A DYNAMIC DUO OR INDEPENDENT ENTITIES:
The Rare Incident of Thrombotic Microangiopathy in setting of polycythemia

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Clinical Case

42-year-old male with significant PMHx of HTN (currently untreated), obesity and tobacco abuse presented with complaints of gradual worsening shortness of breath, abdominal distention and lower extremity swelling for several weeks. Patient stated he had gained twenty-pounds in the past six weeks and felt his abdomen was very tense. Pt is a truck driver and originally was in Philadelphia, PA when symptoms began where he had a CT AP with IV contrast completed which revealed subcutaneous edema of abdominal wall as well as mild edema along perineal fascia and retroperitoneum related to volume overload. His social history was significant for twenty-five pack year smoking history and previous heavy alcohol consumption however quit three years prior. His admission vitals were significant for BP: 131/87, HR: 110, T: 98.6F, RR: 28 PO: 97% RA. Physical exam was remarkable for an irregularly irregular heart rhythm and tachycardia, anasarca to abdominal wall with 2+ bilateral lower extremity edema, decreased breath sounds at bilateral lung bases and mild bibasilar scattered rales, paraspinal hypertonicity levels T5-T9. Laboratory studies were significant for creatinine of 2.0, potassium 5.4, albumin 2.7 and hemoglobin of 21.5. EKG on admission noted to be in atrial fibrillation with rapid ventricular response with right axis deviation.

Management

Patient was initially placed on telemetry and was further evaluated by cardiology, pulmonary, hematology as well as nephrology. Patient was given 40mg IV furosemide daily. Heparin gtt was initiated due to CHADS-VASc of 1. A cardizem gtt was initiated for rate control of atrial fibrillation with eventual plan to transition to oral anticoagulation regimen. Echocardiogram was completed that revealed EF 50% with normal RV size and function, dilated RA, trival MR, dilated IVC. Patient was placed on CPAP for positive pressure ventilation in setting of severe obesity and likely underlying obstructive sleep apnea. He received three rounds of phlebotomy per hematology. Urine albumin/creatinine ratio revealed nephrotic range proteinuria. Creatinine improved to 1.5-1.6 with diuresis and patient was then placed on ACE-Inhibitor for further proteinuria reduction. Patient underwent a renal biopsy which confirmed diagnosis of thrombotic microangiopathy (Figure 1,2).

Results & Imaging

CXR: cardiomegaly without any consolidations, pleural effusions or noted pulmonary edema
Renal US: questionable increased echogenicity bilaterally suggestive of non-specific renal parenchymal disease
Venous Duplex of Abdominal Veins: patent right and left renal vein

UA: pH 6.0; SG: 1.013; trace blood
(-) ketone, nitrites, LE, >300 protein
Na: 53: K: 29; Cr: 69.3; P:C 3.8g
ABG: 7.39/CO2: 52/ HCO3: 31 on RA
BNP: 416
Erythropoietin: 7.0
HIV: non-reactive
Hepatitis panel: negative
SPEP/UPEP: unremarkable
Serum Free Light Chains: unremark.
Spirometry: Reduced FVC and FEV1
ANA (-) RF (-) Scl-70 (-) Anti-Smith (-)

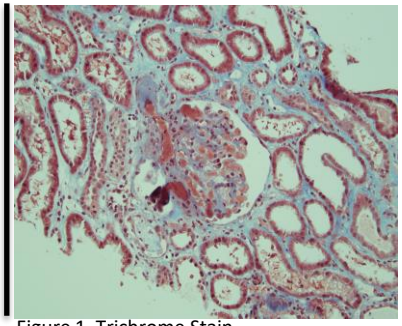
Figure 1. Trichrome Stain

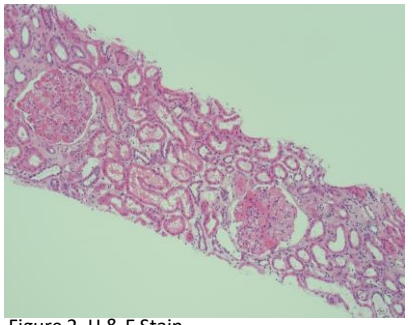
Figure 2. H & E Stain

Discussion

Thrombotic Microangiopathy (TMA) is a term use to describe a condition of clot formation after endothelial injury occurs from some iliciting event. This process can occur in a variety of forms as TMA is used to characterize a spectrum of diseases ranging from hemolytic uremic syndrome (HUS) to thrombotic thrombocytopenic purpura (TTP) and including conditions such as DIC, scleroderma and malignant hypertension. These conditions can ultimately have similar clinical characteristics: microangiopathic hemolysis, thrombocytopenia, anemia, proteinuria and thrombus formation. In our particular patient anemia was not observed, rather, he presented with a confounding condition, polycythemia. The underlying etiology may be attributable to his chronic tobacco use as well as obesity hypoventilation syndrome or could it somehow be affiliated with underlying TMA? To further investigate, an erythropoietin (EPO) level was utilized. In secondary polycythemia, say in response to anemia, the EPO level should be high- hundreds or thousands. In our patient the EPO level resulted as low at 7.0 signifying there could be a primary polycythemia vera process present. Confirmation testing for JAK2 mutation was sent and resulted as negative. The question remains are these two independent processes occurring in one clinical scenario or are the two conditions more related than previously known? What is the relationship of polycythemia to proteinuria?

References

New England Journal of Medicine, 2014. Syndromes of Thrombotic Microangiopathy. 371(19), pp.1846-1848.

Prchal, J. and Prchal, J., 1994. Evolving understanding of the cellular defect in polycythemia vera: implications for its clinical diagnosis and molecular pathophysiology [editorial; comment]. Blood, 83(1), pp.1-4.

Zini, G., 2020. Diagnosis in thrombotic microangiopathy. Pathology, 52, p.S37.