THE ROLE OF ANTIBIOTICS IN PATIENTS WITH INCREASED RISK OF INFECTION DURING EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL) TREATMENT

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ABSTRACT

Objective: In this prospective, randomized study, the incidence of urinary tract infections following extracorporeal shock wave lithotripsy (ESWL) in a high risk population and effectiveness of two different antimicrobial agents were evaluated.

Methods: A total of 56 patients with renal and ureteric stones who had increased risk of infection before ESWL treatment received either 200 mg of Ofloxacin or trimethoprim-sulfamethaxazole (TM+SMZ) 160/400 mg. bid. Patients were followed by simple urine analysis, urine cultures and blood cultures if necessary together with clinical evaluations.

Results: Three patients (5.4%) had positive urine cultures one week after ESWL. The incidence of positive cultures was 40% in patients who had asymptomatic bacteriuria before ESWL.

Conclusion: The urine should be sterilized by appropriate antibiotic administration before initiation of ESWL therapy in patients with bacteriuria to prevent infectious complications.

Key Words: Lithotripsy, Infection, Risk Factors, Antibiotics

INTRODUCTION

Extracorporeal shock wave lithotripsy (ESWL) is now the preferred treatment for most renal and ureteric stones. It is considered a safe procedure since its adverse effects observed to date are generally minor. According to the literature, 16 to 35% of renal stones removed by operation harbor bacteria (1,2). Bacteriuria was reported following ESWL of infection stones (1). However, all organisms within the stones cannot be detected by urine culture. A theoretical risk of urinary tract infection (UTI) and sepsis is present after ESWL. The risk of sepsis arises from fragmentation of the stone which causes microtrauma and passage of bacteria into the blood stream (3).

The experience of ESWL in several centers showed positive urine cultures after lithotripsy in about 5% of patients even in the presence of sterile urine before treatmet (4,5). Though some investigators concluded that prophylactic antibiotics during ESWL were unnecessary in such patients (1,3,5), other studies showed that antibiotic prophylaxis with several agents could reduce the rate of bacteriuria significantly (6-8). ESWL is a relatively safe procedure, but patients with an increased risk of infection such as existing UTI, endoscopic manipulations before or after ESWL, infection stones and/or multiple, large stones, may benefit from periprocedural use of antibiotics.

We evaluated the place of antibiotics by a prospective, randomized study in a high risk patient population who were treated by ESWL.

PATIENTS AND METHODS

A total of 56 consecutive patients with renal and ureteric stones, who were treated at Marmara University School of Medicine Stone Center and who had increased risk of infection, were involved in this prospective randomized study. ESWL was performed by Dornier MFL 5000 lithotriptor. Inclusion criteria into the study consisted of existing asymptomatic

bacteriuria, need for endoscpoic manipulations before initiation of ESWL (e.g. insertion of ureteral stents), presence of partial or full staghorn and/or infection stones. After the information about the study was provided, verbal consent was obtained from all patients and, they were randomly assigned to one of the two groups. Group 1 (29 patients) received ofloxacin 200 mg bid orally, starting 3 days before ESWL and, antibiotic coverage was provided during the next 7 days. Group 2 (27 patients) received trimethoprim-sulfamethaxazole (TM+SMZ) 160/400 mg. bid with the same administration schedule as group 1.

Patients with a predisposition for infective endocarditis or symptomatic urinary tract infections were excluded from the study.

Midstream urine cultures a week prior to and just before ESWL were obtained. All patients returned for a repeat urine analysis and culture the day after ESWL, one and four weeks later. Positive culture results were reported as colony forming units per ml (cfu/ml).

Susceptibility of isolates to the antimicrobial drugs was performed by Kirby-Bauer dics diffusion technique.

Patients were also followed for clinical events related to UTI such as fever more than 38°C, chills, dysuria, urgency and frequency of micturition. In the presence of fever of higher than 38°C, two blood cultures were planned to be obtained.

Statistical analysis of data was performed by Fisher's exact test.

RESULTS

Indications for treatment, characteristics of patients and stones in both groups were given in tables I and II.

There were 5 patients in ofloxacin group who had asymptomatic bacteriuria as the sole or one of the inclusion criteria into the study. All of the isolates in these patients were sensitive to ofloxacin. Three of these patients had sterile urine on the day of ESWL after 3 days of antibiotic therapy. Asymptomatic bacteriuria was not present in TM+SMZ group and all patients had ureteral stent placement either because of a solitary kidney or the presence of a large and/or complex stone. Two patients in ofloxacin group (6.9%) and one patient in TM+SMZ group (3.7%) had positive urine cultures on day 7 ($p>0.5$, Fisher's exact test). One of the patients in the first group had asymptomatic bacteriuria initially and underwent an endoscopic ureteral stent placement. The microorganism isolated from the urine culture a week prior to ESWL was defined as E. coli ($1X10^5$ cfu/ml). After 3 days of antibiotic administration, urine cultures obtained immediately before ESWL and the next day, revealed no bacterial growth. However, urine sample obtained 7 days after ESWL revealed $5X10^4$ cfu/ml of E. coli, again. Another patient in this group with initial asymptomatic bacteriuria (Pseudomonas spp., $4X10^4$ cfu/ml) had negative cultures during the immediate peri-ESWL period. Urine culture on day 7 revealed the same microorganism ($4X10^4$ cfu/ml). There was one patient in TM+SMZ group who had a positive culture on day 7 (Pseudomonas spp., 10^4 cfu/ml). The isolates were sensitive to ofloxacin and all patients had their urine sterilized after a 10 day course of 200 mg bid administration of this agent.

Urine cultures were uniformly negative at 4 weeks in all patients. There were no clinical signs or symptoms of UTI recorded in any one of the groups during this study period.

DISCUSSION

The main objective of any form of treatment is not only to remove the stones from the urinary tract but also to have a complete eradication of any accompanying infection (9)

Studies done by different groups confirmed that only a small proportion of patients with sterile urine prior to ESWL developed UTI after this procedure (3,10,11).

Infection rates after ESWL in patients without bacteriuria were reported to be between 1.2 to 6.7% (3,6,12). In a prospective study Westh and associates showed that bacteremia was a rare event and post-ESWL fever was not influenced by prophylactic antibiotic treatment and urosepsis was reported in 0.3% of the cases after ESWL (13,14). Data from our previous studies also indicated a very low incidence of UTI (0.7%) following ESWL provided that pre-ESWL urine was sterile (15).

However, systematic cultures of stones removed by surgery had demonstrated the presence of infected stones in 14% of the cases (2). It seems necessary to utilize antibiotics before ESWL in patients who are at increased risk of infection (8). Unfortunately, there is insufficient information in the literature concerning the risk of severe infectious complications in this subset of patients. ESWL treatment of 3 patients with existing UTI without knowing the existence of infection did not result in bacteremia in one study (16). Therefore, the authors concluded that the risk of bacteremia may be quite low even in the presence of bacteriuria. We do not know if any asymptomatic

bacteremia occurred in our patient population since we did not obtain routine blood cultures. However, in 2 patients with pre-ESWL asymptomatic bacteriuria, same microorganisms were isolated from the urine on day 7 while early peri-ESWL cultures were negative. This raises the possibility of bacterial persistence in the urine which could not be demonstrated due to antimicrobial suppression. In any case, we had no patient who had the signs or symptoms of either bacteremia or UTI which supported the conclusion of the previous authors on the rare occasion of serious complications even in the presence of previous bacteriuria. However, these findings must be interpreted with caution due to the small number of patients. Certain conclusions can be drawn from a randomized study which will include a placebo control group. Although, we had no severe infectious complications, the rate of bacteriuria after ESWL was 40% (2/5) in patients with previous asymptomatic bacteriuria and its presence before treatment appears to be a high risk factor for post-ESWL UTI. If the patient with ureteric stent placement was excluded, in patients with pre-ESWL asymptomatic bacteriuria, postprocedure positive urine cultures were found in 25% (1/4) when compared to 1.9% (1/51) in patients who had sterile urine initially. Nevertheless, peri-ESWL antibiotic treatment was successful in eradication of 60% of the bacteriuria which showed its importance. In another study, Charton et al found a high rate of bacteriuria (21.3%) in the absence of treatment or an excessively brief treatment and septic shock was observed in about 4.5 % of the cases after ESWL (3). They recommended at least a 3 to 5 day antibiotic treatment before ESWL when the patients are found to be infected prior to ESWL. In the light of the available information, it will be a rational approach to sterilize the urine by at least a 5 day course of appropriate antibiotic administration before initiation of ESWL therapy in patients with bacteriuria to prevent infectious complications. In the absence of bacteriuria even the patients with large stones who may also require endoscopic auxiliary measures can be treated safely with ESWL after a brief antibiotic coverage.

Table I : Patient characteristics of the study population

	Ofloxacin Group (n = 29)	**TM + SMZ Group** (n = 27)
Median age (range)	52 (19 - 68)	49 (14 - 62)
Male / Female	20/9	20/7
Indications for treatment		
asymptomatic bacteriuria	5*	-
ureteral stent placement	25	27

* One patient also had a ureteral stent placed.

Table II : Details of the stones of patients.

	Ofloxacin Group (n = 29)	**TM + SMZ Group** (n = 27)
site		
kidney	21	15
ureter	2	8
multiple sites	6	4
size		
< 1 cm^2	2	2
1 - 2.9 cm^2	10	8
3 - 4.9 cm^2	9	9
> 5 cm^2	8	8

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