Acute Kidney Injury

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Introduction

Acute Kidney Injury (AKI) is a sudden decrease in glomerular filtration rate which is manifested by an increase in serum creatinine concentration or oliguria and classified by stage and cause. AKI is said to occur likely in 20% of patients that visit the hospital. Patients that present with volume overload, electrolyte disorders, uremic complications, and drug toxicity tend to cause this injury (Levey, A. S., & James, M. T., 2017). It is very important for an advance nurse practitioner to understand the pathophysiology of this disease process and the disease mechanism considering the number of cases that are presented to the hospital.

Understanding the disease process will help provide better care to the people that are being affected.

Pathophysiological Processes.

- Acute Kidney Injury is an extensive clinical disorder that is including tubular necrosis, pre-renal azotemia, acute interstitial nephritis, acute glomerular and vasculitic renal diseases, and acute post-renal obstructive nephropathy. Based on the article, the conditions listed previously may cohabit in a single patient (Koza, Y., 2016).
- When the renal blood flow is Impaired, it can lead to hypoxic injury to the renal tubular cells by reducing intracellular ATP, disturbing the intracellular calcium homeostasis, infiltration of leukocytes, damaging the endothelium, releasing cytokines and adhesion molecules and causing apoptosis (Koza, Y., 2016).
- In Acute Kidney Injury, the renin angiotensin-aldosterone system, the renal sympathetic system, and the tubuloglomerular feedback system are activated. The changes in circulatory induces renal vasoconstriction and can lead to increased release of arginine vasopressin, which contributes to water retention (Koza, Y., 2016).

Signs & Symptoms

Acute kidney injury does not have symptoms until the kidneys begin to fail. Acute kidney injury could be detected not through other test that was order but limited to too little urine leaving the body, swelling in legs (Levey, A. S., & James, M. T., 2017).

Some of the signs and symptoms a patient might experience include but not limited to too little urine volume that is less than 0.5 mL/kg/hour for 4 hours; or increased in serum creatinine to greater than 1.5 times baseline, which is known or assumed to have happened within the preceding 7 days; or a urine volume that is less than 0.5 mL/kg/hour for 6 hours (Basile, D. P., Anderson, M. D., & Sutton, T. A., 2012).

Necrosis and apoptosis of tubular cells lead to tubular obstruction, which contributes to the reduction of glomerular filtration rate (GFR). Elevated intracellular calcium levels from tubular damage cause a series of cellular-level alterations that culminate in increased tubuloglomerular feedback, and thus, diminished GFR (Matthews, E., 2018).

Underlying Pathophysiology

The incidence of acute kidney injury varies in different patient population and different parameter are used for criteria. Based on the Kidney Disease Improving Global Outcome (KDIGO) clinical practice guidelines, acute kidney injury is increase in serum creatinine by 0.3 mg/dl (26.5 µmol/L) within 48 hours; or an increase in serum creatinine to greater than 1.5 times baseline, which is known or assumed to have happened.

Vascular compromise causes elevated endothelial injury markers, and production of inflammatory mediators that result in reduced GFR, due to concomitant imbalance between the mediators of vasoconstriction and dilatation that result in renal vasoconstriction and, finally, ischemia. High levels of vasoconstrictors and low levels of vasodilators cause continued hypoxia and cell damage or cell death during the process of acute kidney injury. Ongoing research into the pathophysiology of AKI may yield potential targets in the clinical management of this syndrome (Levey, A. S., & James, M. T., 2017).

Significance of Pathophysiology

Understanding the pathophysiology of this disease process is very beneficial to both the clinician and the patient. An indepth understanding of the disease process by the clinicians will help clinicians to easily explain the etiology of the disease process to the patients and manage the disease to the best of their ability. Once the patients have a good understanding of the subject matter, they can easily strive to manage the health condition in order to remain healthy. The patient could be more complient when they have the knowledge of disease (Tignanelli, Wiktör, Vatsaas, Sachdev, Heung, Park, & Napolitano, L. M. (2018). OUTCOMES OF ACUTE KIDNEY INJURY IN PATIENTS WITH SEVERE ARDS DUE TO INFLUENZA A(H1N1) Pdm09 VIRUS. American Journal of Critical Care, 27(1). 67-73. 

It is very encouraging that there are ongoing efforts in tackling the disease process. Based on all the research articles, clinicians good understanding of the disease process will ensure that patients also receives the best level of care (Koza, Y. 2016).

References


