Acute renal failure due to rhabdomyolysis

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Rhabdomyolysis may be defined as clinical and laboratory syndrome resulting from skeletal muscle injury with release of potentially toxic intra-cellular component into systemic circulation. During the blitz of London, Bywaters described the major clinical sequelae of rhabdomyolysis, including the first causative association with acute renal failure. Rhabdomyolysis has been implicated as the cause of acute renal failure in approximately 5 to 7% of cases. Rhabdomyolysis literally means "striped muscle dissolution". However, a more useful definition is "skeletal muscle injury, reversible or irreversible, that alters the integrity of the cell membrane sufficiently to allow the escape of cell contents into the extracellular fluid".

These cell contents include enzymes such as creatine kinase, glutamic oxaloacetic transaminase, lactate dehydrogenase, aldolase; the heme pigment, myoglobin; electrolytes such as potassium and phosphate; and purines. Creatinine kinase is the most sensitive enzyme marker of muscle injury and is readily determined in most hospital laboratories. The increase plasma concentration of these released substances such as creatine kinase (CK) permits the clinician to diagnose this syndrome. Muscle accounts for approximately 40% of total body mass and falls victim to wide variety of toxic, ischemia, traumatic, infections, inflammatory and metabolic insult. The rhabdomyolysis syndrome has been recognized for centuries. Renal complications of rhabdomyolysis become firmly entrenched in medical literature after the classic description of the "Crush Syndrome" as result of bombing raids of London during World War II.

Mechanism of myohaemoglobinuric renal injury includes renal vasoconstriction and direct heme protein induced cytotoxicity. Laboratory measures for diagnosis of rhabdomyolysis solely on the basis of serum creatine kinase (CK) elevation which is usually greater than 1000 U/L, is approximately five times greater than upper limit of normal level. Elevation of serum myoglobin concentration and/or the presence of myoglobinuria also indicate skeletal or cardiac muscle injury. However, detection of these phenomena is neither a practical nor sensitive way to diagnose rhabdomyolysis for a variety of reasons. Serum levels may fall to normal by the time a patient is hospitalized owing to the rapid clearance of myoglobin from plasma within 1 to 6 hours by both renal excretion and metabolism to bilirubin. In addition, myoglobinuria correlates poorly with myoglobinemia.

Other causes of elevated CK level such as due to myocardial infarction or cerebral infarct or immediate post operative period should be excluded. Renal failure is defined loss of renal function as evidenced by a serum creatinine level greater than 200 mmol/L. Several factors namely previous renal disease, hypertension, diabetes mellitus, drugs or toxic exposure, sepsis, burns, ischemic injury, dehydration and hypotension can lead to acute renal failure independent of rhabdomyolysis. Increased serum potassium, phosphorous and uric acid levels and decreased serum bicarbonate are noted in cases of acute renal failure due to rhabdomyolysis. A total of twenty four cases of acute renal failure due to rhabdomyolysis were studied in Dhaka Medical College in last 3 years in terms of clinical presentation, biochemical parameters including prognosis after treatment. Common presentation was anorexia, nausea & vomiting (91%), followed by oliguria (83%) and generalized body ache (50%) cases. Main causes were physical assault 50%, near-drowning and vigorous exercise 12% each and other causes were road traffic accident.
convulsion (epilepsy), self induced trauma, septicemia, post partum eclampsia. Mean serum CPK was 2341 IU/L; mean blood urea and serum creatinine were 161 mg/dl and 10 mg/dl respectively. Among 24, 6 patients (25%) were treated conservatively and 18 (75%) received dialysis treatment in the form of intermittent peritoneal dialysis or acute hemodialysis. Twenty (83%) patients were cured completely and 2 patients (8.3%) were discharged with risk bond (DORB) and 2 patients (8.3%) expired.10

The incidence of acute renal failure due to rhabdomyolysis in our centre is 6.25% which is consistent with other studies. The important causes of rhabdomyolysis in Western countries like alcohol & drugs, polymyositis are lacking in our study. Two cases of ARF due to rhabdomyolysis were also reported in two different journals and treated successfully.11, 12 It is concluded that acute renal failure due to rhabdomyolysis is a serious condition and prognosis is good if correct treatment is offered including dialysis support in time. Secondly, appropriate attention & measures should be taken to prevent development of this serious condition.

References