EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY PRIOR TO TRANSURETHRAL RESECTION OF PROSTATE IN BLADDER STONES ASSOCIATED WITH BENIGN PROSTATIC HYPERPLASIA

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SUMMARY :

Purpose: *We report our experience with the use of extracorporeal shock wave lithotripsy (ESWL) prior to transurethral resection of the prostate (TURP) in patients who suffered from bladder stones and benign prostatic hyperplasia (BPH).* ***Methods:*** *Thirty-two male patients (54-78 years old, mean 62 years) who have BPH accompanied with bladder stones were treated with ESWL 2-4 days before TURP. Patients with insufficient disintegration by ESWL underwent pneumatic lithotripsy.* ***Results:*** *The mean stone burden was 32mm. ESWL was successful in 19 (59.4%) patients. Complete fragmentation was achieved after a single session in 10 (31.3%) patients, whereas 9 (28.1%) required additional session. 13 (40.6%) patients underwent pneumatic lithotripsy before TURP. No additional intra or postoperative complications due to ESWL were noted.* ***Conclusion:*** *Our experience suggest that ESWL prior to TURP is a safe, noninvasive, comfortable, but inadequate treatment method in bladder stones associated with BPH. It should only be considered as a first line of therapy in the treatment of high risk patients.*

Key Words : *Bladder Stones, Benign Prostatic Hyperplasia, Extracorporeal Shock Wave Lithotripsy, Transurethral Resection of Prostate.*

INTRODUCTION

Bladder stones are not uncommon throughout the world. While pediatric bladder stones are not related to bladder outflow obstruction, adult bladder stones are commonly associated with benign prostatic hyperplasia (BPH), contracture of bladder neck, urethral stricture, neurogenic bladder dysfunction, or infection (1, 2). Among these underlying urological disorders, BPH is the most common aetiologic factor which often requires surgical measures (3)

In the literature, transurethral resection of prostate (TURP) has usually been combined with mechanical or other endoscopic lithotripsy methods in patients with bladder stones and BPH (3, 4). These endoscopic procedures require anesthesia and hospitalisation. Difficulties in the treatment of large (greater than 3cm) or hard calculi and mucosal injuries of urethra or bladder, which may lead to termination of the procedure, are the disadvantages of endoscopic methods (5-8). Limitations and considerable complication rates of these procedures necessitate a totally noninvasive or minimally invasive approach.

With the rapid improvement in technology and clinical experience, the management of urinary tract calculi has shifted from invasive or minimally

invasive procedures to non-invasive extracorporeal shock wave lithotripsy (ESWL) (9). Instead of open surgery or endoscopic procedures, ESWL has been proposed as an attractive alternative method in the treatment of bladder calculi.

In this retrospective study, our experience with ESWL prior to TURP for bladder calculi associated with BPH has been evaluated and presented.

PATIENTS AND METHODS

6200 patients having urinary tract stone(s) were treated with ESWL in Department of Urology, School of Medicine, Gazi University between 1990-1997. Thirty-two male patients (54-78 years old, mean 62 years) who had BPH accompanied with bladder stone(s) were included in this study. Full physical examination, routine urinalysis, urine culture, prostate specific antigen, renal function tests, whole blood examination, electrocardiography, chest roentgenogram, intravenous urography and transrectal ultrasonography were performed on all patients. The mean prostate size was 51 cc (41-64). Of these patients 22 had solitary and 10 had multiple stones. The stone burden was determined by preoperative imaging studies and calculated by the sum of maximum diameters of the calculi. The mean stone burden was 32 (18-64) mm.

No patients had urethral catheters for acute retention and 8 patients had urinary tract infection (UTI). Antibiotic therapy was given to the patients 48-72 h before ESWL based on the urine cultures if they had UTI. Those without UTI had only a single dose prophylactic antibiotic therapy. Patients were given a mild laxative the night before ESWL, and attended for lithotripsy the next morning.

ESWL was performed with Siemens Lithostar Plus (Germany) without any analgesia in prone position on an outpatient basis. Fluoroscopic localization was preferred for all patients. Treatment time averaged 46 min per patient with a range of 19-57 min. The number of shock waves applied was 1250 to 4000 (average 3480); electrical discharge ranged from 17.8 to 19 kV (average 18.4 kV).

The day after ESWL, a plain abdominal film or sonography were used to provide the evidence of stone disintegration. Patients with insufficient disintegration underwent a second session of ESWL. Two or 4 days after ESWL treatment, all patients were evaluated with cystoscopy. Pneumatic lithotripsy was carried out by Swiss Lithoclast in patients who had inadequate disintegration by ESWL. After the evacuation of calculous fragments with Ellik evacuator, TURP was performed in the standart manner. All patients were judged to be stone-free endoscopically at the conclusion of the procedure.

Fisher's exact test was used for statistical analysis.

RESULTS

ESWL was successful in 19 (59.4%) patients. Single session ESWL was sufficient for 10 (31.3%) patients, whereas, 9 (28.1%) patients required a second session for complete disintegration. Of the 19 (59.4%) patients twelve (37.5%) passed the fragments without urinary retention, and stone fragments were evacuated by transurethral manipulation just before the TURP in six(18.8%) patients. Urethral fragment impaction occurred in 1(3.1%) patient with a stone burden of 29mm and

	ESWL successful	ESWL unsuccessful	Total
Stone burden <3cm	8(57.1%)	6(42.9%)	14(100%)
Stone burden ≥3cm	11(61.1%)	7(38.9%)	18(100%)
Total	19(59.4%)	13(40.6%)	32(100%)

Table 1 : ESWL results regarding the stone burden.

	ESWL successful	ESWL unsuccessful	Total
Calcium oxalate or phosphate	15(57.7%)	11(42.3%)	26(100%)
Struvite	4(66.7%)	2(33.3%)	6(100%)
Total	19(59.4%)	11(40.6%)	32(100%)

Table 2 : ESWL results regarding the stone composition.

necessitated endoscopic manipulation. On the other hand, ESWL was found to be unsuccesful in 13(40.6%) patients and were treated by pneumatic lithotripsy. Table 1 shows the success rate of ESWL regarding to stone burden. There were statistically no significant differences between the stone burden groups regarding the success rate (p=0.55).

All patients had mild transient haematuria after ESWL treatment. Cystoscopic examination prior to TURP revealed no deteriorative side effects due to ESWL on the bladder wall. A clear view was obtained after the evacuation of stone fragments. No additional intra or postoperative complications due to ESWL were noted. Stone analysis has shown calcium oxalate or phosphate in 26 and struvite in six patients. There were statistically no significant differences between the stone composition groups regarding the success rate (p=0.53).

First month visit demonstrated that all patients were free of calculi. One-year follow-up was avaliable in 21 (65.6%) patients. No stone recurrence was observed.

DISCUSSION

It is well known that bladder stones are commonly associated with several urological disorders (1, 2). Unless the underlying disorder is corrected, stone removal will only be a temporary measure since its recurrence will not be a rare condition (3). Especially patients with both bladder stones and BPH appear to have some clinical problems including difficulty in eleminating stone fragments and stone recurrence, and urologists should solve these conditions together. Although patients with very large prostate could be treated with open surgical approaches permitting removal of the stones, endoscopic manipulation with different lithotripsy techniques is the standart method for bladder stones prior to TURP (5).

Endoscopic visual cystolithotripsy permits safer and more accurate treatment of vesical stones (10). There are several endoscopic lithotripsy methods including mechanical, electrohydraulic, ultrasonic, pneumatic, and laser. The advantages of these endoscopic procedures are the ability of simultaneous treatment of some underlying diseases which predispose to stone formation. On the other hand, the risk of harmful influence on the bladder mucosa and urethral strictures from prolonged use of endoscopic tools and increased operation time are the potential disadvantages of these methods (5-7). Difficulty in fragmenting dense and poorly fragile large calculi is outdated now with holmium-YAG laser (11). Combination of endoscopic cystolithotripsy methods with TURP can be performed simultaneously or separately (3,4). To perform both procedures in single session prolongs the operation time and may lead to subsequent urethral complications. However, performing the endoscopic lithotripsy at a separate time requires another anaesthesia which might be a risk for the patient. The risks described above created the search for a noninvasive treatment, performable without anesthesia on an outpatient basis.

ESWL have currently replaced surgery as the first line of management of most urinary tract stones. Although ESWL of bladder stones is possibly different from renal and ureteral lithotripsy in several respects, it has been reported as an alternative therapy for bladder stones with its effectiveness and low complication rate. Furthermore, a second session of ESWL can be given the next day with less possibility of deleterious effects, and adequate fluid medium around the stone results in good fragmentation (10). Vallancien et al. (12) treated 8 patients with bladder stones and reported a success rate of 50 %, using piezoelectric extracorporeal lithotripsy. Failure was noted in patients with hard calculi and stones greater than 3 cm in diameter. Vandeursen and Baert (1) treated 10 patients with bladder stones which fragmented completely by ESWL. Bhatia and Biyani (10) treated 43 patients with bladder stones; complete fragmentation was achieved after a single session of ESWL in most of the patients. Kostakopoulos et al. (13) treated 36 patients with bladder stones; complete fragmentation and uncomplicated evacuation occurred in 27 (72%) patients.

Recently, the combination of ESWL and TURP has been proposed as an attractive method with a minimal complication rate. In our series complete fragmentation with ESWL prior to TURP was achieved in 19 (59.4%) patients. It was found that stone burden or stone composition doesn't effect the success rate (Table 1-2, p>0.05). Thirteen (40.6%) patients who had insufficient fragmentation with ESWL were treated by pneumatic lithotripsy with a success rate of 100%. Bosco and Nieh (14) used epidural anesthesia for ESWL (using the Dornier HM3 lithotriptor) and

performed TURP at the same time. Hotyana et al. (2) reported 3 patients with bladder stones and BPH treated with ESWL and then TURP. Contrary to our results, both studies have shown that, ESWL can successfully be performed prior to TURP. Our data should be verified with larger prospective trials.

We believe that treating the patient in prone position results in a clear stone image in plane 2, which allows for easy localization and good assessment of fragmentation. The calculus can shift out of focus due to the vesical capacity. To keep a Foley catheter indwelling during therapy with a resultant collapsed bladder during drainage, which minimizes stone mobility, and interrupted saline irrigation through the catheter to create a good expansion chamber for better fragmentation may improve success rate. Irrigation is alternately clamped and released during therapy (10). Bosco and Nieh (14) and Bhaita and Byani (10) preferred catheter drainage during ESWL. Some others treated their patients without an indwelling Foley catheter (1, 15).

Vandeursen and Baert (1) observed complete clearance of stone fragments in patients with BPH, but any form of infravesical obstruction can impede or prevent fragment clearance. In our study, 12 (37.5%) patients cleared off the small stone fragments until the application of TURP. Relatively bigger fragments which stayed in the bladder were evacuated via the resectoscope sheath prior to resection in 7 (21.9%) patients. Our low stone clearance rate makes the ESWL expensive as a first line treatment method in today' s cost-conscious environment.

In our experience, no severe complications due to ESWL, other than mild transient haematuria, were noted and cystoscopy revealed no mucosal injury, which has also been reported by other authors (2, 16). Probably, the most controversial area related to the use of ESWL for bladder calculi is stone recurrence. It was thought that longer follow-up is required to ascertain the true stone recurrence after bladder ESWL therapy.

Despite the limited material studied, we also believe that the most significant advantage of ESWL is that it allows treatment on an outpatient basis in a selected group of high risk patients with a low volume stone burden. Disintegrating bladder stones with ESWL prior to TURP not only shortens the operation time, but also prevents another anesthesia in this group of patients. In this modern urological era, a new group of patients with minimal obstructive BPH (after penile implants, sphincter surgery, cystoplasty and urethroplasty) may present bladder calculous disease necessitating a totally noninvasive or minimally invasive approach. In these patients, underlying pathological conditions or the mechanical limitations of instrumentation preclude the primary use of endourological procedures or an open operation, ESWL outscores other avaliable treatment modalities (10, 14).

In conclusion, although ESWL is a safe, noninvasive, and comfortable means of treatment, which can be performed without the use of anesthesia on an outpatient basis, it is not an adequate method as a first line therapy in vesical lithiasis. Since ESWL prior to TURP reduces the morbidity and operating time, it should only be considered as the primary management of high risk patients with bladder stones associated with BPH.

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REFERENCES

1. Vandeursen H, Baert L : Extracorporeal shock wave lithotripsy monotherapy for bladder stones with the second generation lithotriptors. J Urol 1990; 143 : 18-19.
2. Hotiana MZ, Khan LA, Talati J : Extracorporeal shock wave lithotripsy for bladder stones. Br J Urol 1993; 71 : 692-694.
3. Nseyo UO, Rivard DJ, Garlick WB, Bennett AH : Management of bladder stones: Should transurethral prostatic resection be performed in combination with cystolitholapaxy ? Urology 1987; 29 : 265-267.

4. Bülow H, Frohmüller HGW : Electrohydraulic lithotripsy with aspiration of the fragments under vision - 304 consecutive cases. J Urol 1981; 126 : 454-456.
5. Razvi HA, Song TY, Denstedt JD : Management of vesical calculi: Comparison of lithotripsy devices. J Endourol 1996; 10 : 559-563.
6. Cetin S, Özgür S, Yazycyoglu A, Ünsal K, İlker Y : Ultrasonic lithotripsy of bladder stones. Int Urol Nephrol 1988; 20 : 361-365
7. Pelander WM, Kaufman JM : Complications of electrohydraulic lithotresis. Urology 1980; 16 : 155-157
8. Grasso M, Bagley DH : Endoscopic pulsed dye laser lithotripsy: 159 consecutive cases. J Endourol 1994; 8 : 25-27.
9. Wadhwa SN, Hemal AK, Sharma RK : Intracorporeal lithotripsy with the Swiss lithoclast. Brit J Urol 1994; 74 : 699-702.
10. Bhatia V, Biyani CS : Vesical lithiasis: open surgery versus cystolithotripsy versus extracorporeal shock wave therapy. J Urol 1994; 151 : 660-662.
11. Grasso M : Experience with the holmium laser as an endoscopic laser lithotrite. Urology 1996; 48 : 199-206.
12. Vallancien G, Aviles J, Munoz R, Veillon B, Charton M, Brisset JM : Piezoelectric extracorporeal lithotripsy by ultrashort waves with the EDAP LT 01device. J Urol 1988; 139 : 689-694.
13. Kostakopoulos A, Stavropoulos NJ, Makricharitis C, Picremenos D, Deliveliotis CH : Extracorporeal shock wave lithotripsy monotherapy for bladder stones. Int Urol Nephrol 1996; 28 : 157-161
14. Bosco PJ, Nieh PT: Extracorporeal shock wave lithotripsy in combination with transurethral surgery for management of large bladder calculi and moderate outlet obstruction. J Urol 1991; 145 : 34-36.
15. Husain I, Atassi R, Altaf BG, El Faquih SR : Adjunctive extracorporeal shock wave lithotripsy in endoscopic management of large calculi. J Endourol 1990; suppl (1) 4: S95, abstract H-12.
16. Bhatia V, Biyani CS : A comparative study of cystolithotripsy and extracorporeal shock wave therapy for bladder stones. Int Urol Nephrol 1994; 26 : 27-31.