Acute renal injury in a patient with concomitant paroxysmal nocturnal hemoglobinuria, glucose-6-phosphate dehydrogenase deficiency and renal cell carcinoma

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Abstract

The authors report a patient who has concomitant glucose-6-phosphate dehydrogenase (G6PD) deficiency, paroxysmal nocturnal hemoglobinuria (PNH) and renal cell carcinoma. The 53 year-old male had G6PD deficiency and repeated blood transfusions due to episodes of hemolytic anemia since 1995. A multilocular renal tumor was found in 2011, and nephrectomy was recently performed in 2014. At the mean time, PNH was diagnosed by flow cytometry showing CD24-deficient granulocytes with a clonality of 99%, CD14-deficient monocytes with a clonality of 94% and CD59-deficient red blood cells with a clonality of 17%. Grossly, the resected kidney was black and heavy. The histopathology demonstrated a clear cell renal cell carcinoma, acute tubular injury, and renal artery thrombosis. Areas of tubular injury showed focal epithelial necrosis, sloughing or apical plasma membranes alongside with vacuolization of the cytoplasm, and fluid retention within the tubular lumens. The hemosiderin deposition was prominent in the renal tubular cells. The CD163 protein is a hemoglobin scavenger receptor. Mononuclear cell infiltrates including CD163-expressing macrophages were identified in the renal interstitium. The CD133 protein is a marker for renal progenitor cells of the parietal epithelial layer of Bowman's capsule. Area of tubular regeneration featured nuclear prominence and flattening of tubular cells, where apical CD133 expression was increased. Apical

CD133 also was focally expressed in renal-cell-carcinoma cells. These facts support free hemoglobin toxicity involved in tubulointerstitial renal injury. The evidence of iron-induced renal tumor or tubular injury has been established in animal studies; however, there are no clinical studies to provide the relationship between chronic hemolysis and renal cancer.