

STONE DISEASE

Diabetes Mellitus and Hypertension Associated With Shock Wave Lithotripsy of Renal and Proximal Ureteral Stones at 19 Years of Followup

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Purpose: SWL has revolutionized the management of nephrolithiasis and it is a preferred treatment for uncomplicated renal and proximal ureteral calculi. Since its introduction in 1982, conflicting reports of early adverse effects have been published. However, to our knowledge the long-term medical effects associated with SWL are unknown. We evaluated these adverse medical effects associated with SWL for renal and proximal ureteral stones.

Materials and Methods: Chart review identified 630 patients treated with SWL at our institution in 1985. Questionnaires were sent to 578 patients who were alive in 2004. The response rate was 58.9%. Respondents were matched by age, sex and year of presentation to a cohort of patients with nephrolithiasis who were treated nonsurgically.

Results: At 19 years of followup hypertension was more prevalent in the SWL group (OR 1.47, 95% CI 1.03, 2.10, $p = 0.034$). The development of hypertension was related to bilateral treatment ($p = 0.033$). In the SWL group diabetes mellitus developed in 16.8% of patients. Patients treated with SWL were more likely to have diabetes mellitus than controls (OR 3.23, 95% CI 1.73 to 6.02, $p < 0.001$). Multivariate analysis controlling for change in body mass index showed a persistent risk of diabetes mellitus in the SWL group (OR 3.75, 95% CI 1.56 to 9.02, $p = 0.003$). Diabetes mellitus was related to the number of administered shocks and treatment intensity ($p = 0.005$ and 0.007).

Conclusions: At 19 years of followup SWL for renal and proximal ureteral stones was associated with the development of hypertension and diabetes mellitus. The incidence of these conditions was significantly higher than in a cohort of conservatively treated patients with nephrolithiasis.

Editorial Comment

This provocative study underscores the need for long-term studies of the impact of our interventions, be they medical or surgical. Specifically, it raises concerns of the development of hypertension and diabetes mellitus following shockwave lithotripsy. The data related to the development of diabetes is particularly compelling, with a high odds ratio (3.75) that persists despite controlling for body mass index, and demonstrates a dose-dependency (correlation with number and intensity of shocks) that supports the hypothesis that a true biological effect exists. Deterioration in pancreatic endocrine function has been reported in up to 30% of patients undergoing SWL for pancreatic stones, though whether this reflects underlying pancreatic disease or the effects of the SW has not been determined. It is also unclear whether the effects noted in this study are peculiar to the shock path and focal area of the Dornier HM-3, or if similar effects may be anticipated with current lithotripter designs.

The data pertaining to hypertension is less compelling. Though more patients who underwent SWL developed hypertension, shockwave lithotripsy had no impact on the final prevalence of hypertension. In other words, the differences seen can be attributed to baseline differences in the rate of hypertension. It is plausible that other differences at baseline, in particular differences in stone size (those observed had smaller stones) reflect a bias that patients treated with SWL were further along in their disease process. Lastly, no dose-response correlation was noted with regards to number or intensity of shockwave and the development of hypertension, making it less likely that a true biological effect exists.

It is important to also note a few weaknesses in study design. The method of follow-up was not consistent in the study – patients treated with SWL were followed by questionnaire while the control group was followed by chart review, though the authors acknowledge that less than 20% of their patients return to their institution for follow-up. No information was gathered regarding subsequent SWL or other therapies for stone disease in either group during the 13 year follow that may confound the analyses conducted.

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Effect of Dietary Modification on Urinary Stone Risk Factors

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Background: This study was undertaken to ascertain the effect of dietary modification on urinary stone risks, and to determine whether the response depends on the prevailing urinary calcium.

Methods: A retrospective data analysis was conducted from our stone registry involving 951 patients with calcareous stones undergoing ambulatory evaluation, whereby 24-hour urine samples were collected during random diet and after dietary modification composed of restriction of calcium, oxalate, sodium, and meat products. Samples were analyzed for stone risk factors. Urinary calcium was also obtained after overnight fast and following a 1 g-calcium load. Changes produced by dietary modification from the random diet were evaluated in 356 patients with moderate-severe hypercalciuria (> 6.88 mmol/day, group I), 243 patients with mild hypercalciuria (5.00-6.88 mmol/day, group II), and 352 with normocalciuria (< 5.00 mmol/day, group III).

Results: Urinary calcium postcalcium load and the percentage of patients with absorptive hypercalciuria type I were highest in group I, intermediate in group II, and lowest in group III. During dietary modification, urinary calcium declined by 29% in group I, 19% in group II, and 10% in group III. Urinary oxalate did not change. Urinary saturation of calcium oxalate declined by only 12% in group I, 6% in group II, and nonsignificantly in group III, owing to various physicochemical changes in urinary biochemistry, which attenuated the effect of the decline in urinary calcium. Urinary saturation of brushite declined in all 3 groups due to the fall in urinary calcium, phosphorus, and pH. This reduction was more marked in the hypercalciuric groups than in the normocalciuric group. Urinary saturation of monosodium urate also decreased from a decline in urinary sodium and uric acid.

Conclusion: Secondary rise in urinary oxalate occurring from calcium restriction can be avoided by concurrent dietary oxalate restriction. Dietary modification (restriction of dietary calcium, oxalate, sodium, and meat products) is more useful in reducing urinary saturation of calcium oxalate among patients with hypercalciuria than among those with normocalciuria.

Editorial Comment

The pendulum swings once more. Dietary restriction of calcium may play a select role in recurrent stone management. This study suggests that those who stand to benefit most from calcium restriction are those with urinary CA > 275 mg/day and those with calcium phosphate supersaturation. The authors correctly note that the addition of potassium citrate supplementation to dietary restriction of calcium may be important to have a

significant impact on calcium oxalate saturation, as limiting dairy products alone will decrease the alkali load leading to lower pH and citrate levels. They also emphasize that calcium restriction should be part of a broad dietary intervention that also limits oxalate intake so as to avoid a compensatory increase in urinary oxalate due to increased bowel absorption. Though a diagnosis of absorptive hypercalcuria type I (AH1) was determined by a calcium load test, the authors did not stratify response to calcium restriction based on this diagnosis. However, almost 75% of patients with urinary CA > 275 mg/day were diagnosed with AH1. The authors propose that the use of a calcium-sparing diuretic and potassium citrate supplementation are additional important considerations to prevent a negative calcium balance with subsequent impact on bone density.

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ENDUROLOGY & LAPAROSCOPY

Robot Assisted Laparoscopic Partial Nephrectomy: Initial Experience

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Purpose: Advances in laparoscopy have made laparoscopic partial nephrectomy a technically feasible procedure but it remains challenging to even experienced laparoscopists. We hypothesized that robotic assisted laparoscopic partial nephrectomy may make this procedure more efficacious than the standard laparoscopic approach.

Materials and Methods: Ten patients with a mean age of 58 years and mean tumor size of 2.0 cm underwent robotic assisted laparoscopic partial nephrectomy and another 10 with a mean age of 61 years and mean tumor size of 2.18 cm underwent laparoscopic partial nephrectomy, as performed by a team of 2 surgeons (MS and ST) between May 2002 and January 2004. Demographic data, intraoperative parameters and postoperative data were compared between the 2 groups.

Results: There were no significant differences in patient demographics between the 2 groups. Intraoperative data and postoperative outcomes were statistically similar. In the 10 patients who underwent robotic assisted laparoscopic partial nephrectomy there were 2 intraoperative complications. There was 1 conversion in the laparoscopic partial nephrectomy group.

Conclusions: Robotic assisted laparoscopic partial nephrectomy is a safe and feasible procedure in patients with small exophytic masses. The robotic approach to laparoscopic partial nephrectomy does not offer any clinical advantage over conventional laparoscopic nephrectomy.

Editorial Comment

Advances in laparoscopy allowed surgeons to perform complex reconstructive and ablative surgical procedures. Laparoscopic partial nephrectomy is the best example to depict these innovations where accuracy, speed and surgeon's expertise must work in concert. Robotic surgery may bring some advantages to the novice laparoscopists when performing laparoscopic radical prostatectomies but for nephron-sparing nephrectomies does not appear to help. Although the authors acknowledge the need of randomization of larger number of patients for clinical