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Pathological Diagnosis of Thrombotic Microangiopathy: Insights from Diverse Clinical Settings

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Thrombotic microangiopathy (TMA) is a pathologic descriptor characterized by microvascular endothelial injury and thrombosis, resulting from endothelial injury or abnormal activation of the coagulation system. Clinically, it presents with a triad of thrombocytopenia, microangiopathic hemolytic anemia (MAHA), and organ injury. Since pathologic findings reflect tissue responses to injury and vary significantly depending on disease severity and chronicity, a meticulous correlation between clinical context and histological features is essential for an accurate diagnosis. The spectrum of TMA pathology encompasses acute lesions, such as glomerular thrombi, endothelial cell swelling, and mesangiolysis, as well as chronic features like double contours of the glomerular basement membrane (GBM) and arterial "onion-skin" intimal fibrosis. In this presentation, I will share various cases categorized by their clinicopathological concordance. First, I will discuss typical cases of primary TMA, such as atypical hemolytic uremic syndrome (aHUS) and thrombotic thrombocytopenic purpura (TTP), alongside secondary TMA caused by infections or malignant hypertension, where clinical and pathological findings align. Second, I will address diagnostic dilemmas involving clinicopathological discrepancies. These include cases where renal biopsy provides the sole evidence of TMA despite the absence of profound hematologic signs and conversely, cases with definite clinical signs of TMA but only minimal histological changes. TMA occurs in a wide range of clinical settings, including glomerular diseases and transplantation. It is important to recognize that typical pathology can exist without clinical laboratory evidence, suggesting that TMA is frequently underestimated in clinical practice. Therefore, active interpretation of even subtle pathological changes is crucial to avoid underdiagnosis and to establish

appropriate management strategies for improved patient outcomes.

Keywords: Thrombotic microangiopathy, Kidney, Pathology