# Incidence of Infectious Complications after Extracorporeal Shock Wave Lithotripsy in Patients Without Associated Risk Factors

Alejandra Mira Moreno,* María Dolores Montoya Lirola, Pedro José García Tabar, Juan Francisco Galiano Baena, José Antonio Tenza Tenza and Juan José Lobato Encinas

*From the Department of Urology, General Hospital University of Alicante, Alicante, Spain*

**Abbreviations and Acronyms**

AUA = American Urological Association

EAU = European Association of Urology

SWL = extracorporeal shock wave lithotripsy

Accepted for publication May 19, 2014.

* Correspondence: General Hospital University of Alicante, Pintor Baeza St., Alicante, Spain (telephone: +34 620653800; e-mail: ale_mimo@hotmail.com).

**Editor's Note: This article is the fifth of 5 published in this issue for which category 1 CME credits can be earned. Instructions for obtaining credits are given with the questions on pages 1584 and 1585.**

**Purpose:** We determined the incidence of infectious complications (asymptomatic bacteriuria, urinary tract infection and urosepsis) in patients without associated risk factors treated with extracorporeal shock wave lithotripsy.

**Materials and Methods:** We performed an observational, prospective cohort study between October 2010 and June 2013. We included all patients without risk factors who were treated with extracorporeal shock wave lithotripsy for kidney or ureteral lithiasis. All patients underwent urine culture 5 days before the procedure. Another urine culture was performed 7 days after lithotripsy. No patient received antibiotics.

**Results:** Initially 366 patients with a mean ± SD age of 53 ± 13 years were enrolled in the study. A total of 64 patients (17.5%) underwent extracorporeal shock wave lithotripsy with a previously placed Double-J® stent. After lithotripsy urine culture was positive in 20 patients (5.8%), of whom 4 (1.2%) presented with symptomatic urinary infection and the remaining 4.6% showed no symptoms. Urosepsis did not develop in any case. In our study patient age was an independent risk factor for bacteriuria after lithotripsy.

**Conclusions:** The incidence of infectious complications after extracorporeal shock wave lithotripsy in patients without risk factors is low. This leads us to conclude that without defined risk factors antibiotic prophylaxis is not justified. Also, elderly patients were more at risk for bacteriuria after extracorporeal shock wave lithotripsy and, thus, for a possible infectious complication.

**Key Words:** kidney, ureter, urolithiasis, antibiotic prophylaxis, lithotripsy

CONSIDERED a safe and effective treatment, SWL is a widely used technique for treating kidney and proximal ureteral lithiasis. However, this technique is not free of complications.[1,2] Some of these complications are infectious, such as asymptomatic bacteriuria, urinary tract infection and sepsis.[3–6] Variable rates of infectious complications after SWL have been published.[7–9]

Until September 2012 the AUA recommended antibiotic prophylaxis in patients treated with SWL based on the meta-analysis of Pearle and Roehrborn.[8] New evidence that emerged in recent years led to a change in these recommendations.[10–12] Today the AUA and EAU agree in not recommending generalized antibiotic prophylaxis, although they recommend it when associated factors exist



0022-5347/14/1925-1446/0
THE JOURNAL OF UROLOGY®

http://dx.doi.org/10.1016/j.juro.2014.05.091
Vol. 192, 1446-1449, November 2014
Printed in U.S.A.

that could increase the risk of infection.[13,14] There is no agreement between the AUA and EAU about the risk factors that should be considered for prophylactic treatment.

Knowing the exact incidence of bacteriuria and urinary tract infection after SWL in patients without risk factors would allow us to decrease antibiotic use[15] and, therefore, minimize the consequences resulting from it, such as the development of resistant bacteria, the risk of adverse reactions and the economic cost of antibiotic treatment.[16] Therefore, the principal objective of our study was to determine the incidence of infectious complications (asymptomatic bacteriuria, urinary tract infection and urosepsis) in patients without associated risk factors who were treated with SWL. The secondary objective was to determine factors associated with an increased risk of infectious complications.

## MATERIAL AND METHODS

We designed an observational prospective cohort study, which was performed at the lithiasis section at our institution. All patients treated for kidney or ureteral lithiasis at our center between October 2010 and June 2013 were included in analysis. All participants met certain criteria, including age at least 18 years, negative urine culture before SWL, absent external bladder catheter or nephrostomy tube and no history of infectious stones or recurrent urinary tract infections before SWL. Study exclusion criteria were patient loss to followup, no urinary culture within 7 days of lithotripsy and endourological manipulation during or after SWL.

Urine culture was ordered for all patients 5 days before the procedure and urinary tract x-ray was performed on the day of lithotripsy. Seven days after SWL a new urine culture was performed. X-ray was repeated at 30 days, the final evaluation was performed and data collection was completed.

Variables collected at the beginning of the study were patient prior pathological conditions, lithiasis size (largest diameter in the long axis), stone number and location, and whether the patient had a Double-J catheter before SWL due to obstructive lithiasis or urinary sepsis. During the lithotripsy session information was collected on the number of waves and energy used, and whether immediate stone fragmentation was achieved. In the final revision the data collection was completed to include certain variables, including lithiasis fragmentation, renal colic after the SWL session (defined as colic pain on the treated side requiring continued oral or intravenous analgesia), stone residues greater than 5 mm on followup x-ray, urine culture result (more than $10^5$ cfu/ml considered positive), symptomatic urine infection (defined as dysuria, voiding frequency and/or urinary urgency with a positive urine culture) and urinary sepsis (defined as symptomatic urine infection plus systemic inflammatory response syndrome).

In all cases SWL was performed as an ambulatory care procedure with the patient under sedation and using the Lithotripter S II (Dornier Medtech, Wessling, Germany). Informed consent was obtained from all the patients.

Statistical analysis was performed with SPSS® 19. Statistical significance was evaluated using the chi-square method, Student t-test and multivariate linear logistic regression analysis with $p < 0.05$ considered statistically significant.

## RESULTS

Included in study were 366 patients (219 men or 60% and 147 women or 40%) with a mean ± SD age of 53 ± 13 years. Of the patients 81 (22%) had hypertension, 38 (10.4%) had diabetes mellitus and 34 (9.3%) had dyslipidemia. No patient had renal insufficiency, defined as a glomerular filtration rate of less than 60 ml/minute/1.73 $m^2$. A total of 64 patients (17.5%) underwent SWL with a previously placed Double-J stent.

The mean size of treated stones was 1.3 ± 0.6 cm (range 0.5 to 2.7). At the SWL session a mean of 3,099 ± 571 shock waves per session were used with an average energy of 2.6 ± 0.3 mJ/$mm^2$. No renal protective pause was used in any case. Table 1 lists stone and treatment characteristics.

After the initial phase 21 patients were excluded from study due to lack of followup in 19 and no followup urine culture after SWL in 2. Therefore, 345 patients completed the study.

Post-SWL urine culture was positive in 20 cases (5.8%). Table 2 lists the isolated microorganisms. Although 16 patients indicated that they had urinary tract symptoms such as dysuria and frequency, only 4 also had a positive urine culture. Therefore, only 1.2% of patients presented with a symptomatic urinary infection. The remaining 16 patients (4.6%)

**Table 1.** *Stone and treatment characteristics in 366 patients*

| | No. Pts (%) |
|---|---|
| Stone location: | |
| Calyx | 158 (43.2) |
| Renal pelvis | 113 (30.9) |
| Ureter | 68 (18.6) |
| Multiple | 27 (7.4) |
| No. stones: | |
| Single | 245 (66.9) |
| Multiple | 121 (33.1) |
| Size (cm): | |
| 0.5—1 | 140 (38.3) |
| 1.1—2 | 195 (53.3) |
| Greater than 2 | 31 (8.5) |
| No. shock waves: | |
| 0—1,500 | 6 (1.6) |
| 1,501—2,500 | 72 (19.7) |
| 2,501—3,500 | 225 (61.5) |
| Greater than 3,500 | 63 (17.2) |
| Energy (mJ/$mm^2$): | |
| 1.65—2.4 | 85 (28.2) |
| 2.41—2.7 | 253 (69.1) |
| Greater than 2.7 | 28 (7.7) |