Is scoring system of computed tomography based metric parameters can accurately predicts shock wave lithotripsy stone-free rates and aid in the development of treatment strategies?

Abstract

Objective: The objective was to determine the predicting success of shock wave lithotripsy (SWL) using a combination of computed tomography based metric parameters to improve the treatment plan.

Patients and Methods: Consecutive 180 patients with symptomatic upper urinary tract calculi 20 mm or less were
enrolled in our study underwent extracorporeal SWL were divided into two main groups, according to the stone
size, Group A (92 patients with stone ≤10 mm) and Group B (88 patients with stone >10 mm). Both groups were
evaluated, according to the skin to stone distance (SSD) and Hounsfield units (≤500, 500–1000 and >1000 HU).

Results: Both groups were comparable in baseline data and stone characteristics. About 92.3% of Group A rendered
stone-free, whereas 77.2% were stone-free in Group B ($P = 0.001$). Furthermore, in both group SWL success rates
was a significantly higher for stones with lower attenuation <830 HU than with stones >830 HU ($P < 0.034$).
SSD were statistically differences in SWL outcome ($P < 0.02$). Simultaneous consideration of three parameters stone size, stone attenuation value, and SSD; we found that stone-free rate (SFR) was 100% for stone attenuation
value <830 HU for stone <10 mm or >10 mm but total number SWL sessions and shock waves required for the larger stone group were higher than in the smaller group ($P < 0.01$). Furthermore, SFR was 83.3% and 37.5%
for stone <10 mm, mean HU >830, SSD 90 mm and SSD >120 mm, respectively. On the other hand, SFR was 52.6% and 28.57% for stone >10 mm, mean HU >830, SSD <90 mm and SSD >120 mm, respectively.

Conclusion: Stone size, stone density (HU), and SSD is simple to calculate and can be reported by radiologists to applying combined score help to augment predictive power of SWL, reduce cost, and improving of treatment strategies.