

STONE DISEASE

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The effect of fat and nonfat components of the skin-to-stone distance on shockwave lithotripsy outcome

Hammad FT, Balakrishnan A.

Department of Surgery, Faculty of Medicine, Al Ain, United Arab Emirates

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Background: Few studies have addressed the effect of skin-to-stone distance (SSD) on the success of extracorporeal shockwave lithotripsy (SWL). Nevertheless, the effect of the two components of SSD, that is, the fat SSD (FSSD) and nonfat SSD (NFSSD) components, was not previously investigated.

Methods: In this prospective study, all patients (n = 113) who had single radio-opaque kidney stones and underwent SWL for the first time between January 2006 and June 2007 were recruited. SSD, FSSD, and NFSSD were measured by noncontrast CT scan at 0°, 45°, and 90° and the average was calculated. The outcome was defined as successful (completely stone free or residual fragments ≤ 3 mm) or unsuccessful (residual fragments > 3 mm or complete failure of fragmentation).

Results: Sixty-nine (61%) patients had successful treatment. On univariate analysis, SSD, FSSD, and NFSSD were significantly lower in the successful group compared with those with unsuccessful outcome (71.9 ± 13.3 vs. 86.2 ± 25.1 mm [p = 0.001], 27.2 ± 10.3 vs. 36.1 ± 17.3 mm [p = 0.011], and 44.7 ± 7.2 vs. 50.1 ± 13.9 mm [p = 0.02], respectively). The muscle component of the NFSSD was also lower in the successful group (21.5 ± 4.1 vs. 25.2 ± 10.0 mm [p = 0.01]). On multivariate analysis, factors that independently predicted treatment success were SSD, stone attenuation, and stone size but not the FSSD or NFSSD.

Conclusions: Although the total SSD appeared to be a significant predictor of SWL success, its fat and nonfat components did not independently predict the final outcome and only appeared to be important through their contribution to the total SSD.

Editorial Comment

It is important to note that the average skin-to-stone distance (SSD) of 7.8 cm and average BMI of 25 indicates that the study population was relatively healthy, and it may be worthwhile to extend this study to patients with morbid obesity to confirm that the relative contribution of fat vs. muscle to the SSD does not affect efficacy. The article has important implications. Despite the fact that disproportionate amounts of fat vs. non-fat in the retroperitoneum have been reported in child vs. adult, athlete vs. obese, Asian vs. Caucasian; for ESWL, differences in skin-to-stone distance are more important than the type of tissue between the shock and the stone; specifically the main issue is the distance traveled. The other major contribution of this article relates to their stringent evaluation of success with CT scans at 6 weeks and well defined endpoints. Specifically, with a mean stone size of about 12 mm, approximately 40% were stone-free, 20% had residual fragments < 3 mm, 30% had residual fragments > 3 mm and 10% had no fragmentation. It is feasible that as 92% of patients were treated with sedation, higher success rates might have been noted with general anesthesia as reported in other studies.

Dr. Manoj Monga*Director, Stevan B. Stroom Center for**Endourology & Stone Disease**Glickman Urological & Kidney Institute**The Cleveland Clinic**Cleveland, Ohio, USA**E-mail: endourol@yahoo.com*