

Gallioli A., Fontana M., De Lorenzis E., Ripa F., Zanetti S.P., Boeri L., Sampogna G., Gadda F., Serrago M., Albo G., Longo F., Montanari E.

Foundation IRCCS Ca' Granda Ospedale Maggiore Policlinico - University of Milan, Dept. of Urology - Dept. of Clinical Sciences and Community Health, Milan, Italy

Introduction & Objectives: Computed Tomography (CT) represents the gold-standard for preoperative characterization of kidney stones. In literature, few studies report on the relationship between Hounsfield (HU) values and postoperative outcomes after percutaneous nephrolithotomy (PCNL). The aim of this study is to evaluate the relation between a CT parameters and complications/stone-free rate (SFR) after PCNL.

Materials & Methods: From November 2010 to December 2018 121 patients with available CT scan were submitted to mini-PCNL by two urologists (E.M., F.L.). The parameters evaluated by one single urologist, blinded to clinical data, were as follows: stone volume and diameter, mean HU (HUM), delta HU (Δ HU), i.e. HU difference between the center (HUC) and periphery of the calculi and HU density (HUD), defined as HUM/D, were evaluated on CT. The evaluated peri-operative parameters were surgical time, reduction of hemoglobin, fever, need for transfusion, perioperative creatinine variations and hospital stay. Complications were classified (according to Clavien-Dindo score) into three groups: no complications, grade 1-2 and grade \geq 3 complications. SFR, defined as the absence of residual fragments, was assessed by US/CT after 3 months.

Results: Mean surgical time was 117 (standard deviation \pm 44) minutes, medium hospital stay was 5.3 (\pm 2.7) days. 72 (59.5%) patients experienced no complications, 31 (25.6%) grade 1-2 and 17 (14%) grade \geq 3 complications, respectively. Blood transfusion were necessary in 11 (9%) cases; embolization occurred in 5 cases (4%). On linear regression model, HUD was the only HU parameter to be (inversely) correlated with surgical time ($r^2=0.08$; $p=0.001$) and hospital stay ($r^2=0.07$; $p=0.003$). Complications, hemoglobin decrease and change in renal function were not related to any HU value. The patients who suffered postoperative fever had bigger stones in diameter (22.1 ± 13.5 vs. 17.1 ± 7.2 , $p=0.01$) and lower HUD (38.7 ± 18.8 vs. 49.3 ± 24 , $p=0.03$). HUD values in patients requiring transfusion were significantly higher (60 ± 7.9 vs. 45.5 ± 2.2 , $p=0.048$), as for HUC (971 ± 379 vs. 1210 ± 363 , $p=0.048$). SFR was 62%. Predictors of SFR were stone diameter (cut-off 17 mm, AUC=0.69), stone volume (cut-off 1350 mm^3 , AUC=0.68) and HUD (cut-off 38.4 HU/mm, AUC=0.69). On multivariate analysis, stone volume resulted a significant predictor of SFR (Wald test=4.7, $p=0.03$).

Conclusions: HUD values were inversely correlated with hospital stay and operative time. In contrast, HUD and HUC were higher in transfused patients. This may be the result of high energy needed to break hard stones which rises the risk of mucosal damages. HUD and stone volume should be preoperatively evaluated to better characterize the lithiasis to be treated and to guide postoperative management, such as the kind of imaging to prescribe during follow-up.