

Rhabdomyolysis in Dak-Bum devotees: A case series

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ABSTRACT

Introduction: India is a land of culture and heritage always known for its rituals. The devotees offer their prayers in the form of fasting, sacrifices and many other difficult ways to please Almighty! While doing so they often endanger their lives. Rhabdomyolysis, in a particular group of devotees of Bihar/Jharkhand known as Dak-Bum, is a life-threatening clinical entity which occurs in these devotees who travel a long distance in a short period in a fasting state. Rhabdomyolysis detected by myoglobinuria can lead to acute kidney injury and mortality. **Aim:** To study and identify cases of rhabdomyolysis in devotees (Dak-Bum) and the role of early diagnosis and management. **Materials and Methods:** The study was conducted at Ruban Emergency Hospital Patna from August 2010 to August 2013 over 27 patients - 26 males and 1 female of age group 22–34 years. They presented with major symptoms such as dehydration, tender swollen calf muscles and myoglobinuria. The patients were admitted over a period of 2–3 weeks time in a single year (nine patients in 2010, five patients in 2011 and seven patients in 2012 and six patients in 2013). The study was restricted to the month of August every year, as this ritual occurs in a particular season. Inclusion criteria were all previously healthy devotees. The study period was from admission till discharge with daily follow-up of each patient. **Results:** Rhabdomyolysis developed in 27 Dak-Bum devotees and all had acute renal failure at the time of admission. RIFLE criteria-Stage F (failure) and acute kidney injury network criteria (3rd stage). However, recovery was good due to early intervention in the form of haemodialysis and forced alkaline diuresis by soda bicarbonate infusion. **Conclusion:** Rhabdomyolysis developing in Dak-Bum devotees because of travelling a long distance in a short period, could be managed well due of early diagnosis, timely referral, haemodialysis and forced alkaline diuresis.

Keywords: Haemodialysis, myoglobin, rhabdomyolysis

Introduction

Deoghar, a small town in Jharkhand is about 365 km from state capital Ranchi. Dak-Bum devotees are a special category of devotees who travel a long distance in a short period. Dak word derived its origin from the past when letters were distributed on foot and postman walked very fast. Bum is a local word used for devotees. They visit this place in the month of Shravan (July–August) to offer holy water they carry from Sultanganj another small town in Bihar. These devotees cover a distance of 105 km on foot, in the fasting state in 24 h! Their blind faith believes that-tough the path or type of worship, more will be the blessings! Hence, some of them endanger their life developing

acute kidney injury (AKI) due to rhabdomyolysis because of skeletal muscle injury caused by brisk walking (non-traumatic rhabdomyolysis) in fasting state. Lack of education, use of non-steroidal anti-inflammatory drugs (NSAIDs), delay in diagnosis and management can cause increased mortality in these devotees.

Rhabdomyolysis is caused by injury to skeletal muscle and involves leakage of large quantities of potentially nephrotoxic intracellular contents (mainly myoglobin) into systemic circulation. It is a type of heme pigment nephropathy.^[1]

Rhabdomyolysis was first described reported in 1881, in German literature. It was described by Bywaters and Beal in the victims of crush injury during the 1940–1941 London, England, bombing raids of World War II.

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Classification

Rhabdomyolysis can be broadly classified into traumatic and nontraumatic types. Important examples of traumatic rhabdomyolysis are crush injury due to a bomb blast, road traffic accidents and other disasters like earthquakes and prolonged immobilization. Examples of nontraumatic rhabdomyolysis are severe exertion, heat stroke, calisthenic exercises, untrained marathon runners, prolonged convulsion, drug – ecstasy abuse, alcohol, statins, burns, and electric shock.^[2]

Pathogenesis of heme pigment nephropathy

Any type of rhabdomyolysis leads to the release of myoglobin which is freely filtered at the glomerulus.^[3] Heme center of myoglobin induces lipid peroxidation and renal injury. This myoglobin gets deposited as ferric myoglobin in the kidney. Further ferric myoglobin oxidises to ferril myoglobin. The precipitation of myoglobin with Tamm–Horsfall protein results in obstructing casts in distal nephrons hence resulting AKI.^[4] It is the intrinsic type of AKI. Other major complications endangering lives of devotees are hypovolemia, metabolic acidosis, compartment syndrome, arrhythmias and cardiac arrest due to hyperkalemia, disseminated intravascular coagulation, and hepatic dysfunction [Figure 1].

Materials and Methods

A prospective case study was conducted at Ruban Emergency Hospital (REH), S. P. Verma Road, Patna from August 2010 to August 2013, over 27 patients (9 patients in 2010, 5 patients in 2011 and 7 patients in 2012 and 6 patients in 2013). REH is a tertiary level care centre with developed recourses. Twenty-six males and one female of age group 22–34 years were included in this study. The devotees presented with symptoms such as dehydration, oliguria, tender calf muscles and lab reports showed increased serum creatinine and myoglobinuria. The patients were admitted over a period of 2–3 weeks time in a single year. The study was restricted to the month of August every year, as this ritual occurs in the month of Shravan only (end of July and beginning of August). All devotees were previously healthy. The

overall incidence of AKI due to rhabdomyolysis at REH was 9.71%, i.e., out of total 278 cases of AKI admitted over these 3 years due to various causes, 27 were due to rhabdomyolysis. Patients were closely monitored every day in Intensive Care Unit (ICU) and wards from their admission until discharge of about 2–3 weeks time every year [Figure 2].

Results

Observations

All 27 patients had acute renal failure (ARF) at the time of admission as evident from clinical features like dehydration, oliguria, tender swollen calf muscles, and lab reports which showed increased serum creatinine and myoglobinuria (RIFLE criteria-Stage F (Failure) and acute kidney injury network criteria (3rd stage). The serum creatinine was raised to almost 3 times the baseline, i.e., serum creatinine was more than 4 mg/dl at the time of admission in almost all patients.^[5]

Major manifestations at the time of admission were – dehydration found in 27 devotees, oliguria seen in 23, tender calf muscle seen in 18, myoglobinuria seen in 17 and altered sensorium was seen in 14 devotees. Some also had fever, vomiting and pain abdomen.

Patient never had isolated symptoms but cluster of symptoms like dehydration in almost all patients along with other symptoms. Some patient showed more than one symptom in major form.

Important investigations which proved ARF were – raised serum (sr) creatinine, blood urea, serum creatine kinase, hyperkalemia and myoglobinuria. Arterial blood gas analysis showed metabolic acidosis. Kidney biopsy was done in 2 patients after 2 weeks to rule out acute cortical necrosis (ACN).

Mostly patients were managed in ICU as they had chances of developing cardiac arrhythmias and cardiac arrest due to hyperkalemia. Hemodialysis was done at the earliest for better outcome [Figure 3].

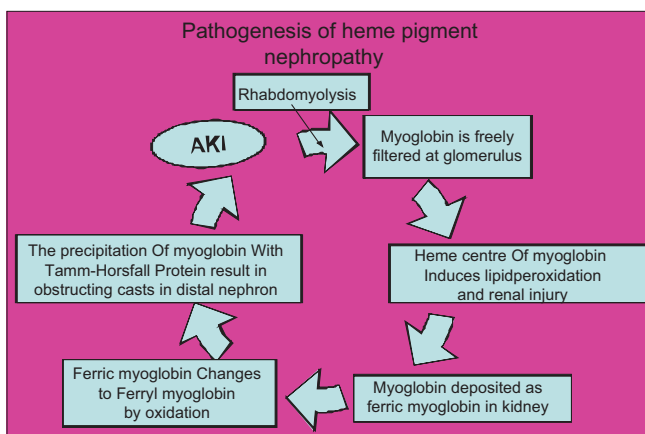


Figure 1: Pathogenesis of heme pigment nephropathy, how rhabdomyolysis due to any cause leads to acute kidney injury

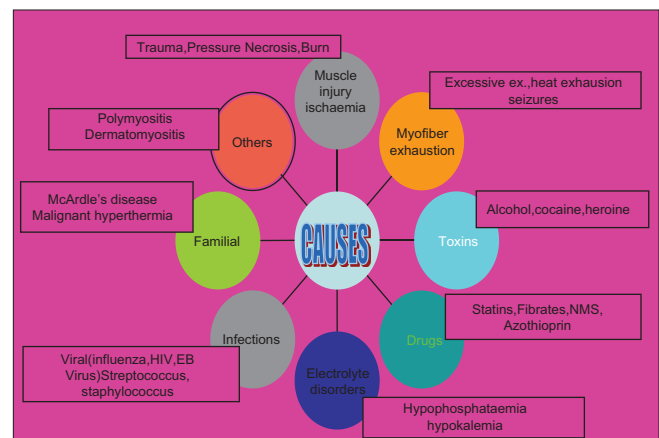


Figure 2: Various causes of rhabdomyolysis, both traumatic and nontraumatic, common causes and rare causes



Figure 3: (a) Images of major symptoms like tender swollen calf muscles. (b) Myoglobinuria

Management

Raised serum creatinine and serum potassium needed urgent hemodialysis in 21 patients. Alkaline diuresis was done by soda bicarb infusion in most of the patients. Dehydration was corrected by IV fluids and strict input/output charting was done.

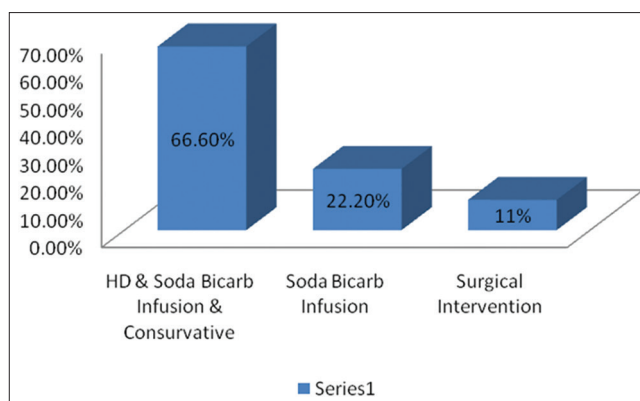
Other major medical management included use of diuretics mainly loop diuretics, analgesics (avoiding NSAIDs), and use of appropriate renal safe antibiotics in concerned patients. Surgical intervention in form of fasciotomies or debridement of necrotic tissue was done in 3 patients [Graph 1].

Outcome

Because of timely referral, early diagnosis and aggressive management in form of hemodialysis and soda bicarb infusion there were no serious outcomes and none progressed to ACN or chronic kidney disease proved by kidney biopsy in 2 patients who took longer time to recover. Three patients developed compartment syndrome and needed surgical intervention. Twenty-one patients were discharged in about 10 days time but 6 patients had longer stay of about 18 days. There were no fixed number of hemodialysis but it was done till serum creatinine ceased to rise, urine output improved and overall general condition of patients improved.

Discussion

Rhabdomyolysis develop in a particular group of devotees from Bihar/Jharkhand known as Dak-Bum. It is nontraumatic type of rhabdomyolysis and devotees can be considered as untrained marathon runners. It is caused by injury to skeletal muscles and involves leakage of large quantities of potentially nephrotoxic intracellular contents mainly myoglobin into systemic circulation. The precipitation of myoglobin with Tamm–Horsfall protein results in obstructing casts in distal nephrons hence resulting in AKI. It is intrinsic type of AKI due to heme pigment nephropathy. The renal injury is due to combination of factors like volume depletion, renal vasoconstriction, direct heme protein mediated cytotoxicity, disseminated intravascular coagulation and intraluminal cast formation. Volume depletion is often prominent due to fasting state of devotees and sequestration of large volumes of fluid in injured muscles. Volume depletion activates the rennin angiotensin system resulting in renal vasoconstriction. Myoglobin is freely filtered at the glomerulus and is toxic to



Graph 1: The percentage of different but major mode of managements including both medical and surgical interventions

tubular epithelial cells. The heme centre of myoglobin may directly induce lipid peroxidation and renal injury, and liberated free iron catalyses the formation of hydroxyl radical through the Fenton reaction inducing free radical mediated injury. Finally, the precipitation of myoglobin with Tamm–Horsfall protein and sloughed proximal tubular cells may result in obstructing cast in the distal nephrons leading to AKI. The binding of myoglobin increases in acidic urine.

The various aspects like social, religious and cultural has one thing in common that these devotees are from poor socioeconomic status and form a large local group during a particular month every year. So regarding public health, they carry significant importance and need special attention from health sector to protect them.

The devotees are group of healthy people. Due to lack of knowledge and false social belief, land into a dangerous domain and in absence of early diagnosis and management may have irreversible kidney injury or even death. The main mode of management are fluid replacement, soda bicarb infusion and hemodialysis. Soda bicarb infusion dissolves the cast deposited in renal tubules and hemodialysis restores normal kidney function and also protects from life threatening refractory hyperkalemia.

Role of family physician

Being the first contact physician, their responsibility is maximum to identify condition at earliest and go for early referral. Any devotee developing clinical sign and symptoms of ARF should be managed in an aggressive manner. Detail history, proper general examination are essential. Furthermore family physicians should discourage use of NSAID in spite of severe body aches or there will be more renal damage. Opiates may be used or paracetamol should be used for analgesia. Family members should be explained the life-threatening situation and should be encouraged to take patient earliest to a tertiary centre with proper haemodialysis set up.

Significance of data for family medicine - Rhabdomyolysis in devotees is limited to a particular state of India. During July/August thousands of devotees accumulate hence causing

significant load on health care system. Moreover this practise is slowly increasing in other states also.

The data though small carry significant importance for local family physicians. Many cases go un reported or the patients fail to reach the proper health setups. Family medicine dealing at grass root level becomes prime speciality to tackle this kind of dangerous clinical entity. We lack proper data recording systems hence the overall incidence of these cases are difficult to find out.

The role of family physician is tough as dealing with spiritual platform and religious belief. But, they play most important key role as they are from the local setups and can counsel patients better. Together with nephrologist they constitute a strong team for better outcome of these patients.

Conclusion

A group of devotees from Bihar and Jharkhand known as Dak-Bum (untrained marathon runners) endanger their life by travelling long distance in a short period of time and hence are at a risk of developing rhabdomyolysis (nontraumatic) which may lead to AKI. Due to early diagnosis, referral on time and aggressive management in form of hemodialysis, there is better outcome. Lack of health education and false belief lead them to medical emergencies. Family physicians play a key role in this situation by early diagnosis and referral to a tertiary centre with developed Nephrology Department. They should have skills

to diagnose rhabdomyolysis at the earliest stage so as to save devotees and together with nephrologist they constitute a strong team. As part of awareness campaign, all general physicians of local locality should be trained and regular seminars should be organised.

The whole observation needs many more strong platforms to handle and protect these devotees properly.

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Conflicts of interest

There are no conflicts of interest.

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