

From Sedentary Lifestyle to Exertional Rhabdomyolysis: A Case Report

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Abstract It is imperative that internists and hospitalists who are the frontier of care seen by the patient are aware of the red flags associated with Rhabdomyolysis. This case report discusses the clinical evaluation of Exertional Rhabdomyolysis (ER) highlighting the utility of various laboratory tests and clinical hospital course. We here in discusses the clinical evaluation of a 44-year-old male with a sedentary lifestyle who presented with an episode of acute soreness of the proximal muscles, and a near faint in the field in the heat summer month during a basketball game. He reported a prior weightlifting and aerobic running exercise 48 hours before the event. ER was complicated with an acute kidney injury (AKI). The patient's symptoms improved during hospital admission and labs including creatinine kinase and liver enzymes and kidney function gradually was restored close to reference ranges.

Keywords: *exercise-induced rhabdomyolysis*

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1. Introduction

Rhabdomyolysis can be precipitated by common etiologies that share similar pathophysiology and it is not uncommon that it can occur without an identified triggering event. These common etiologies include immobilizations, trauma, sepsis, hyperthermia, recent surgical intervention, toxins, infections, and exercise [1]. Exertional rhabdomyolysis (ER) has been reported in athletes and individuals with a poor baseline conditioning after a period of intense training coupled with sudden increase of training routine coupled with predisposing environmental factors such as high temperature, and individual factors such as being on supplements, or illicit drug use and dehydration [1]. Clinically, ER is suspected in patients presenting with muscle soreness (myalgias) or muscle weakness (typically in proximal muscles) with or without reported dark cola coloration of the urine that occurs within short period of strenuous exercise routine (usually but not limited to 48–72-hour period). Additionally, electrolyte disturbances, acute kidney failure, elevation of muscle enzymes and heme positive urine analysis but minimal or absent red blood cells [2]. It is also warranted to clinically suspect such symptoms early during presentations in the context of intoxicated patient

on illicit drugs. Prompt recognition and diagnosis of rhabdomyolysis and its complications is crucial to initiate management. We herein, report a case of young male who lived a sedentary life and had just initiated an intense exercise program and developed ER. Our case highlights the importance of raising awareness for early diagnosis of ER among internists and hospitalists. The patient was informed that data concerning the case would be submitted for publication, and he provided an informed consent.

2. Case Report

A 44-years-old Latin American male with a past medical history of anxiety and inguinal hernia repair presented to our hospital with one day history of bilateral shoulder muscle soreness and a near faint and an iced tea colored urine after strenuous exercise. The patient reports a sedentary lifestyle, and that he joined a routine exercise approximately 48-72 hours prior to the presentation. Muscle soreness was first localized in the shoulders and thighs bilaterally then he noticed slight swelling and redness in the same areas. The patient denied chest pain, palpitation, fever, night sweats, shortness of breath, orthopnea, paroxysmal nocturnal, dyspnea or any gastroenterology or urinary symptoms. His family history

was unremarkable. On a physical exam, the patient had a BM of 32.1 Kg/m², alert and oriented to time, person and place, vital signs were unremarkable (blood pressure 100/74mmHg, heart rate 100 beats per minute, 98.0 F temperature, respiratory rate 22 /min and the patient was saturating 99% on room air). The patient had distant heart sounds (due to body habitus) but regular S1 and S2, right sided S 3, no murmurs, rubs, or gallops. The patient had an equal breathing sound bilateral, without any wheezes or rhonchi. Abdominal examination was unremarkable with no evidence of organomegaly. Extremities examination revealed bilateral tenderness and mild erythematous skin changes, intact sensations, pulses felt peripherally and no muscle weakness. The patient was not on any medications at home. Chest Xray showed a normal cardiac silhouette with no focal pulmonary consolidation or pleural effusion. Electrocardiogram (EKG) demonstrated normal sinus rhythm (Figure 1). Given the near fainting reported by the patient, an echocardiogram was performed and revealed a left ventricular (LV) ejection fraction of 55%, mild concentric left ventricular (LV) hypertrophy, and otherwise normal right ventricular function and no valvular abnormalities. Ultrasound extremities bilateral showed no evidence of acute deep venous thrombosis in the visualized bilateral upper or lower extremity veins. Computerized tomography of the brain without contrast agent showed no evidence of acute intracranial hemorrhage, midline shift, or mass effect. Given the history, the development of Exertional rhabdomyolysis was suspected and confirmed with the laboratory workup as following: Total serum creatine phosphokinase (CK) was 36335U/L (reference range 30 – 35 U/ L), serum LDH level was 1000 U/L (reference

range 120 – 246 U/L), elevation of the serum ALT 56 U/l (reference range 0 – 35 U/L) and AST levels 246 U/L (reference range 15- 46 U/L) despite normal bilirubin levels. COVID 19 test was negative. Urine Drug toxicology screen was positive for opiates, despite not disclosing this on the social history. Serum potassium, sodium, calcium, magnesium, and phosphorus were all within normal limit. Evidence of acute kidney injury was noted with serum creatinine of 3.01 mg/dl (reference range 0.6-1.25mg/dL), BUN 38 (reference range 9-20 mg/dL) and GFR of 23 ml/min/1.73². Aldolase was expectedly elevated 73.2 (reference range 1.0 to 7.5 units per liter (U/L). TSH was normal 2.27 uIU/mL (reference range 0.46-4.6 uIU/mL). Urine Analysis showed evidence of urinary myoglobin excretion. The confirmed diagnosis of exertional Rhabdomyolysis (ER) was reached, and the patient was admitted for further management and monitoring. Intravenous hydration with normal sodium chloride was initiated immediately and maintained (total given 4000-7000 ml) along with 1300mg sodium bicarbonate in aim to decrease the nephrotoxicity of myoglobin by forced alkaline diuresis. The patient's symptoms improved during hospital admission and labs gradually was restored close to reference ranges. Lab levels of CK trended downward as follows: 36335 > 19751 > 10900 > 1600, as well as ALT trended downward 188 > 143 > 132 > 127 and AST trended downward 417 > 346 > 250 > 151. Selected laboratory workups improved over hospital admission intervals are summarized in Figure 2. With the resolution of symptoms and improvement of the patient's condition, the patient was offered educational and counseling about appropriate lifestyle planning and exercise training.



Figure 1. Electrocardiography in a patient with Exertional Rhabdomyolysis. Rhythm is Sinus Tachycardia

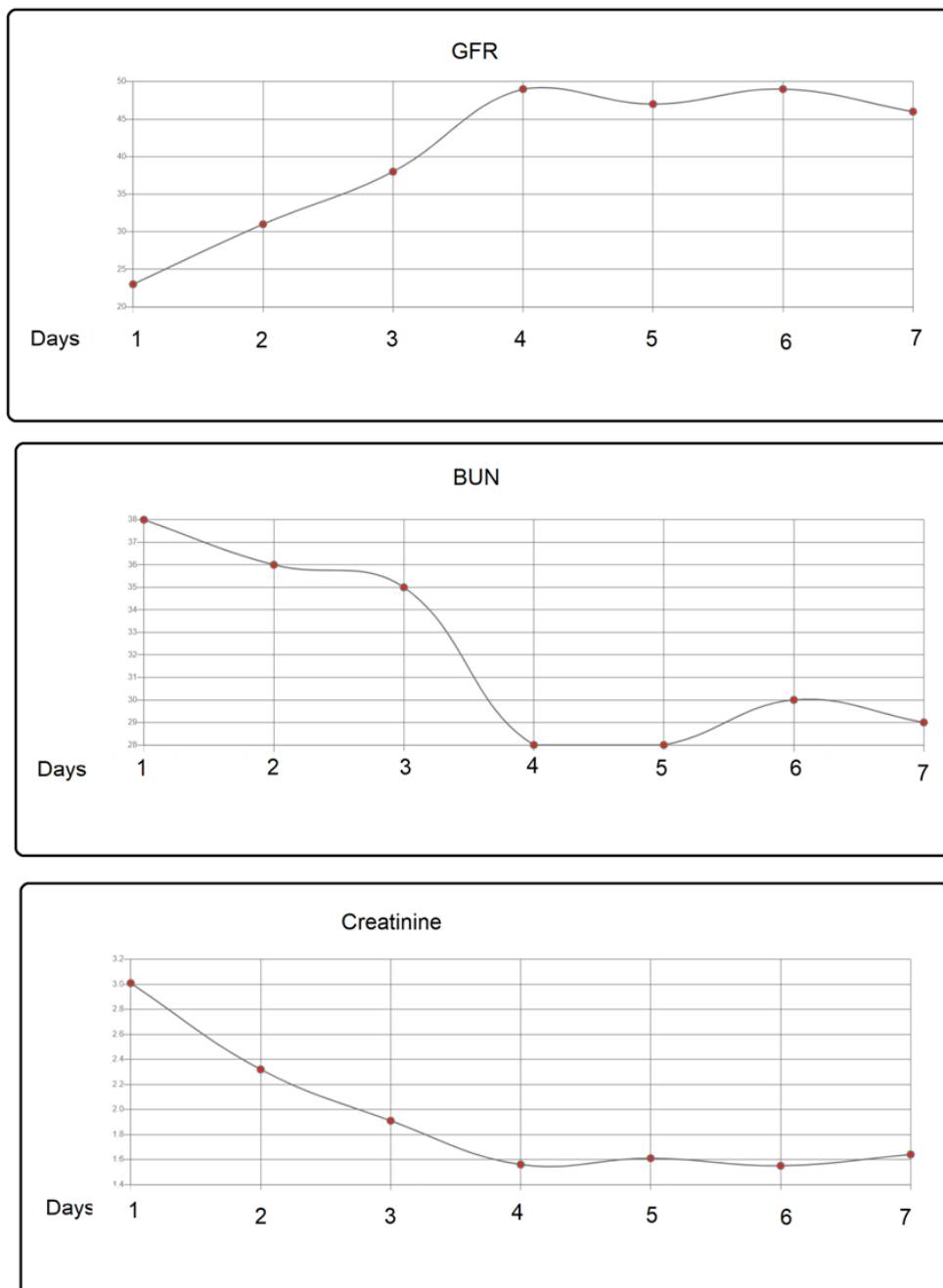


Figure 2. Kidney function test in a patient with exertional rhabdomyolysis showing improvements of creatinine, blood urea nitrogen and glomerular filtration rate (GFR) across days of hospital admission

3. Discussion

We here in present a case of exertional Rhabdomyolysis (ER) in a young male who lived a sedentary life and was engaged in a short-term strenuous exercise under summer heat conditions and was under the influence of drug use (opioids), which fits the risk factor profile for ER. Risk factors for ER include young age, males, sedentary lifestyle, heat exposure along with strenuous exercise [1]. It is more common in athletes and military personnel undergoing strenuous exercises. However, it can occur in any individual exposed to strenuous unaccustomed exercises. Repeated occurrence of ER should raise the flag of an underlying muscular genetic disorders [3]. One of the major complications of ER, is acute kidney injury (AKI) resulting from the nephrotoxic effect of myoglobin

released from muscle breakdown which causes renal vasoconstrictions and tubular obstruction [4]. Hence, awareness among internists and hospitalists is crucial to be familiar with early recognition and management strategies. Our patient was a typical case presenting with proximal muscle soreness (especially shoulders and thigh) post unaccustomed exercise and meeting the diagnostic criteria of elevated CK more than 5 times upper limit of normal and a positive urine for blood (myoglobin) but lacking red blood cells under microscopic analysis. In this case report, the patient was also exposed to an additional risk factor of using opiates. The mainstay treatment for ER is cessation of physical activity, rest, and aggressive fluid hydration and, in some cases, forced alkalization of the urine could be utilized [5]. Hospitalization time varies depending on the severity of the condition and acute

kidney injury. Risk stratifying is essential to be able to prevent recurrence of future attacks post exercise. Hence patient counseling and education should be emphasized specifically about the gradual preconditioning with hydration prior to exercise routine is recommended. In conclusion, we have demonstrated in this case the occurrence of a complicated exertional rhabdomyolysis with acute kidney injury in a non-athlete patient that had the predisposing risk factors.

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