Predictors of Upper Urinary Tract Stone-Free Rate in Children Undergoing Shock Wave Lithotripsy: A Prospective Study of 117 Children

Introduction and Objective: To evaluate our experience with pediatric patients undergoing shock wave lithotripsy (SWL) in the era of minimally invasive therapy for upper tract urolithiasis, to assess the predictors of stone clearance by single-session SWL.
Materials and Methods: We analyzed all pediatric patients who underwent SWL from April 2009 to March 2010. All data were collected in a prospective database. Patients were treated using a Dornier Lithotripter S with ultrasound and fluoroscopic imaging. Subjects were defined as stone-free if imaging within 3 months showed no evidence of stones after SWL monotherapy. Univariate and multivariate logistic regression analyses were used to determine successful stone clearance by single-session SWL in relation to age and sex of patients, size, location and opacity of the stones, presence of ureteral stents, anomalous kidney, and previous renal surgery.
Results: A total of 117 children (123 renal units) with a median age of 4 years underwent 169 SWL sessions with a median shock count of 2,000 per session. Median stone size was 13 mm (range 8-40 mm). Urolithiasis was multiple in 40 renal units and bilateral in 12 cases. Stone locations were as follows: renal pelvic (48%), caliceal (27%), pelvic and caliceal (21%), and upper ureteral (4%). The presence of anomalous kidneys, previous renal surgery, and ureteral stents were noted in 7%, 16%, and 13% of cases respectively. The stone-free rates were 68.3%, 87.7%, and 96.8% after first, second, and third SWL sessions respectively. Five patients required readmission, of them 4 required auxiliary procedures. Large stone size was an independent predictor for residual stones/fragments after first SWL session on multivariate analysis (odds ratio 2.9, 95% confidence interval 1.27-6.65, P=0.012). The median stone size for those who had successful stone clearance by single-session SWL was 13 mm, while those who required further SWL session(s) had median initial stone size of 16 mm (P= 0.002).
Conclusion: Pediatric SWL appears to be efficient for upper tract urolithiasis and it is well tolerated. Single SWL session stone-free rate was dependent on stone size with excellent results for upper tract stones of 13 mm or less.