Rectus femoris muscle hernia after sport blunt trauma: dynamic ultrasound findings

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Section: Paediatric radiology
Area of Interest: Musculoskeletal soft tissue
Procedure: Diagnostic procedure
Imaging Technique: Ultrasound
Imaging Technique: Ultrasound-Power Doppler
Special Focus: Trauma Case Type: Clinical Cases
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Patient: 11 years, male

Clinical History:

The young male patient, an amateur football player, presented to the emergency department after a football injury, when he was hit in the thigh. Clinical examination revealed a painful palpable lump in the anterior surface of the thigh. The mass was more prominent during hip and knee flexion.

Imaging Findings:

The patient was referred for ultrasound of the anterior surface of the thigh. The ultrasound examination was performed with the patient in the supine position and with the affected leg both in neutral position and with flexion of the hip and knee. A high frequency transducer was used. The examination revealed the presence of a small defect in the fascia of the rectus femoris muscle. There was also a muscle protrusion through this defect, which was more prominent when the rectus femoris contracted. (Fig. 1a, b) When the leg was in the neutral position, the protrusion was less conspicuous. (Fig. 1c) Power Doppler and directional eFLOW techniques identified a blood vessel perforating the fascia at the site of the protruding muscle. (Fig. 2) Dynamic examination with power Doppler technique confirmed the protrusion of muscle next to a perforating vessel. (Fig. 3)

Discussion:

The term muscle hernia (MH) refers to a focal protrusion of the muscle tissue through an either congenital or acquired fascial defect and right into the overlying subcutaneous tissue. MH may be solitary, bilateral or multiple and most commonly affect leg muscles and commonly the tibialis anterior muscle. The rectus femoris and the upper extremity muscles are rarely affected. MH can be caused by trauma, sport injuries, compartment syndrome or iatrogenic causes. Perforating vessels or nerves may also create weak points in muscular fasciae through which MH can protrude, as it was the case in our patient. [1, 2]

MH may sometimes cause pain. Clinical examination characteristically reveals a local mass becoming more prominent when the underlying muscle contracts or when the patient is erect. Ultrasound with high-frequency transducers is the primary imaging modality for the diagnosis of MH. Radiologists should keep in mind not to put pressure on the probe during examination, as this would reduce the hernia. [1] Secondly, the patient should not be examined only at rest because MH become more prominent after exercise. [3] Marking of the skin helps localization of the mass during examination. Ultrasound can easily identify the fascial defect where the echogenic fascia is thinned or completely interrupted and the bulge of muscle through the defect. Sometimes, the herniated muscle may
overlap the adjacent fascia and resemble a mushroom. The herniated muscle is less echogenic compared to the normal muscle. This could be attributed to either anisotropy or atrophy induced by the chronic low-grade trauma of the herniated muscle fibres. MH may appear spoke-like due to the normal echogenic fibroadipose septa which are herniated and appear as echogenic lines radiating from the fascial defect. Colour and Power Doppler techniques detect perforating vessels which are usually found at the site of MH. [4] 3D Ultrasound has also been reported to successfully evaluate MH. [5]

MRI is also used to evaluate MH. However, it lacks the dynamic nature of US and given the thinness of the fasciae, it may miss some MH. Moreover, prolonged MRI examination time and its high cost hinder its widespread use. [1] In a recently published case series it was shown that dynamic ultrasound is more accurate than MRI in identifying a MH. [6]

As MH are usually asymptomatic, they may be treated conservatively with support stockings. Surgery with fasciotomy or closing the defect with synthetic mesh may be required to prevent severe pain or cramps. [4, 6]

**Differential Diagnosis List:** Rectus femoris muscle hernia after sport blunt trauma, Muscle hernia, Muscle tear, Soft tissue tumour, Haematoma, Thrombophlebitis, Arteriovenous aneurysms, Epidermoid cysts

**Final Diagnosis:** Rectus femoris muscle hernia after sport blunt trauma.

**References:**


Description: Transverse view of a small protrusion of the rectus femoris muscle (arrowhead). This image was taken with the muscle contracted. Origin: Rafailidis D. Radiology Dpt, GH “Gennimatas”, Thessaloniki, Greece.
**Description:** Longitudinal view with a small part of the muscle seen bulging through the fascial defect (arrowhead). This image was taken with the muscle contracted. M: rectus femoris muscle **Origin:** Rafailidis D. Radiology Dpt, GH “Gennimatas”, Thessaloniki, Greece.

**Description:** Longitudinal view of the same area with the patient at rest shows the reduction of the protrusion below the fascial defect (arrowhead). **Origin:** Rafailidis D. Radiology Dpt, GH “Gennimatas”, Thessaloniki, Greece.
Description: Power Doppler technique demonstrates a blood vessel traversing the fascial defect along with the hernia. Origin: Rafailidis D. Radiology Dpt, GH “Gennimatas”, Thessaloniki, Greece.
Directional eFLOW technique identifies a prominent blood vessel traversing the fascia at the site of the hernia. This technique is a high resolution blood flow detection mode available in certain devices. **Origin**: Rafailidis D. Radiology Dpt, GH “Gennimatas”, Thessaloniki, Greece.
Figure 3

**Description:** Split screen image shows that the blood volume changes during contraction and relaxation of the muscle. **Origin:** Rafailidis D. Radiology Dpt, GH “Gennimatas”, Thessaloniki, Greece.