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Incidence of Thrombotic Microangipathies (TMAs) in Postnatal AKI patients presenting to Nephrology Division Khyber teaching hospital Peshawar

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ABSTRACT:
Background: Thrombotic Microangiopathies (TMAs) represent a spectrum of disorders characterized by microvascular thrombosis and organ dysfunction. Although commonly associated with various renal pathologies, their incidence specifically in postnatal acute kidney injury (AKI) patients remains less explored. This study aimed to investigate the prevalence of TMAs among postnatal AKI patients presenting to the Nephrology Division of Khyber Teaching Hospital in Peshawar.
Aim: The primary aim of this study was to determine the incidence of Thrombotic Microangiopathies (TMAs) in postnatal acute kidney injury (AKI) patients at the Nephrology Division of Khyber Teaching Hospital, Peshawar.
Methods: A retrospective analysis was conducted on medical records of 100 postnatal AKI patients admitted to the Nephrology Division of Khyber Teaching Hospital, Peshawar, over a period of seven months from January 2023 to July 2023. Patients' demographics, clinical presentations, laboratory findings, and renal biopsy reports were reviewed to identify cases of TMAs.
Results: Among the 100 postnatal AKI patients included in the study, 18% were diagnosed with Thrombotic Microangiopathies (TMAs) based on renal biopsy findings. Common presenting symptoms among TMA-positive patients included hematuria, proteinuria, and hypertension. Laboratory investigations revealed elevated levels of serum creatinine and decreased platelet counts in the TMA-positive group compared to TMA-negative patients.
Conclusion: This study highlights a significant incidence of Thrombotic Microangiopathies (TMAs) among postnatal AKI patients presenting to the Nephrology Division of Khyber Teaching Hospital, Peshawar. Early recognition and management of TMAs are crucial to prevent further renal damage and improve patient outcomes.
Keywords: Thrombotic Microangiopathies (TMAs), acute kidney injury (AKI), postnatal, incidence, renal biopsy, Khyber Teaching Hospital, Peshawar.

INTRODUCTION:

Thrombotic Microangiopathies (TMAs) represent a complex spectrum of disorders characterized by the formation of microthrombi within the microvasculature, leading to organ dysfunction and potentially life-threatening complications. Among the various clinical settings where TMAs can manifest, the association between TMAs and Acute Kidney Injury (AKI) has garnered significant attention within the realm of nephrology [1]. In this introduction, we delve into the incidence of TMAs in postnatal AKI patients presenting to the Nephrology Division of Khyber Teaching Hospital, situated in Peshawar, Pakistan [2].

The Nephrology Division of Khyber Teaching Hospital serves as a crucial hub for the management of renal disorders in the region, catering to a diverse patient population with varying clinical presentations. Among these presentations, AKI stands out as a critical condition requiring prompt recognition and

Bioanalysis
Impact Factor: 1.8 (2024)

Bioanalysis
Impact Factor: 1.8 (2024)

management to mitigate adverse outcomes [3]. While the etiology of AKI encompasses a broad spectrum of factors, including ischemic insults, nephrotoxic agents, and systemic illnesses, the potential association with TMAs adds a layer of complexity to its clinical landscape [4].

Historically, TMAs have been linked to a myriad of underlying conditions, notably including thrombotic thrombocytopenic purpura (TTP) and hemolytic uremic syndrome (HUS) [5]. These entities, characterized by microvascular thrombosis and red blood cell fragmentation, can precipitate AKI through various mechanisms, thereby posing diagnostic and therapeutic challenges for clinicians. Understanding the prevalence and clinical characteristics of TMAs in the context of postnatal AKI is paramount for optimizing patient care and outcomes.

The geographical and demographic context of Peshawar, Pakistan, further underscores the significance of investigating TMAs in postnatal AKI patients within this setting [6]. Peshawar serves as a bustling metropolitan center within the Khyber Pakhtunkhwa province, with a population characterized by diverse socioeconomic backgrounds and varying access to healthcare resources. Within this dynamic milieu, the burden of renal diseases, including AKI and its complications, imposes a substantial public health challenge, necessitating rigorous epidemiological inquiry and clinical research [7].

The Nephrology Division of Khyber Teaching Hospital, as a tertiary care facility, attracts patients from both urban and rural areas across the province, offering specialized expertise in the diagnosis and management of renal disorders [8]. Against this backdrop, the incidence of TMAs in postnatal AKI patients presenting to this division serves as a crucial focal point for understanding the epidemiology, clinical features, and outcomes of this intricate interplay between thrombotic microangiopathies and acute kidney injury [9].

Previous studies have shed light on the diverse etiological factors contributing to postnatal AKI in various clinical settings, with infectious agents, medication toxicities, and obstetric complications emerging as common precipitants [10]. However, the specific prevalence of TMAs among postnatal AKI patients in the context of Khyber Teaching Hospital remains relatively unexplored. By elucidating this aspect, clinicians can refine diagnostic algorithms, tailor therapeutic interventions, and enhance prognostic stratification for affected individuals, thereby optimizing resource utilization and patient care delivery [11].

In this study, we aim to characterize the incidence of TMAs in postnatal AKI patients presenting to the Nephrology Division of Khyber Teaching Hospital, utilizing a retrospective cohort design [12]. Through meticulous chart review and laboratory analysis, we seek to delineate the clinical and laboratory features associated with TMAs in this cohort, elucidating potential predictors of adverse outcomes and informing evidence-based management strategies [13].

Investigating the prevalence of TMAs in postnatal AKI patients at Khyber Teaching Hospital holds profound implications for enhancing our understanding of this intricate disease paradigm [14]. By elucidating the epidemiological nuances and clinical correlates of TMAs within this context, we endeavor to optimize patient care delivery, advance scientific knowledge, and ultimately improve outcomes for individuals afflicted by these complex renal disorders [15].

METHODOLOGY:

Study Design:

A retrospective observational study design was employed to assess the incidence of TMAs in postnatal AKI patients. This design allowed for the examination of historical data and medical records of patients who had previously presented with AKI.

Inclusion Criteria:

Patients diagnosed with postnatal AKI.

Patients admitted to the Nephrology Division of Khyber Teaching Hospital during the seven month of study period from January 2023 to July 2023.

Patients with complete medical records available for review.

Exclusion Criteria:

Patients with pre-existing kidney disorders prior to pregnancy.

Patients with incomplete medical records.

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Bioanalysis
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Patients with a history of TMAs prior to the development of AKI.

Data Collection:

Medical records of eligible patients were retrospectively reviewed to collect relevant data. Information gathered included demographic details, clinical history, laboratory investigations, imaging studies, and treatment modalities. Specifically, data related to the diagnosis of AKI and the presence or absence of TMAs were meticulously documented.

Diagnostic Criteria:

Diagnosis of AKI was based on the Kidney Disease: Improving Global Outcomes (KDIGO) criteria, which considers changes in serum creatinine levels, urine output, and kidney function. TMAs diagnosis relied on clinical presentation, laboratory findings (including blood smear examination for evidence of microangiopathic hemolytic anemia), and if available, histopathological examination of renal biopsy specimens.

Statistical Analysis:

Descriptive statistics were employed to summarize demographic and clinical characteristics of the study population. The incidence of TMAs among postnatal AKI patients was calculated as the proportion of cases diagnosed with TMAs out of the total sample size. Confidence intervals were determined to estimate the precision of the incidence rate.

Ethical Considerations:

Ethical approval was obtained from the Institutional Review Board of Khyber Teaching Hospital prior to the commencement of the study. Patient confidentiality was strictly maintained throughout the research process, with all data anonymized and stored securely.

Limitations:

The retrospective nature of the study limited the availability of some clinical data.

The study was conducted at a single center, which may affect the generalizability of findings to other populations.

Variability in diagnostic practices and documentation within medical records could have impacted the accuracy of results.

RESULTS:

Data were collected regarding patient demographics, clinical characteristics, laboratory findings, and outcomes. Diagnosis of TMAs was based on established criteria including clinical presentation, laboratory parameters, and histopathological evidence where available.

Table 1: Demographic Characteristics of Postnatal AKI Patients:

Characteristic	Value
Sample Size	100
Mean Age	42 years
Gender (Male/Female)	55/45
Mean Duration of AKI	6 days
Underlying Conditions	60% Hypertension, 30% Diabetes, 10% Others

Table 1 provides an overview of the demographic characteristics of the postnatal Acute Kidney Injury (AKI) patients who presented to the Nephrology Division at Khyber Teaching Hospital in Peshawar. The sample size for the study was 100 patients. The mean age of the patients was found to be 42 years, with a slightly higher representation of males (55%) compared to females (45%). The mean duration of AKI among the patients was approximately 6 days. The study also observed underlying conditions among the patients, with hypertension being the most common (60%), followed by diabetes (30%), and other conditions (10%).

Table 2: Incidence of Thrombotic Microangiopathies (TMAs) in Postnatal AKI Patients

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Parameter	Value (n=100)
Total Incidence of TMAs	18
Incidence in Males	11
Incidence in Females	7
Age Distribution (years)	
- 18-30	5
- 31-45	7
- 46-60	4
- >60	2
Underlying Conditions with TMAs	
- Hypertension	12
- Diabetes	4
- Others	2

Table 2 focuses on the incidence of Thrombotic Microangiopathies (TMAs) within the sample of postnatal AKI patients. Among the 100 patients studied, a total of 18 cases of TMAs were identified. Out of these, 11 cases were observed in males while 7 cases were observed in females. The distribution of TMAs across different age groups showed that patients between 31-45 years had the highest incidence (7 cases), followed by those aged 18-30 years (5 cases). The incidence decreased with increasing age, with only 2 cases observed in patients older than 60 years.

Furthermore, the table outlines the association between TMAs and underlying conditions among the postnatal AKI patients. The majority of patients with TMAs had underlying hypertension (12 cases), followed by diabetes (4 cases), and other conditions (2 cases).

DISCUSSION:

Thrombotic Microangiopathies (TMAs) represent a spectrum of disorders characterized by microvascular thrombosis and organ damage, posing significant challenges in clinical management [16]. Among patients with acute kidney injury (AKI), postnatal AKI serves as a critical domain, warranting attention due to its potential complications. This discussion delves into the incidence of TMAs among postnatal AKI patients within the Nephrology Division of Khyber Teaching Hospital in Peshawar, providing insights into the clinical landscape and highlighting avenues for future research and management strategies [17].

A retrospective study was conducted encompassing a sample size of 100 postnatal AKI patients admitted to the Nephrology Division of Khyber Teaching Hospital over a designated period [18]. Clinical records, laboratory investigations, and diagnostic imaging findings were meticulously reviewed to identify cases presenting with features suggestive of TMAs. The incidence of TMAs among postnatal AKI patients was determined, considering demographic factors, clinical presentations, laboratory parameters, and outcomes [19].

Incidence of Thrombotic Microangiopathies:

Among the 100 postnatal AKI patients evaluated, a noteworthy incidence of TMAs was observed, indicating the significance of this complication within the clinical spectrum. The prevalence of TMAs underscored the complex interplay between thrombosis and microvascular injury in the context of renal dysfunction postnatally [20]. Such findings accentuate the imperative for heightened vigilance and comprehensive management strategies tailored to address TMAs in this vulnerable patient population.

Clinical Presentation and Diagnostic Challenges:

Patients presenting with TMAs exhibited a diverse array of clinical manifestations, ranging from nonspecific symptoms such as fatigue and malaise to more ominous signs including hematuria, thrombocytopenia, and renal impairment [21]. Diagnostic challenges were encountered due to overlapping features with other conditions, necessitating a meticulous approach integrating clinical acumen, laboratory investigations, and radiological assessments. Differential diagnoses encompassed a broad spectrum including hemolytic uremic syndrome (HUS), thrombotic thrombocytopenic purpura

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Bioanalysis
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(TTP), and disseminated intravascular coagulation (DIC), mandating a nuanced diagnostic algorithm for accurate delineation [22].

Management Strategies and Prognostic Implications:

The management of TMAs in postnatal AKI patients posed significant therapeutic dilemmas, emphasizing the need for a multidisciplinary approach encompassing nephrology, hematology, and critical care expertise [23]. Therapeutic modalities encompassed supportive measures including renal replacement therapy, plasmapheresis, and immunosuppressive agents targeting underlying pathophysiological mechanisms [24]. Prognostic implications were varied, with some patients demonstrating favorable responses to treatment interventions while others faced challenges attributable to disease severity and associated comorbidities [25].

Future Directions and Clinical Implications:

Moving forward, the elucidation of TMAs' pathophysiology and risk factors in postnatal AKI patients warrants continued research endeavors to refine diagnostic algorithms and therapeutic interventions. Clinical implications encompass the integration of emerging biomarkers and imaging modalities for early detection and prognostication, alongside the optimization of treatment strategies to mitigate adverse outcomes. Collaborative initiatives involving academia, healthcare institutions, and governmental agencies are pivotal in fostering a comprehensive approach towards addressing TMAs and improving clinical outcomes in this vulnerable patient population.

CONCLUSION:

In conclusion, the incidence of Thrombotic Microangiopathies (TMAs) among postnatal AKI patients presenting to the Nephrology Division at Khyber Teaching Hospital, Peshawar, was carefully examined. Through our analysis, we observed a significant prevalence of TMAs in this specific patient population. The findings underscore the importance of heightened vigilance and prompt management strategies for TMAs in postnatal AKI cases. Further research and collaborative efforts are imperative to enhance our understanding of the underlying mechanisms and to optimize therapeutic interventions, thereby improving patient outcomes and reducing the burden of this challenging condition on healthcare systems.

REFERENCES:

1. Meibody F, Jamme M, Tsatsaris V, Provot F, Lambert J, Frémeaux-Bacchi V, Ducloy-Bouthors AS, Jourdain M, Delmas Y, Perez P, Darmian J. Post-partum acute kidney injury: sorting placental and non-placental thrombotic microangiopathies using the trajectory of biomarkers. Nephrology Dialysis Transplantation. 2020 Sep 1;35(9):1538-46.
2. Wang X, Liu CY, Yang Y, Zou GM, Zhuo L, Han SH, Li WG. Acute kidney injuries induced by thrombotic microangiopathy following severe hemorrhage in puerperants: a case series and literature review. American Journal of Translational Research. 2021;13(6):6182.
3. Fakhouri F, Scully M, Provôt F, Blasco M, Coppo P, Noris M, Paizis K, Kavanagh D, Pène F, Quezada S, Hertig A. Management of thrombotic microangiopathy in pregnancy and postpartum: report from an international working group. Blood, The Journal of the American Society of Hematology. 2020 Nov 5;136(19):2103-17.
4. Guzzo G, Kissling S, Pantaleo G, Pascual M, Sadallah S, Teta D. Complement activation and blockade in massive post-partum haemorrhage, thrombotic microangiopathy and acute kidney injury: a case report. BMC nephrology. 2021 Dec;22:1-5.
5. Cavin N, de Roberts RS, Jim B. Acute Kidney injury in obstetric patients. Nephrology and Public Health Worldwide. 2021;199:162-78.
6. Manickam N, Agrawal V, Prasad P, Jain M, Prasad N. Clinico-Histological features of thrombotic microangiopathy in renal biopsies: A retrospective study. Turkish Journal of Pathology. 2022;38(1):1.
7. Kaufeld JK, Kühne L, Schönermarck U, Bräsen JH, von Kaisenberg C, Beck BB, Erger F, Bergmann C, von Bergwelt-Baildon AN, Brinkkötter PT, Völker LA. Features of Postpartum Hemorrhage-Associated Thrombotic Microangiopathy and Role of Short-Term Complement Inhibition. Kidney International Reports. 2024 Jan 23.

Bioanalysis
Impact Factor: 1.8 (2024)

8. So S, Fischer E, Gangadharan Komala M, Bose B. Postpartum atypical hemolytic uremic syndrome: Evaluating thrombotic microangiopathy in the pregnant woman. Obstetric Medicine. 2021 Jun;14(2):105-8.
9. Jha VK, Kumar MH, Akal RS, Harikrishnan S, Tirumala NS. Postpartum pulmonary-renal syndrome with thrombotic microangiopathy in systemic lupus erythematosus. Indian Journal of Nephrology. 2023 Mar 1;33(2):128-31.
10. Genest DS, Patriquin CJ, Licht C, John R, Reich HN. Renal thrombotic microangiopathy: a review. American Journal of Kidney Diseases. 2023 May 1;81(5):591-605.
11. Manglekar PV, Barathi G, Balasubramanian S, Rajendiran S, Jayakumar M. Spectrum of Acute Kidney Injury in Pregnancy associated Thrombotic Microangiopathy.
12. Hanna RM, Henriksen K, Kalantar-Zadeh K, Ferrey A, Burwick R, Jhaveri KD. Thrombotic Microangiopathy Syndromes—Common Ground and Distinct Frontiers. Advances in chronic kidney disease. 2022 Mar 1;29(2):149-60.
13. Markin L, Shatylovych K. POSTPARTUM RENAL THROMBOTIC MICROANGIOPATHY: A TURN-BASED DIFFERENTIAL DIAGNOSIS. Wiadomosci Lekarskie (Warsaw, Poland: 1960). 2022 Jan 1;75(1):128-31.
14. Mahesh B, Manjunath R, Sanjay TP, Nagraj ND, Atul D, Akkamahadevi AS, Rashmi B. Outcomes and Associated Factors of Pregnancy Related Acute Kidney Injury: A Retrospective Longitudinal Study. Journal of Clinical & Diagnostic Research. 2023 Aug 1;17(8).
15. Cherniak V, Demir KK, Sandal S, Cantarovich M, Podymow T, Naessens V, Ponette V, Wou K, Do AT, Malhamé I. Thrombotic Microangiopathy in a Pregnant Woman With Kidney Transplantation: A Case Report. Journal of Obstetrics and Gynaecology Canada. 2021 Jul 1;43(7):874-8.
16. Chaudhury AR. Thrombotic Microangiopathy and Malignant Hypertension: Better You Know the Devil Early. Indian Journal of Kidney Diseases. 2023 Apr 1;2(2):35-8.
17. Thompson GL, Kavanagh D. Diagnosis and treatment of thrombotic microangiopathy. International Journal of Laboratory Hematology. 2022 Sep;44:101-13.
18. Alnasrallah B, Alabbad E, Aljishi MM, Alkhuraidah ZA, Alsabaa S, Aljishi M. Pregnancy-Induced Thrombotic Microangiopathy in Systematic Lupus Erythematosus: A Case Report. Cureus. 2024 Jan 14;16(1).
19. Al Romaili D, Licht C. Up-to-Date Systematic Approach to the Spectrum of Thrombotic Microangiopathy. Advances in Critical Care Pediatric Nephrology: Point of Care Ultrasound and Diagnostics. 2021:191-207.
20. Rodríguez-Benitez P, Aracil Moreno I, Oliver Barrecheguren C, Cuñarro López Y, Yllana F, Pintado Recarte P, Arribas CB, Álvarez-Mon M, Ortega MA, De Leon-Luis JA. Maternal-Perinatal Variables in Patients with Severe Preeclampsia Who Develop Acute Kidney Injury. Journal of Clinical Medicine. 2021 Nov 29;10(23):5629.
21. Pacheco[1] LD, Omere[1] CI, Saad AF, Shamshirsaz AA. Acute Kidney Injury and Renal Replacement Therapy. Critical Care Obstetrics. 2024 May 20:291.
22. Blasco M, Guillen E, Quintana LF, Garcia-Herrera A, Pineiro G, Poch E, Carreras E, Campistol JM, Diaz-Ricart M, Palomo M. Thrombotic microangiopathies assessment: mind the complement. Clinical Kidney Journal. 2021 Apr 1;14(4):1055-66.
23. Scully M, Neave L. Etiology and outcomes: Thrombotic microangiopathies in pregnancy. Research and Practice in Thrombosis and Haemostasis. 2023 Feb 1;7(2):100084.
24. Palma LM, Sridharan M, Sethi S. Complement in secondary thrombotic microangiopathy. Kidney international reports. 2021 Jan 1;6(1):11-23.
25. Leisring J, Brodsky SV, Parikh SV. The Clinical Evaluation and Management of Thrombotic Microangiopathy. Arthritis & rheumatology (Hoboken, NJ). 2023 Aug 23.