NU Rounds

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Best Regards,

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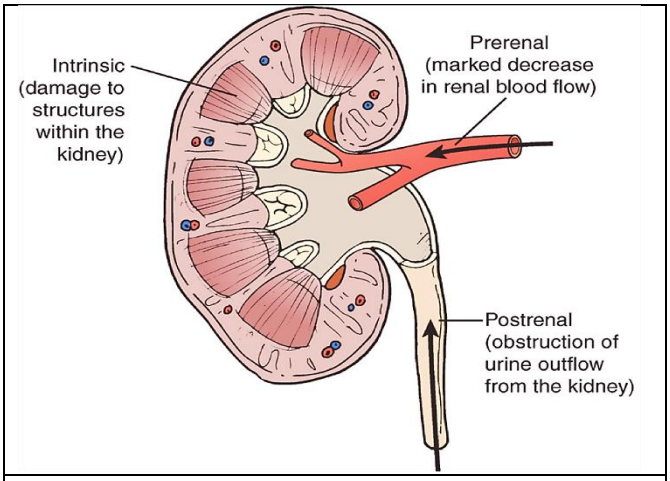
1. Investigation of the risk factors for acute kidney injury following traumatic hemorrhagic shock

Introduction: Traumatic hemorrhagic shock occurs when substantial bleeding induced by an external or internal injury which reduces circulating blood volume and oxygen supply and causes shock. During hemorrhagic shock, the body undergoes cellular hypoxia and extensive tissue ischemia, especially in the kidneys. Acute kidney injury (AKI) can result from renal ischemia, which is brought on by a drop in renal perfusion pressure.[1] AKI affects 10-15% of hospitalized patients, and in intensive care units, it has been observed to affect almost 50% of patients.[2] Renal hypoxia, decreased renal perfusion pressure, and decreased systemic blood volume can all contribute to inadequate renal blood flow in severe hemorrhagic shock, which can result in AKI. AKI in patients with acute hemorrhagic shock is dependent on several factors, such as the extent of damage, the patient's pre-existing health state, the existence of comorbidities, and the promptness and efficacy of treatment interventions. The prevention or reduction of AKI severity may depend on the early identification of risk factors.[1] To provide a theoretical foundation for developing preventative measures and enhancing clinical outcomes, this study was conducted to determine the clinical features and risk factors for AKI brought on by severe hemorrhagic shock.



Acute kidney injury

Methods: In total, 417 patients with severe hemorrhagic shock were included in this retrospective cohort study. Acute Physiology and Chronic Health Evaluation II (APACHE II) score, organ dysfunction, and injury severity score (ISS) were assessed within 24 hours of the trauma. The duration between the trauma and the admission was noted, and sepsis that developed within 72 hours of the trauma was assessed. The primary endpoint was the development of acute kidney injury (AKI), which is characterized by a rise in serum creatinine of ≥0.3 mg/dL (≥26.5 μmol/L) within 48 hours, an increase to 1.5 times the baseline, or a urine volume of less than 0.5 mL/(kg·h) for a minimum of 6 hours. The mean creatinine level for the three months before admission was used to define the baseline creatinine level. The Kidney Disease Improving Global Outcomes (KDIGO) clinical practice recommendations were used in determining the AKI stage.

Results: AKI was observed in 29.3% of cases following severe hemorrhagic shock. The average period from trauma to AKI for 122 patients who had AKI was 18 hours. Eighty (65.6%) patients were categorized as requiring kidney replacement therapy in the hospital, with 24 (19.7%) being classified as stage 1, 18 (14.7%) as stage 2, and 4 (3.3%) as stage 3. Multivariable analysis showed that sepsis (OR, 4.536; p=0.030), acute myocardial injury (OR, 2.745; p=0.044), age (OR, 1.048; p<0.001), and B-type natriuretic peptide (OR, 1.002; p=0.041) were the independent risk factors for AKI. AKI was negatively linked with mean

arterial pressure (OR, 0.972; p = 0.017), base excess (OR, 0.842; p = 0.001), and road traffic accidents (OR, 0.202; p = 0.001). In Figure 1, the model demonstrated a good calibration, with the area under the receiver operating characteristic (ROC) curve for prediction being 0.85.

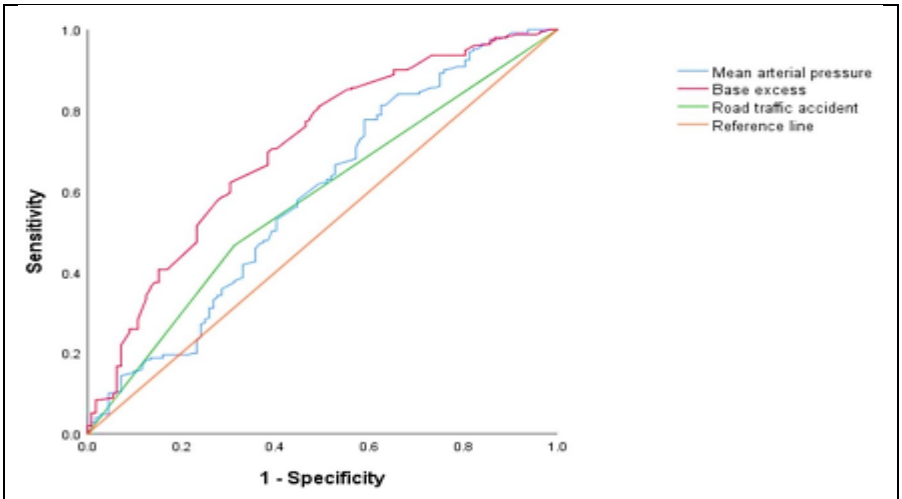


Figure 1. Whole model and the risk factor's ROC curve for predicting acute kidney injury following severe hemorrhagic shock.

Discussion: According to this study, 29.3% of patients with severe hemorrhagic shock had an incidence of AKI. Age, sepsis, acute myocardial damage, and B-type natriuretic peptide were found to be independent risk factors.[1] In Liu-ming LU et al., both univariate and multivariate logistic regression analyses revealed that the independent factors for hemorrhagic shock complicated by AKI were platelet count, lactic acid, carbon dioxide partial pressure, alanine aminotransferase, APACHE IV score, sequential organ failure assessment (SOFA) score, and mechanical ventilation.[3] Nasu T et al. showed that multivariate analysis found two independent predictors of AKI to be the arterial lactate level and the minimal prehospital systolic blood pressure. AUC-ROC (area under the receiver operating characteristic curve) of 0.867 and 0.852 in the prediction of AKI stage I or F, respectively, indicated that the model demonstrated strong discriminability.[4]

Conclusion: The current study found that age, B-type natriuretic peptide, sepsis, and early myocardial damage are independent risk factors for AKI following severe hemorrhagic shock. Following acute hemorrhagic shock, AKI was negatively linked with mean arterial pressure, base excess, and road traffic injuries.

Acute kidney damage (AKI) can be prevented, and patient outcomes can be enhanced by early detection and efficient treatment of certain risk factors.

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2. Potential use of phosphatase and tensin homolog immunohistochemistry as a prognostic marker in post-prostatectomy patients with castration-sensitive prostate cancer

Introduction: Prostate cancer (PCa) appears to be a highly diverse illness with a wide variety of prognoses. However, there remains an unmet medical need in PCa research regarding the understanding and management of intratumor heterogeneity in locally invasive PCa. The current clinical indicators, such as clinical T stage, Gleason score, and prostate-specific antigen (PSA) levels, make it challenging to distinguish between the variety of prognoses. Prior studies have shown that prognosis prediction for PCa with seminal vesicle invasion following prostatectomy can be aided by the inclusion of tumor immune cell profiling alongside clinical and pathological information.[1] Prostate cancer typically exhibits loss of phosphatase and tensin homolog on chromosome 10 (PTEN). Prior research has indicated a connection between PTEN depletion and metastases and recurrence following radical prostatectomy for localized prostate cancer. Additionally, it was discovered that patients with castration-resistant prostate cancer (CRPC) had a worse prognosis when PTEN was lost. However, the expression and prognostic relevance of PTEN in castration-naïve prostate cancer (CNPC) have not been investigated.[2] Reports regarding the classification of CSPC based on protein-level PTEN expression following prostatectomy are lacking.[1]
So, this study was conducted to determine whether post-prostatectomy patients with castration-sensitive prostate cancer (PCa) could benefit from employing the phosphatase and tensin homolog (PTEN) gene as a predictive marker.

Methods: This retrospective analysis comprised 180 individuals who had radical prostatectomy and had castration-sensitive PCa. The patient's medical records, specifically the pathology report of the specimen taken during the prostatectomy, provided the pathological diagnoses. Immunohistochemistry was used to assess PTEN expression, and patients were divided into PTEN-Normal and PTEN-Loss groups according to the staining intensity. Using the Cox proportional hazards model, the relationship between PTEN expression and biochemical recurrence was examined.

Results: Overall, PTEN-normal expression was found in 156 patients, while PTEN-loss was found in 24. The follow-up duration, age, prostate volume, clinical T stage, pathological T stage, pathological N stage, Gleason score, and surgical margin status based on PTEN expression were all similar. Comparing the PTEN-Loss group to the PTEN-Normal group, patients in the PTEN-Loss group had a poorer recurrence-free rate (35% vs. 75%) and a greater probability of biochemical recurrence (hazard ratio, 4.642; 95% confidence range, 2.137–10.083; $p < 0.001$). The prediction of biochemical recurrence following prostatectomy was enhanced by measurement of PTEN expression in addition to clinicopathological variables, such as the serum prostate-specific antigen level, Gleason score, and T stage (area under the curve, 0.577 vs. 0.688).

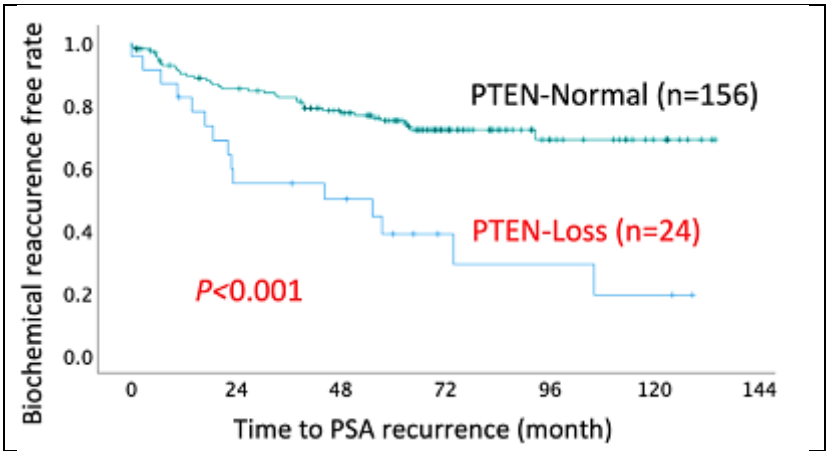

Figure 1: Kaplan-Meier estimates of the expression of tensin homolog (PTEN) and phosphatase.

Discussion: According to Zhang JY et al., PTEN loss was seen in 58 patients, of whom 4 had heterologous PTEN loss and 54 had homologous PTEN loss. Gleason score and baseline PSA level were not correlated with PTEN expression. Patients with intact PTEN were less likely than those with PTEN deletion to present with high metastatic volume illness.[2] Based on the percentage of PTEN seen by immunohistochemistry, this study established a threshold value of 20%.[1] According to the study outcomes by Matsubara N et al., a 50% cutoff value for the fraction of stained cells in PTEN immunostaining was utilized to assess the total loss of PTEN expression.[3]

Conclusion: The current study concludes that in patients with castration-sensitive PCa who have already had a prostatectomy, decreased PTEN expression is a substantial predictor of biochemical recurrence.

Tumor suppressor genes (TSGs) such as phosphatase and tensin homolog (PTEN) are crucial for controlling cell proliferation and division.

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3. Role of stents in the etiology of Acute Kidney Injury after determining the independent predictors of AKI

Introduction: Prophylactic ureteral stent implantation during colectomy can help identify the ureters intraoperatively and provide early repair, which can reduce the risk and unfavourable consequences of ureteral injury. Stenting, however, raises the risk of urologic adverse events, including infections or haematuria following surgery, disturbance of normal anatomy, and ureteric or renal injury related to catheterization.[1] The recommendation for prophylactic stenting might be strengthened if the adverse effects were less significant. Several studies have reported a considerable rise in AKI after stenting, while others showed no increase. Confounding by indication is one issue that can make results difficult to interpret: high-risk patients are more likely to benefit from prophylactic stent implantation, but they are also more likely to develop postoperative AKI unrelated to stenting.[2] For the identification of independent predictors of AKI, this retrospective cohort study evaluates the role of stents in the etiology of AKI.

Methods: This retrospective analysis comprised 1224 consecutive patients with colorectal cancer. Propensity score matching was utilized to establish stent-treated and control groups after patients received ureteral stents. Patients experiencing sepsis and emerging cases were not included in the analysis. Two balanced groups were created using minimally invasive methods, a history of diabetes mellitus, and previously recognized independent predictors of AKI. Patients with complex Crohn's disease typically had ureteral stents implanted for right-sided colon resections, left-sided colon resections, and abdominal perineal resections. Urologic surgeons carried out the stenting technique at the request of colorectal surgeons.

Results: Fluoroscopy was necessary in 36 (15.2%) of patients. About 212 (89.5%) patients had bilateral stents implanted, 16 (6.8%) had unilateral stents, 3 (1.3%) had unknown stents, and 5 (2.1%) had coding problems. Eighty-four percent of the time, lit stents were implanted (68.4% bilaterally and 15.6% mixed, meaning one lighted, one non-lighted). In 12.2% of patients, non-lighted stents were the only option; in 2.8%, it was unknown. Between the groups, there were similarities in baseline demographic variables and procedure-related baseline parameters. AKI rates were not different in stented patients compared to controls (P = 0.82). There were no differences between postoperative complications, such as urinary tract infections (UTI, P = 0.82), average postoperative creatinine (P = 0.67), chronic renal insufficiency (CRI, P = 0.49), length of stay (LOS, P = 0.15), or 30-day readmissions (P = 0.79) (Table 1).

	Patients	Preop-erative Cr (mg/dl)	Postopera-tive Cr (mg/dl)	AKI	Long-term Creatinine (mg/dl)	CRI (sensitive)	CRI (strict)
No stents	237	0.97 ± 0.40	0.90 ± 0.45	48 (20.3%)	1.06 ± 0.62	21 (8.9%)	17 (7.2%)
Stents	237	0.94 ± 0.39	0.92 ± 0.52	51 (21.5%)	1.01 ± 0.47	16 (6.8%)	9 (3.8%)
P value		0.47	0.67	0.82	0.35	0.49	0.16

Long-term creatinine sampled between 3 months and 1 year after surgery; CRI sensitive: chronic renal insufficiency, where long-term creatinine was ≥ 0.3 + preoperative creatinine; CRI strict: chronic renal insufficiency, where long-term creatinine was ≥ 1.5 * preoperative creatinine

Table 1: Renal problems in individuals with and without stents

Discussion: Even though illuminated stents were primarily used and evaluated using sensitive KDIGO criteria, there was no rise in AKI or even a minor increase in perioperative creatinine with ureteral stenting in this study, where patients were matched with risk factors associated with AKI.[2] However, Schmeid et al. found not a significant rise in AKI incidence with ureteral stents despite a strict threshold of 15.9% in patients without stents in research that looked at several variables and liberal stent use. A comparison of the groups' acute renal injuries using unadjusted analysis showed no discernible differences. There was no significant variance in acute renal injury between the groups even after correction. Patients having accelerated recovery colorectal surgery do not have a higher risk of acute renal injury when they have prophylactic ureteral stenting.[3]

Conclusion: The current study concludes that in a cohort of patients where stenting was often used, ureter stents inserted for identification did not appear to cause AKI or AKI-related problems.

A careful balance of risks and benefits is needed when placing preventive ureteral stents prior to colorectal surgery to help prevent ureteral injury or make an unintentional injury easier to discover.

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4. Myeloperoxidase-Associated Glomerulonephritis and Possible IgA-Mediated Anti-Glomerular Basement Membrane Disease- A Rare Case

Introduction: Anti-glomerular basement membrane (anti-GBM) illness, also known as Goodpasture syndrome, is an organ-specific autoimmune disease that affects the lungs and kidneys, resulting in fast progression of glomerulonephritis, extensive alveolar hemorrhage, and even respiratory failure.[1] Anti-neutrophil cytoplasm antibodies (ANCA) and "double-positive" anti-GBM antibodies have long been associated with glomerulonephritis, with reported results differing throughout case studies. Anti-myeloperoxidase (MPO) antibodies are more frequently associated with double seropositivity. The etiology is still unknown, although the formation of autoantibodies against GBM has been suggested as an epiphenomenon of glomerular damage caused by vasculitic disease.[2] This is the first instance of IgA anti-GBM illness and MPO necrotizing vasculitis occurring at the same time.

Case presentation: A 67-year-old male patient was admitted to the hospital with a one-month history of malaise, dyspnoea, nocturnal sweats, and an inadvertent 9.5 kg weight loss without any noticeable changes in urine production. The patient had a history of hypertension and colon cancer and was surgically removed. The patient had tonsillar enlargement and discharge, which was observed during examination. There was no peripheral oedema, and his chest was audible to auscultate. His serum albumin was 34 g/L, urea was 112 mg/dL (40.1 mmol/L), and creatinine was 12 mg/dL (1,063 mmol/L) at the time of admission. Haematuria and 3+ proteinuria was seen in the urine. The anti-MPO serology revealed a positive result with titres more than 134 mmol/L.

The enzyme-linked immunosorbent test did not reveal the presence of IgG anti-GBM antibodies. The levels of complement C3 and C4 were within normal limits, and the serum electrophoresis showed no signs of paraprotein. There was no sign of anti-neutrophil or anti-double-stranded DNA antibodies. A kidney measuring 12 and 13 cm without hydronephrosis was discovered via ultrasound. After receiving a kidney biopsy on the second day of his hospital stay, hemodialysis was started. There was evidence of crescentic glomerulonephritis in the tentative biopsy report. As a result, the patient received intravenous cyclophosphamide after three days of pulsed methylprednisolone therapy for ANCA-associated crescentic glomerulonephritis. A CT scan of the patient's chest, abdomen, and pelvis was done to rule out any cancer because of the patient's history of severe weight loss.

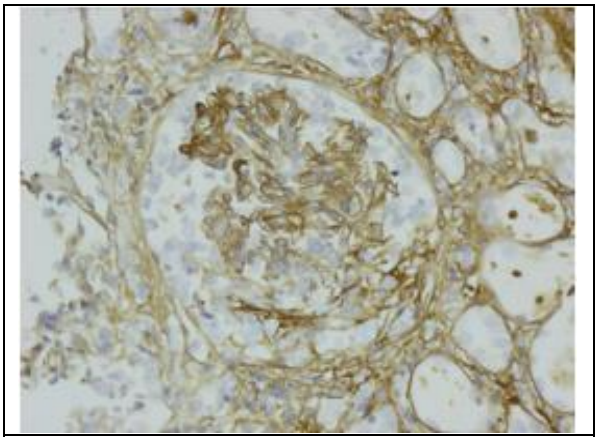

Figure 1: Section stained with IgA immunoperoxidase demonstrating linear IgA staining of the glomerular capillary walls (magnification × 200).

A CT scan identified an unintentional thrombus in a left renal vein branch that supplies the kidney's top pole. Initially, the patient's renal vein thrombus was managed with a heparin infusion as an anticoagulant. During his treatment with anticoagulant therapy, he experienced a period of haemoptysis with ground glass opacities on his chest CT scan, which indicated a small alveolar haemorrhage. The glomerular capillary walls showed linear IgA staining (Figure 1) upon release of the immunochemistry biopsy data, suggesting concomitant IgA anti-GBM illness; all other standard stains, including C3, were negative. Considering the alveolar haemorrhage and the lack of a laboratory test to identify any potential anti-GBM IgA in circulation, the choice was made to treat the anti-GBM illness empirically using ten cycles of plasma exchange. On day 16, the patient was discharged from the hospital with a creatinine level of 3.54 mg/dL (313 mmol/L). At six months, his renal function had stabilized, with an estimated glomerular filtration rate of 33 mL/min, and MPO remained low-level positive with no signs of active disease.

Discussion: Anti-GBM illness is clinically sporadic in patients whose serum is positive for ANCAs but negative for anti-GBM antibodies. False-negative results can occur when anti-GBM antibodies are detected using ELISA. Therefore, anti-GBM illness cannot be ruled out with negative serum anti-GBM antibody test results. Physicians treating patients with an uncommon form of glomerulonephritis may find it easier to diagnose and treat the condition sooner because of the unusual case.[2] Anti-GBM illness combined with IgA nephropathy is uncommon. The prognosis and clinical signs are superior to those of straightforward anti-GBM illness. In this instance, corticosteroid and cyclophosphamide treatment improved the patient's condition and kept his renal function mostly steady.[3]

Conclusion: This is the first instance of ANCA-associated glomerulonephritis and "double-positive" IgA anti-GBM illness that has been reported. Renal function recovery in an IgA anti-GBM illness that necessitates renal replacement therapy at the time of presentation.

A kidney or lung biopsy is required to confirm or exclude anti-GBM illness in patients with a high level of clinical suspicion whose serum is negative for anti-GBM antibodies.

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