

Spontaneous Bilateral Rectus Abdominis Rhabdomyolysis in a 24-Year Old Male Following Intense Physical Activity in a Sub-Urban Nigerian Town: A Case Report

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Abstract

Introduction: Exercise induced Rhabdomyolysis is a syndrome characterised by disintegration of the skeletal muscles and release of toxic intracellular contents into the plasma. It can be precipitated by strenuous exercise and its diagnosis can easily be missed by physicians. Soft tissue ultrasonography is an invaluable tool for evaluating patients with rhabdomyolysis especially in sub Saharan Africa where sophisticated imaging modalities like magnetic resonance imaging (MRI) and computed tomographic scanners are not readily available. Ultrasonography in this case is the commonly available modality. It is cheap and easier to use. It can aid in the diagnosis of suspected cases, help to determine extent of the disease, identify associated complications and also for monitoring disease progression. Spontaneous rhabdomyolysis following exercise has not been previously reported in our environment. **Objectives:** To report a case of exercise induced rhabdomyolysis in a 24 year old male patient. To highlight the importance of ultrasound in evaluating patients with rhabdomyolysis, describe the notable ultrasound findings and review relevant existing literature on this condition. **Case Report:** A 24 year old male with spontaneous rhabdomyolysis of the infra-umbilical segment of both recti abdominis muscles, who presented to a private ultrasound facility in Agbor, Delta state, Nigeria. His symptoms were; lower abdominal pain made worse with movements, and passage of dark red urine which developed spontaneously following a week history of intense physical exercise at a gymnasium. An ultrasound scanner of the Toshiba Medical systems Corp Model 2016 (Xario 100) with a 7 to 12 MHz linear array transducer was used to scan both recti abdominis muscles in different planes. Abnormal findings were noted involving the infra umbilical segment of both abdominal recti muscle belly. Notable findings were thickening of the muscle fascia, blurring of the fat planes, fat stranding, disorganization of the normal architectural pattern of the fibres as well as presence of hypoechoic lesions within the affected muscle segment. The images were frozen and the sonograms were acquired and saved. **Conclusion:** Ultrasonography is an indispensable tool for evaluating patients with exercise induced spontaneous rhabdomyolysis. This case study is of immense significance in developing affordable methods of image based diagnosis and investigation of rhabdomyolysis that also aids in standard clinical, laboratory and histopathological studies of the condition.

Keywords: Rhabdomyolysis, ultrasonography, Agbor, exercise-induced, rectus abdominis, echogenicity.

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INTRODUCTION

Rhabdomyolysis is a clinical condition which results from injury to the skeletal muscles causing the release of structural components of the muscles into the blood plasma¹. Precipitation of some of these toxic structural components like myoglobin in the glomerular capillaries results in direct acute kidney injury and renal tubular obstruction [1-3]. Hence, it may be associated with derangement of electrolytes and urea level.

Elevated serum creatinine kinase levels, hyperuricemia, hypoalbuminemia are notable findings in such patients [3].

There are inherited and acquired causes of rhabdomyolysis [3]. Common acquired causes includes exposure to toxic agents, electrolyte abnormalities, endocrine disturbances and autoimmune myopathies, while inherited causes includes; disorders of glycogen metabolism, fatty acid oxidation, mitochondrial

oxidative phosphorylation, chanellopathies and sickle cell disease [4, 5].

Although history, clinical examination, laboratory studies and muscle biopsy are relevant tools for evaluating suspected cases of rhabdomyolysis, imaging with ultrasonography may help with specific findings which may aid diagnosis.

CASE REPORT

A 24 year old male presented to the ultrasound facility with a 3-day history of persistent lower abdominal pain made worse with mobility. Pain was localized below the level of the umbilicus at the region of the rectus abdominis muscle bilaterally with associated mild swelling of the overlying subcutaneous tissues in the aforementioned region. The pain got progressively worse with passing of time. History of almost simultaneous passage of dark red urine was also elicited.

There was no history of direct trauma to the abdominal wall. No history of use of drugs like rifampicin and cyclophosphamide preceding the onset of symptoms. There was no history of headache, confusion, loss of consciousness or fever. No obvious skin ulcers or defects were observed.

The patient admitted he had been engaging himself in a daily strenuous physical activity preceding onset of his symptoms. His vital signs at presentation were essentially normal. However, general examination revealed an adult male with painful distress which was marked on palpation of the lower abdomen. Sonographic assessment was performed using a Toshiba

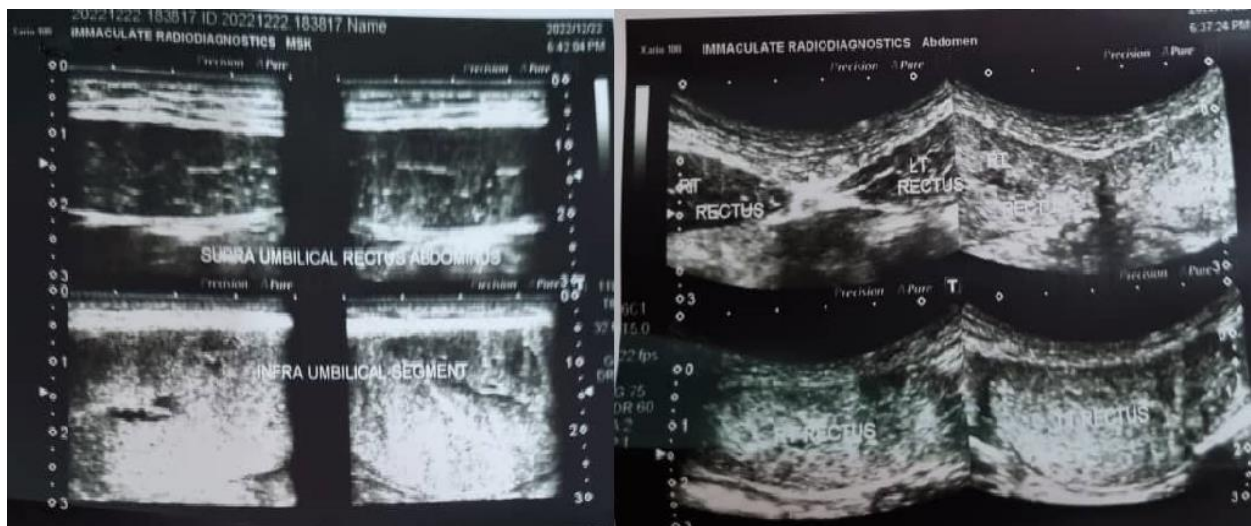
Ultrasound scanner (Xario 100) 2016 model with both low frequency curved array transducer and high frequency linear array transducers.

The intra-abdominal visceral and overlying anterior abdominal wall soft tissues were scanned in various planes. Sonography revealed slightly increased renal parenchymal echogenicity bilaterally with preserved cortico-medullary distinction, renal outline and sizes. The other intraabdominal visceral showed normal sonographic appearances, and there was no free intraperitoneal fluid collection.

Sonographic evaluation of the supra and infra umbilical region of the anterior abdominal wall shows comparative enlargement of the infra umbilical segment of the recti muscles with a heterogenous echotexture and loss of the normal striae. There was thickening of the muscle fascia, presence of fat stranding and disorganization of the normal architectural pattern of the muscle fibres. Patchy areas of hypo echogenicity were also noted within the muscle belly of the rectus abdominis in the aforementioned segments bilaterally. Minimal fluid was also noted between the muscle fibres and fascia.

A sonographic impression of rhabdomyolysis of the infra-umbilical segment of both abdominal recti muscles, with associated sonogram features of an evolving bilateral acute renal parenchymal disease was made.

Notably, serum creatinine kinase (CK) level was elevated with microglobinuria. Sonographic images acquired are shown in Figs A and B below.



A. Longitudinal sonogram of both abdominal recti muscles, B. Transverse sonogram of both abdominal recti muscles

Figures A and B are longitudinal and transverse sonograms of the supra and infra umbilical segments of both rectus abdominis muscle respectively. The infra umbilical segment shows increased muscle bulk, with heterogenous echogenicity of the muscles

and scattered areas of hypoechoogenicity within suggestive of areas of necrosis. Thickening of the intervening musculo-fascial planes was also noted.

Muscle biopsy for histologic correlation was recommended, and the patient was referred back to the managing physician for urgent appropriate medical care.

DISCUSSION

Rhabdomyolysis is a syndrome characterised by disintegration of skeletal muscles [1]. Clinically documented classical features of rhabdomyolysis includes; myalgia, muscle weakness and muscle swelling [1, 6]. Chen *et al.*, [7] noted muscle pain as the most commonly experienced symptom in suspected patients with rhabdomyolysis. Evidence of superficial abdominal pain in this patient whose case is being reported, further validates this earlier reported finding by Chen *et al.*, [7].

A condition called “benign exertional rhabdomyolysis” has been described elsewhere in healthy persons who developed muscle pain, elevated serum creatinine kinase levels and myoglobinuria following intense exercise [8]. These constellations of symptoms are similar to the symptoms and findings in this patient whose case is being reported.

Lin *et al.*, [9], have also previously reported the development of exercise induced rhabdomyolysis amongst 119 high school students in Taiwan who were engaged in vigorous exercises in cold weather, with most of the students developing muscle pain and dark urine within 2 to 4 days of exercising. This is quite similar to the time frame for symptom onset after strenuous exercising in this reported case which is about a week.

The development of rhabdomyolysis is thought to occur under extreme hot or humid conditions and thus may be related to exertional heat stress or heat stroke [10, 11]. Similarly, the timing of occurrence of symptoms in this reported case happening in the month of December when the weather is quite dry and hot (harmattan weather) also supports this assertion.

Exposure to cold has also been implicated as an environmental cause of rhabdomyolysis [12]. Documented risk factors for exertional rhabdomyolysis and renal failure includes; dehydration, drug use, sickle cell disease and malignant hyperthermia.

Melli *et al.*, [13] had previously conducted a study in a large adult population cohort, where they observed that majority of cases of patients with rhabdomyolysis had multiple etiologic factors. However, in this reported case, only two etiologic risk factors have been identified; strenuous exercise and the dry harmattan weather.

Historically, various ultrasound appearances have been described in patients with rhabdomyolysis [14-18]. Some of these studies have described multiple

hyperechoic areas within affected muscles with disorganized fascicular architectural pattern in patients who abuse drugs like heroin and alcohol [15, 16]. Muscle fibre hyper contractility in the acute phase of an injury is thought to be responsible for the hyperechoic intramuscular appearances [17].

Chiu *et al.*, [18] and Raul Carillo *et al.*, [14] respectively reported separately the ultrasound findings in a child who developed rhabdomyolysis of the abductor muscles of the thigh after running, and a 30 year old post traumatic female patient with rhabdomyolysis of both thigh muscles. Both authors reported findings of reduced muscle echogenicity, increased muscle thickness and disorganization of the muscle fibres with associated soft tissue edema and preserved tissue vascularity.

A more recent study by Jerome Boyle *et al.*, [19] described the findings of hyperechoic muscle and a hypoechoic halo of edema in two confirmed cases of rhabdomyolysis after exercise.

In this reported case, the ultrasound findings are probe tenderness, swelling of the infra umbilical segment of the rectus abdominal muscle with heterogenous parenchymal echogenicity, distortion in the normal orientation and outline of the rectus abdominis muscle fibres, thickening of the muscle fascia, presence of fat stranding, presence of patchy areas of hypo echogenicity within the muscle belly of the rectus abdominis in the infra umbilical aspects of the anterior abdominal wall bilaterally. Minimal fluid was also noted within muscle fascicles. These findings are similar to the findings earlier reported by Chiu *et al.*, [18] and Raul Carillo *et al.*, [14].

CONCLUSION

This case report shows that ultrasound is an indispensable tool for assessing a patient with suspected rhabdomyolysis. It can aid in accurate diagnosis, assessment of extent of muscle disintegration, monitoring of treatment response and disease progression. It is also a supportive tool for clinical evaluation, laboratory and muscle biopsy studies particularly in suspected cases of spontaneous exercise induced Rhabdomyolysis.

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