STONE DISEASE

Shock wave lithotripsy at 60 or 120 shocks per minute: a randomized, double-blind trial

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Purpose: The rate of shock wave administration is a factor in the per shock efficiency of shock wave lithotripsy (SWL). Experimental evidence suggests that decreasing shock wave frequency from 120 shocks per minute results in improved stone fragmentation. To our knowledge this study is the first to examine the effect of decreased shock wave frequency in patients with renal stones.

Materials and Methods: Patients with previously untreated radiopaque stones in the renal collecting system were randomized to SWL at 60 or 120 shocks per minute. They were followed at 2 weeks and 3 months. The primary outcome was the success rate, defined as stone-free status or asymptomatic fragments less than 5 mm 3 months after treatment.

Results: A total of 220 patients were randomized, including 111 to 60 shocks per minute and 109 to 120 shocks per minute. The 2 groups were comparable in regard to age, sex, body mass index, stent status and initial stone area. The success rate was higher for 60 shocks per minute (75% vs 61%, $p = 0.027$). Patients with larger stones (stone area 100 mm or greater) experienced a greater benefit with treatment at 60 shocks per minute. The success rate was 71% for 60 shocks per minute vs 32% ($p = 0.002$) and the stone-free rate was 60% vs 28% ($p = 0.015$). Repeat SWL was required in 32% of patients treated with 120 shocks per minute vs 18% ($p = 0.018$). Fewer shocks were required with 60 shocks per minute (2,423 vs 2,906, $p < 0.001$) but treatment time was longer (40.6 vs 24.2 minutes, $p < 0.001$). There was a trend toward fewer complications with 60 shocks per minute ($p = 0.079$).

Conclusions: SWL treatment at 60 shocks per minute yields better outcomes than at 120 shocks per minute, particularly for stones 100 mm or greater, without any increase in morbidity and with an acceptable increase in treatment time.

Editorial Comment

Over the last decade, lithotripter technology has been disappointingly stagnant. Indeed, current lithotripters are less effective at stone fragmentation than the original Dornier HM3 lithotripter. As a result, endoscopic stone management, which has advanced substantially during this same time frame, has become an increasingly attractive option for the treatment of renal calculi. Recent efforts, however, have been underway to improve SWL efficacy and efficiency through optimization of treatment parameters.

Paterson and colleagues first demonstrated in a novel porcine model that slowing the rate of shock wave delivery improved stone fragmentation (1). In the current study, Pace and co-workers report the first prospective, randomized clinical trial comparing slow with fast shock wave delivery on SWL outcomes. Among 220 patients with > 5 mm renal calculi randomized to slow (60 shocks/minute) versus fast (120 shocks/minute) shock wave delivery, "success rates" (defined at stone free or asymptomatic fragments less than 5 mm) were superior in the slow shock wave group. When stratified by stone size into smaller and larger stones (< 100 mm^2 or ≥ 100 mm^2), the difference in success rates and stone free rates between the 2 treatment groups was more pronounced in the larger stone group.

While small stones are generally successfully fragmented under most conditions, larger stones have been less successfully treated, particularly with newer generation lithotripters. Therefore, slowing the rate of

shock wave delivery may provide a means of achieving acceptable outcomes with SWL for stones which are increasing being treated by endoscopic means. The small increase in treatment time associated with slower shock wave delivery should be more than compensated for by the less frequent need for retreatment and the fewer complications associated with poorer fragmentation. Perhaps with optimization of SWL treatment parameters, non-invasive management will once again become the preferred treatment option for renal calculi.

Reference

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Randomized controlled study of mechanical percussion, diuresis, and inversion therapy to assist passage of lower pole renal calculi after shock wave lithotripsy

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Objectives: To determine whether mechanical percussion, diuresis, and inversion (PDI) therapy after shock wave lithotripsy (SWL) improves the clearance rates of lower pole renal stones.

Methods: In this single-blind study, 108 patients who underwent SWL treatment for lower pole renal stones with a total diameter of 2 cm or less were prospectively randomized into two groups. One group (n = 49) received SWL only and the other group (n = 59) received a median of four sessions of PDI therapy (range 1 to 12), 1 to 2 weeks after each SWL session. PDI therapy was performed as follows. Patients drank 500 mL of water 30 minutes before therapy; they then lay in a prone Trendelenburg position on a 45 degrees -angle couch, and received continuous 10-minute manual mechanical percussion applied over the flank. Stone clearance was documented with plain abdominal radiography, with additional imaging, if indicated, 1 and 3 months after initial SWL therapy.

Results: The patients from both groups were comparable in terms of total stone diameter, infundibular neck diameter, infundibular length, caliceal height, infundibular-pelvic angles, infundibular-ureteral angles, infundibular-vertebral angles, lower pole cortical thickness, and caliceal number. All patients underwent a maximum of four SWL treatments. For all assessable patients, the radiologically documented complete stone clearance rate at 3 months for the SWL-alone group was 35.4% and for the SWL plus PDI group was 62.5% (chi-square test, P = 0.006).

Conclusions: PDI therapy is a valuable adjunct in assisting passage of lower pole renal stone fragments after SWL therapy.

Editorial Comment

The dependent location of the lower pole calyces has been shown to constitute an impediment to passage of fragments after SWL. Other anatomic factors, such as the length, width and angle of the lower pole infundibulum also likely contribute to the probability of fragment clearance. Pace and colleagues previously

showed in a randomized trial that a regimen of percussion, diuresis and inversion therapy in patients left with residual < 4 mm lower pole calyceal fragments after SWL resulted in an additional 40% of patients clearing fragments from the kidney compared with no further clearance in the observation group (1).

In the current study, Chiong and associates randomized patients with lower pole stones to undergo 4 formal sessions of percussion, diuresis and inversion therapy starting 1-2 weeks after SWL versus no additional therapy and found a significant improvement in stone free rates in the treated group compared with the control group (63% versus 35%). Although the mean stone size in the 2 groups was 1 cm in the control group and 0.8 cm in the treated group, patients with stones up to 2 cm in size were included, a group that has previously been shown to respond poorly to SWL (2). As such, this regimen offers promise for improving stone free rates in a group of patients who have historically done poorly with SWL. Perhaps combining these mechanical maneuvers with pharmacotherapy using potassium citrate, which has been shown in a randomized trial to improve clearance of residual fragments after SWL of lower pole stones (3), will further improve treatment outcomes in this problematic patient group.

References

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ENDOUROLOGY & LAPAROSCOPY

Laparoscopic rectovesical fistula repair

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Background and Purpose: Rectovesical fistula (RVF) is a rare complication of radical prostatectomy. A 62- year-old man with clinically localized prostate cancer underwent open radical prostatectomy that was complicated by rectal injury and subsequent RVF development. Conservative management failed, and the patient was referred for surgical correction.

Technique: The operative steps consisted of (1) cystoscopy, (2) RVF catheterization, (3) ureteral catheterization, (4) five-port transperitoneal laparoscopic approach, (5) cystotomy, (6) opening of the fistulous