

## Hounsfield Unit attenuation values can be useful to differentiate pyonephrosis from hydronephrosis in acute obstructive uropathy

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**Introduction & Objectives:** The diagnosis of pyonephrosis (PYO) vs. uninfected hydronephrosis (HYDRO) is challenging in clinical practice. Computerized tomography (CT) attenuation values (Hounsfield unit—HU) are routinely used to differentiate the nature of fluid collections in various cavities of the body. We aimed to investigate the diagnostic role of HU value assessment in the differentiation of PYO from HYDRO in patients presenting for obstructive uropathy.

**Materials & Methods:** We retrospectively analyzed clinical and laboratory data from patients with hydronephrosis on CT who underwent nephrostomy tube or ureteral catheter placement for obstructive uropathy at our Institution between 2013 and 2018. PYO was confirmed upon the observation of pyuria following the insertion of the needle or the ureteral catheter. An experienced radiologist drew a ROI for quantitative measurements of the HU values of hydronephrotic region of the effected kidney. Descriptive statistics and ROC analysis were performed to evaluate the predictive value of the HU assessment in the differentiation of PYO from HYDRO.

**Results:** Obstructive uropathy was caused by stones, tumors and other causes in 102 (80.3%), 18 (14.2%) and 7 (5.5%) cases. Overall, 81 (63.8%) and 46 (36.2%) patients had HYDRO and PYO, respectively. Mean white blood cells (15901 vs. 11295/mm<sup>3</sup>;  $p < 0.001$ ) and C-reactive protein (16.2 vs. 6.3 mg/dl;  $p < 0.001$ ) values were significantly higher in PYO than HYDRO patients. Groups were comparable in terms of age, gender, BMI and pre operative serum creatinine values. The mean value of HU assessments in patients with PYO was significantly higher than that of patients with HYDRO (11.6 vs. 3.4;  $p < 0.001$ ). Rates of perirenal fat stranding and the degree of HYDRO were similar between groups. Postoperative SIRS (78.3% vs. 30.9%;  $p < 0.001$ ) and sepsis (52.2% vs. 12.3%;  $p < 0.001$ ) were more frequently found in the PYO than the HYDRO group. The ROC curve demonstrated a good predicted accuracy of HU values in differentiating PYO vs. HYDRO (AUC 0.76; 95%CI 0.67-0.84). In particular a HU value of over 6.3 could diagnose the presence of PYO with 71.7% sensitivity and 71.6% specificity.

**Conclusions:** PYO is significantly associated with septic complications in patients with obstructive uropathy undergoing kidney decompression procedures. Measuring HU values of the fluid of the dilated collecting system may be useful to differentiate PYO from HYDRO. This approach could be useful to promptly adopt preventive strategies to mitigate septic complications associated with infected obstructed system.