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CLINICAL CASE

Ultrasound findings in rhabdomyolysis☆

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KEYWORDS
Rabdomyolysis;
Ultrasound;
Diagnosis

Abstract
Background: Rhabdomyolysis is defined as skeletal muscle necrosis. Ultrasound assessment has recently become a useful tool for the diagnosis and monitoring of muscle diseases, including rhabdomyolysis. A case is presented on the ultrasound findings in a patient with rhabdomyolysis.
Objective: To highlight the importance of ultrasound as an essential part in the diagnosis in rhabdomyolysis, to describe the ultrasound findings, and review the literature.
Clinical case: A 30 year-old with post-traumatic rhabdomyolysis of both thighs. Ultrasound was performed using a Philips Sparq model with a high-frequency linear transducer (5–10 MHz), in low-dimensional scanning mode (2D), in longitudinal and transverse sections at the level of both thighs. The images obtained showed disorganisation of the orientation of the muscle fibres, ground glass image, thickening of the muscular fascia, and the presence of anechoic areas.
Conclusions: Ultrasound is a useful tool in the evaluation of rhabdomyolysis.

PALABRAS CLAVE
Rabdomiólisis;
Ultrasonido;
Diagnóstico

Manifestaciones ultrasonográficas en rabdomiólisis

Resumen
Antecedentes: La rabdomiólisis se define como la necrosis del músculo esquelético. Recientemente la evaluación ultrasonográfica se ha posicionado como una herramienta de gran utilidad para el diagnóstico y seguimiento de enfermedades musculares, entre ellas la rabdomiólisis. Se presenta el caso de un paciente en el que se realizó evaluación ultrasonográfica de rabdomiólisis.

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Objetivo: Resaltar la importancia de la ultrasonografía como parte fundamental en el diagnóstico en rabdomiólisis, describir los hallazgos ultrasonográficos y revisar la literatura disponible.
Caso clínico: Paciente de 30 años con rabdomiólisis por inmovilización prolongada de ambos muslos. Se le practicó insonación con ultrasonido modelo (Philips Sparq), empleando un transductor lineal de alta frecuencia (5-10 MHz), bajo modo de escaneo bidimensional (2D), en cortes longitudinales y transversales al nivel de ambos muslos. Las imágenes obtenidas fueron: desorganización de la orientación de las fibras musculares, imagen de vidrio despulido, engrosamiento de la fascia muscular y la presencia de zonas anecoicas.
Conclusiones: La ultrasonografía es una herramienta útil en la evaluación de la rabdomiólisis.

Background

Rhabdomyolysis is secondary to necrosis of the skeletal muscle, and the resulting release of its structural components into the circulation. These include electrolytes, myoglobin and sarcolemma proteins (creatine kynase, aldolase, lactate dehydrogenase, alanine amino transferase and aspartate aminotransferase). Simultaneously there is major depletion of ATP created by dysfunction of the ionic interchange pumps, which leads to a persistent increase in calcium levels at sarcoplasmic level, continuous contraction of the muscle fibres, activation of protease and phospholipases, destruction of myofibrillar proteins of the cytoskeleton disintegrating the myocyte[1–3] (Fig. 1).

Massive muscle necrosis manifests clinically as myalgia, muscle weakness and pigmentation of urine with no haematuria. Acute renal injury is the most serious potential complication of rhabdomyolysis, and is considered a marker of poor prognosis.[4]

Rhabdomyolysis is a complex entity, for which an appropriate initial approach is essential, as is follow-up monitoring of its progression in order to make correct and timely treatment decisions and avoid the serious associated complications. Early diagnosis requires high clinical suspicion and the relevant laboratory tests. Magnetic resonance is the best imaging method for diagnosing rhabdomyolysis, due to its high sensitivity and specificity in assessing the muscle. Its disadvantage is the cost, the inherent risks in transferring critically ill patients to the imaging room and time usage.[5] Ultrasound has been widely used in assessing musculoskeletal disease because it is easily accessible, it is a non-invasive procedure, it can be performed at the patient's bedside, has a low learning curve and it does not use ionising radiation. Diagnosis is facilitated because the ultrasound findings, such as muscle disorganisation, are correlated with clinical symptoms and muscle insonation is used to evaluate the day-to-day progress of the rhabdomyolysis patient for purposes of comparison. Brockmann assessed the usefulness of muscle ultrasound, and reported its sensitivity to be above 81% and specificity 96% in the detection of abnormal changes in muscle tissue. It is also useful in detecting neurogenic changes, with sensitivity above 77%, and even greater specificity (98%), with lower precision in detecting myopathic changes (79%) and clearly lower precision for non-specific changes in tissue (70%).[6] However, we know of no studies that assess the use of ultrasound as a diagnostic tool in rhabdomyolysis.

The objective of this study is to describe the advantages of ultrasound and its principle findings in the diagnosis and evaluation of rhabdomyolysis.[7–9]

Clinical case

We present the case of a 30-year-old male patient, with no chronic degenerative diseases relevant to his current disease. The disorder started during an abseiling activity, when he was left hanging and only attached at the waist by one harness for approximately 6 h, in an arched position, and his lower limbs were immobilised. After rescue, he presented pain in his spine, with induration and loss of sensitivity in the pelvic limbs and pigmented urine. He was transferred to the *Fundación Clínica Médica Sur* for integral care. The laboratory results were: CPK > 41,000 U/l, CK-MB 21.6 U/l, myoglobin 44,171 ng/ml, ALT 295 U/I, AST 812 U/I, FA 35 UI/l, GGT 41 UI/l, DHL 3866 IU/l, BUN 104 mg/dl, Cr 9.07 mg/dl, uric acid 10.8 mg/dl, Na 138 mmol/l, K5.53 mmol/l, Cl100 mmol/l, corrected Ca 6.8 mg/dl, phosphorus 10.1 mg/dl, Mg 2.56 mg/dl, albumin 1.8 mg/dl.

A presumptive diagnosis was made of rhabdomyolysis and compartment syndrome of the pelvic limbs, due to the presence of induration of the limbs with loss of sensitivity, with levels up to 5 times higher than the reference CPK level, and with pigmented urine and acute renal function disturbance. The patient underwent dermofasciectomy of both thighs and was admitted to the intensive care unit.

Ultrasound insonation was performed with a Philips Sparq model with a high-frequency linear transducer (5–10 MHz), in low-dimensional scanning mode (2D), in longitudinal and transverse sections at the level of both thighs. The images obtained were as follows: ground glass-like or cloudy image (reduced echogenicity), thickening of muscular fascia (Fig. 2A), hyperechoic intramuscular areas in both rectus femoris muscles (Fig. 2B), irregular anechoic areas in the