). Only 2 patients required permanent dialysis postoperatively. Satisfactory long-term renal function was achieved in 382 patients (95.5%). A total of 18 patients had progressed to renal failure a mean of 3.6 years after surgery. Patient age, the amount of renal parenchyma resected, a congenitally absent or atrophic contralateral kidney and the time of contralateral nephrectomy were noted to be significantly associated with postoperative renal function.

**Conclusions:** Open surgical partial nephrectomy can be safely performed in patients with tumor in a solitary kidney. Long-term cancer-free survival with the preservation of renal function can be reliably expected in most of these cases.

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### **Complications of Intravesical Therapy for Urothelial Cancer of the Bladder**

*Madhusudan P. Koya, Michael A. Simon, Mark S. Soloway*

**Purpose:** Intravesical therapy is an integral part of treatment in patients with superficial urothelial carcinoma of the bladder. The American Urological Association and European Association of Urology guidelines on bladder cancer incorporate it for the treatment of superficial bladder cancer. Given the extensive use of intravesical immunotherapy and chemotherapy, it is essential for the practicing urologist to be aware of the local and systemic side effects of these therapies.

**Materials and Methods:** We reviewed the literature on intravesical immunotherapy and chemotherapy with particular emphasis on side effects, complications and their management. A Medline search of the English language literature for the last 25 years was done on Entrez PubMed and all relevant articles were studied in full. All side effects and complications were studied and their management was reviewed.

**Results:** Intravesical therapy for transitional cell carcinoma of the bladder is generally safe. There is a high incidence of local, usually self-limiting, relatively minor side effects and infrequent, potentially severe local and systemic side effects. Most side effects are avoidable.

**Conclusions:** Although intravesical therapy is generally safe, local and systemic side effects occur and it is important to be aware of them. Identifying complications early, preventing them when possible and managing them efficiently are critical. Most complications are preventable. Knowing the risks and benefits of chemotherapeutic and immunotherapeutic agents may decrease the short-term and long-term toxicity of these agents. Adherence to guidelines may prevent inappropriate use, which can lead to unnecessary complications, resulting in bladder dysfunction and even cystectomy.

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### **Impact of Increased Number of Biopsies on the Nature of Prostate Cancer Identified**

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**Purpose:** Increasing the number of cores obtained at the time of transrectal ultrasound guided prostate biopsy

has increased the number of cancers identified. However, there is increasing recognition that many men with prostate cancer may not benefit from early, aggressive intervention and that over detection of prostate cancer has resulted in over treatment. We determined the impact of the greater number of prostate biopsies on the nature of cancer identified.

**Materials and Methods:** In the Cancer of the Prostate Strategic Urologic Research Endeavor database, a longitudinal disease registry of men with prostate cancer, we identified those men diagnosed between 1999 and 2002 with complete data on serum prostate specific antigen, Gleason score, clinical T stage, number of biopsies obtained and number involved with cancer.

**Results:** We identified 4,072 men with 6 or more prostate biopsies obtained at initial diagnosis. Of the men 30%, 47% and 24% underwent 6, 7 to 11, and more than 12 biopsies, respectively. The number of biopsies correlated significantly with numerous sociodemographic and clinical variables including prostate specific antigen, comorbidities and income. There did not appear to be differences in disease characteristics as assessed by Kattan and Cancer of the Prostate Risk Assessment scores among men with a biopsy number between 6 and 17. In the subset of 1,548 men undergoing radical prostatectomy, no differences in biochemical-free survival were observed among the various biopsy groups at a median followup of 2.2 years.

**Conclusions:** The increasing number of prostate biopsies obtained at diagnosis increases cancer detection but the impact on disease characteristics remains unclear. Our data suggest that the risk stratification of prostate cancers is independent of biopsy number (6 or greater) in a contemporary cohort of men.

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### **Safety and Efficacy of Intravesical Bacillus Calmette-Guerin Instillations in Steroid Treated and Immunocompromised Patients**

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**Purpose:** We assessed the safety and efficacy of intravesical bacillus Calmette-Guerin instillations in steroid treated and immunocompromised patients.

**Materials and Methods:** We retrospectively reviewed the charts of 697 patients treated with bacillus Calmette-Guerin instillations at our institution from 1991 to 2004. In 24 patients (3.5%) an underlying comorbidity directly affecting the immune system was diagnosed before bacillus Calmette-Guerin administration or steroids were administered at least 6 weeks before and at the time of bacillus Calmette-Guerin instillations. The immunosuppressive effect of steroids was assessed by the percent of lymphocytes. End points were the bacillus Calmette-Guerin response at 6 months, defined as normal cystoscopy, cytology and biopsy when available, and treatment related toxicity.

**Results:** Four patients (17%) had active lymphoma or chronic lymphocytic leukemia during bacillus Calmette-Guerin administration and 21 (88%) had a concurrent condition for which oral steroids (11), inhaled steroids (14) or oral and inhaled steroids (4) were administered. Patients treated with oral steroids had a lower percent of lymphocytes than patients treated with inhaled steroids and 15 age matched patients with high risk superficial bladder cancer and no steroid treatment (12.3% vs 17.5% and 18.6%, respectively). The overall bacillus Calmette-Guerin response rate at 6 months was 58%. Ten of the 24 patients had disease recurrence and 3 had disease progression at a median followup of 63.5 months (IQR 19.5, 89). One patient treated with oral steroids had self-limited febrile disease and worsening of myalgia 48 hours after his third bacillus Calmette-Guerin cycle. No other systemic adverse event following bacillus Calmette-Guerin therapy was recorded and all patients completed scheduled treatments.

**Conclusions:** Intravesical bacillus Calmette-Guerin is a viable therapeutic option in patients with high risk superficial bladder cancer and concomitant lymphoma or chronic lymphocytic leukemia, treatment with low dose oral steroids or treatment with inhaled steroids. The bacillus Calmette-Guerin response rate at 6 months and the side effects profile associated with bacillus Calmette-Guerin therapy in these patients were comparable to those in patients with no evidence of immunosuppression. Further studies are warranted to assess the safety and efficacy of bacillus Calmette-Guerin instillations in critically immunocompromised patients.

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### **The Interpretation of Serum Prostate Specific Antigen in Men Receiving 5 $\alpha$ -Reductase Inhibitors: A Review and Clinical Recommendations**

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**Purpose:** We reviewed the effects of 5 $\alpha$ -reductase inhibitors on prostate specific antigen and clarified the adjustments that should be made to compensate for these effects to ensure that the usefulness of prostate specific antigen for detecting prostate cancer is maintained.

**Materials and Methods:** We reviewed articles published in the scientific literature with relevance to the effects of 5 $\alpha$ -reductase inhibitors on the usefulness of prostate specific antigen for detecting prostate cancer.

**Results:** A total serum prostate specific antigen of 4.0 ng/ml has traditionally been used as the threshold for triggering prostate biopsy. However, clinical trials of finasteride and dutasteride have shown that 5 $\alpha$ -reductase inhibitors decrease serum prostate specific antigen in patients with and without prostate cancer. To compensate, the doubling rule has been applied in clinical trials and clinical practice. However, doubling serum prostate specific antigen may overestimate actual prostate specific antigen in some patients receiving 5 $\alpha$ -reductase inhibitors for up to 6 to 9 months, accurately estimate prostate specific antigen from 1 to 3 years and underestimate it thereafter. An increase in prostate specific antigen of 0.3 ng/ml from nadir as a trigger for biopsy maintains 71% sensitivity for prostate cancer in men receiving dutasteride with 60% specificity, similar to the 4.0 ng/ml prostate specific antigen cutoff using placebo.

**Conclusions:** We propose that a prostate specific antigen increase from nadir of 0.3 ng/ml or greater could represent an alternative to the doubling rule for monitoring prostate specific antigen in patients on 5 $\alpha$ -reductase inhibitors. The prostate specific antigen increase from nadir appears to be a more accurate cancer indicator than a doubled value in some patients.

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### Endoscopic Treatment for High Grade Vesicoureteral Reflux in Infants

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**Purpose:** Minimally invasive endoscopic treatment for vesicoureteral reflux has become an established alternative to long-term antibiotic prophylaxis and surgical intervention in children. We determined the long-term efficacy and safety of this treatment for high grade reflux in infants.

**Materials and Methods:** We retrospectively reviewed the medical records of 411 consecutive infants who underwent endoscopic treatment of grade III to V vesicoureteral reflux between June 1985 and October 2004. A total of 29 patients (7%) were excluded from study because they were lost to followup or the medical records were incomplete. Of the remaining 382 infants, including 203 males, 274 had bilateral and 108 had unilateral vesicoureteral reflux. This represented 642 high grade refluxing units with grade III to V disease in 232, 339 and 71, respectively. A dimercapto-succinic acid scan performed in 312 infants revealed renal scarring in 88 (28%). The tissue augmenting substance used for endoscopic injection was polytetrafluoroethylene and dextranomer/hyaluronic acid copolymer in 432 and 210 ureters, respectively. Endoscopic treatment was done at a median age of 7 months (range 2 months to 1 year). Median followup in these patients was 7 years (range 6 months to 20 years).

**Results:** Complete resolution of vesicoureteral reflux after a single injection occurred in 443 ureters (69%), including 73% with dextranomer/hyaluronic acid copolymer and 65% with polytetrafluoroethylene. Of the 642 ureters 127 (20%) required more than 1 injection to correct vesicoureteral reflux. In 60 ureters vesicoureteral reflux was downgraded to grade I or II and no further treatment was given, while 12 ureters that failed to respond to endoscopic treatment required open surgical intervention. Only 1 ureter required reimplantation to treat vesicoureteral obstruction.

**Conclusions:** Endoscopic correction is a safe, effective, minimally invasive outpatient procedure for high grade vesicoureteral reflux in infants. Early correction of vesicoureteral reflux may provide protection from reflux associated renal damage and prolonged antibiotic use.

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### Prostate Specific Antigen Doubling Time Calculation: Not as Easy as 1, 2, 4

Timothy J. Daskivich, Meredith M. Regan, William K. Oh

**Purpose:** Although prostate specific antigen doubling time is widely used to predict outcomes such as time to progression and prostate cancer specific mortality, clinicians may be unaware of the impact of method on prostate specific antigen doubling time calculation. We present a critical review of the literature to assess the diversity of methods used to calculate prostate specific antigen doubling time. We then describe the need for methodological consistency with the literature by showing examples from our clinical experience at our institution.

**Materials and Methods:** A comprehensive review of articles evaluating prostate specific antigen doubling time as a prognostic and predictive indicator in various prostate cancer disease states was performed using PubMed. Case examples were drawn from the prostate cancer database at our institution. The database is a registry of 4,651 patients with prostate cancer who have been seen at our institution since 1998.

**Results:** The methodology of prostate specific antigen doubling time calculation is inconsistent in the literature. Based on our experience and data presented in the literature the different methods in the literature are not always interchangeable. Small deviations from the methods outlined in a study can sometimes lead to wide variation in calculated prostate specific antigen doubling time. This variation of up to several months or longer is large enough to cause errors in assessment of prognosis and can even lead to incorrect management. The rules for prostate specific antigen doubling time calculation found in the literature can be categorized into 4 parameter groups, including method, calculation interval, data acquisition rules and data analysis rules. Case examples illustrate the importance of adherence to the literature with regard to each parameter.

**Conclusions:** Consistency with the literature in methodological elements of prostate specific antigen doubling time calculation is essential for the accurate calculation of prostate specific antigen doubling time. Clinicians and researchers should understand how methodological differences influence the value of calculated prostate specific antigen doubling time for purposes of patient care and research.

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### **Initial Therapy With Radical Prostatectomy for High Risk Localized Prostate Cancer**

*James E. Montie*

**Purpose:** This study provides a perspective on initial treatment in select patients with high risk, localized prostate cancer.

**Materials and Methods:** A select literature review was done with commentary on the philosophy of initial surgery followed by adjuvant or salvage therapies.

**Results:** Early detection and associated stage migration identify a cadre of men with unfavorable but apparently localized prostate cancer who historically would not have been viewed as appropriate candidates for radical prostatectomy. Decreased morbidity from radical prostatectomy and data demonstrating improved outcomes in some patients treated with multimodal therapy protocols provide a rationale for including radical prostatectomy as part of an aggressive treatment plan

to achieve optimal local elimination of cancer. Data suggest that radical prostatectomy and adjuvant or possibly even salvage radiation therapy may provide the best elimination of large local cancers. Whether such an approach provides results that are better than or even as good as those of the common standard of radiation therapy plus androgen deprivation therapy remains to be seen and, if so, at what cost to the patient in terms of adverse effects. However, it is likely that optimal elimination of local disease is needed to achieve the maximum benefit from adjuvant systemic endocrine, chemotherapy or targeted treatments. In other words optimal local therapy may be necessary but not sufficient.

**Conclusions:** Initial radical prostatectomy may have a role for treating high risk localized prostate cancer.

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