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Rhabdomyolysis – Understanding the Mechanics

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Introduction

As a hospital healthcare provider on a Medical/Surgical Unit the probability of examining and treating a patient diagnosed with rhabdomyolysis is scarce. Knowing the mechanics of the disease will assist the provider in evaluating and treating the patient. Awareness of the pathophysiology of the disease is vital in accurately diagnosing and treating the disease. The role of the advanced practice nurse is fundamental in distinguishing possible causes of the phenomenon by recognizing signs and symptoms that occur with the disease. Completing a thorough physical exam on the patient and obtaining special lab tests will assist in identifying the ailment. Treating the patient appropriately will enhance the outcome and can prevent possible serious and long-term complications.

Understanding the mechanics of rhabdomyolysis will enhance awareness and understanding of the disease. Rhabdomyolysis is a result of skeletal muscle breakdown and subsequent release of intracellular contents that can lead to possible life-threatening complications (Shapiro & Luchette, 2012). Employed on a Medical/Surgical Unit two patients were diagnosed with rhabdomyolysis within a two-year period. The first case was intriguing and supported further analysis of the disease.

Exploratory research on the topic provided detailed insight on the cause and symptoms. Care for the patients were greatly enhanced. Obtaining further knowledge of the pathophysiology, manifestations, and treatment of the disease were identified.

Signs & Symptoms

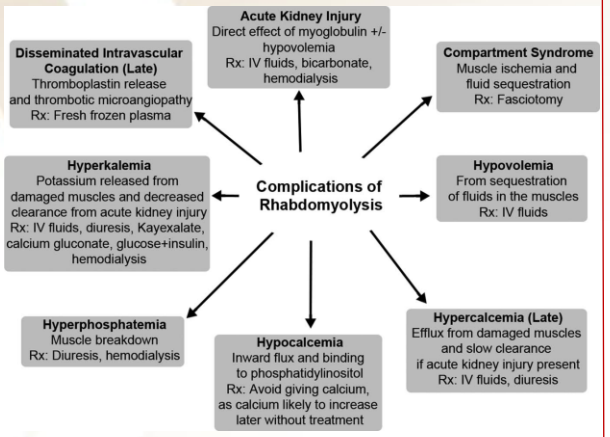
The gold standard clinical manifestations of rhabdomyolysis include the triad of dark urine, muscle pain/weakness, and fatigue. Patients may complain of flank pain along with low back discomfort that may reflect secondary acute renal failure (Raghuram, 2012). Presentation of chest pain, shortness of breath and weakness of the left upper extremity warrants an EKG to determine cardiac dysrhythmias (Pescatore, Robidoux, Cole, Waldman, & Ginty, 2014).

Underlying Pathophysiology

Rhabdomyolysis is triggered by various factors including: Traumatic and indirect muscle damage

- Medications, toxic substances, herbal supplements
- Genetic, metabolic, and endocrinolgic disorders
- Infectious and inflammatory processes
- Exercise and heat
- Ischemia
- Alcohol and drug abuse

Fig. Torres, pg. 66



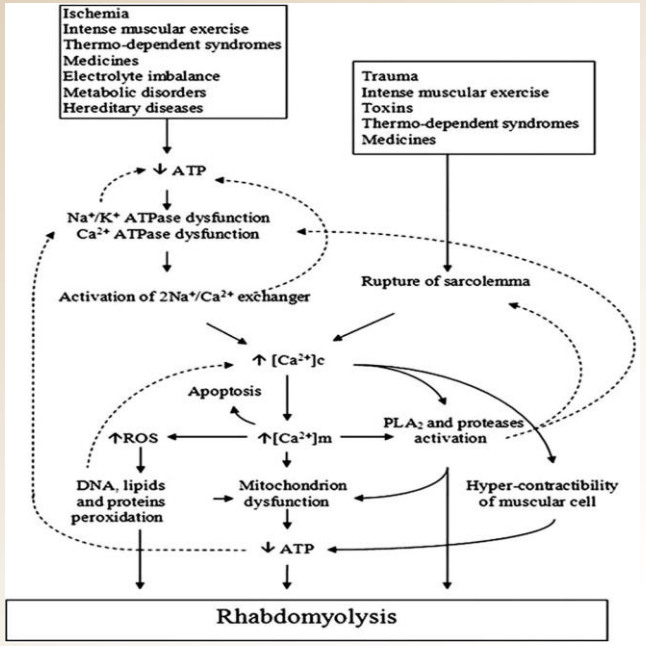


Fig. Torres, pg . 60

The Skeletal muscle breakdown in rhabdomyolysis leads to the depletion of adenosine triphosphate (ATP). The loss of ATP energy causes the sodium/potassium pump and the sodium/calcium exchangers to become non-functional. The damage subsequently releases potassium, phosphates, creatine kinase (CK), lactate dehydrogenase, and aldolase into circulation (Torres, Helmstetter, Kaye, & Kaye, 2015). Myoglobin released into the extracellular space and bloodstream is filtered out of the body by the kidneys leading to dark urine called myoglobinuria. Myoglobin is harmful to the kidney and can lead to acute kidney injury (Elsayed & Reilly, 2010).

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Significance of Pathophysiology

Understanding the mechanics of rhabdomyolysis leads to successful treatment of the patient. Basic knowledge of cellular functions and normal electrolyte balance will promote understanding of potential risks. The release of intracellular potassium into the circulation leads to hyperkalemia. Prevention of electrolyte imbalances is beneficial.

Awareness of the pathophysiology of rhabdomyolysis will improve the healthcare professional in diagnosing, treating, and planning care for the individual. Decreasing the risk of complications is vital in promoting optimal health.

Nursing Implications

Nursing care is impacted by early recognition and treatment of rhabdomyolysis. Assessing the patient for possible muscle injury from trauma or crush injury, alcohol or drug abuse can lead to rapid detection and treatment. Reviewing results of serum electrolytes potassium, calcium, and sodium, and myoglobin levels can determine the health of the muscle and kidney. Routine urinalysis screening is a traditional test for detection of rhabdomyolysis (Alhadi, Ruegner, Snowden, & Hendey, 2014). Early diagnosis can support the maintenance of the individual's urinary flow and prevents kidney failure. Administering appropriate medications and providing aggressive intravenous fluid will maintain adequate kidney flow and reduce the risk of renal damage (Antonn & Chakraborti, 2011).

Nursing Implications Cont.

The need for temporary hemodialysis may be warranted in severe situations. An electrocardiogram demonstrating a prolonged P-R interval, peaked T waves, and widened QRS complex supports the evidence of hyperkalemia (Zimmerman & Shen, 2013).

Conclusion

Rhabdomyolysis can occur from traumatic injuries, abuse of alcohol or drugs, ischemia, medications, and electrolyte imbalances. Life-threatening consequences can occur quickly. Rapid diagnosis and treatment is vital in preventing major complications to organs and tissues. Even though cases are rare 25,000 national cases are reported annually with 7% accounting for acute kidney injury (Elsayed & Reilly, 2010).

The advanced practice nurse must have proficient knowledge of cellular functions and metabolic disorders. Awareness of the disturbance in the normal balance is required in understanding the pathophysiology of rhabdomyolysis. Treatment plans should be based on laboratory results of serum levels, urinalysis, and EKG readings. Continuing education for the healthcare professional is paramount.

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