

Quadriceps contusion with compartment syndrome

Evacuation of hematoma in 2 cases

A high intramuscular pressure due to contusion with hematoma developed in the thigh of 2 athletes after moderate blunt muscle trauma. The pain became severe a few hours after the trauma. In both patients a fasciotomy and evacuation of the hematoma was performed. In 1 of the patients, a computed tomogram verified the hematoma preoperatively. The postoperative course was uneventful. A compartment syndrome associated with a major hematoma should be considered as a cause of progressive pain at rest after blunt muscle trauma.

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Introduction

Thigh muscle contusions after blunt trauma are common in athletics, especially in contact sports. Residual symptoms with joint stiffness and muscle weakness sometimes follow. Myositis ossificans can also develop (Jackson & Feagin 1973, Williams 1980). Recommended treatment of the acute injury is cooling and elevation, compressive splinting, and rest (Rothwell 1982, Jackson & Feagin 1973, Pettersson & Renström 1983). Also aspiration of the hematoma has been proposed (Molloy & McGuirk 1976, O'Donoghue 1976). In cases with signs of increased intramuscular pressure, surgery has been advocated (Pettersson & Renström 1983, Holland et al. 1985).

A compartment syndrome has been defined as "A condition in which high pressure within a muscle compartment reduces capillary blood per-

fusion below a level necessary for tissue viability" (Mubarak & Hargens 1981). There may be paralysis of involved muscles and neurologic symptoms distally due to ischemia in nerves passing the compartment (Ackroyd et al. 1983). In the 2 cases presented here, compartment syndromes resulted from contusions of the anterior thigh muscles.

Case 1. While playing handball, a 34-year-old man was kneed on the distal part of his right thigh; he continued to play without treatment, but was admitted to the hospital 18 hours after the injury with severe pain at rest. The right thigh was swollen and hypertonic. There was no neurocirculatory deficit in the leg. The pressure was 10.1 kpa (76 mm Hg) in the distal part of the vastus intermedius muscle, while the pressure in the rectus femoris muscle was 4.3 kpa. Computed tomography discriminated a general muscular edema in the thigh and a hematoma in the distal part of the vastus intermedius muscle (Figure 1). A fasciotomy was performed and

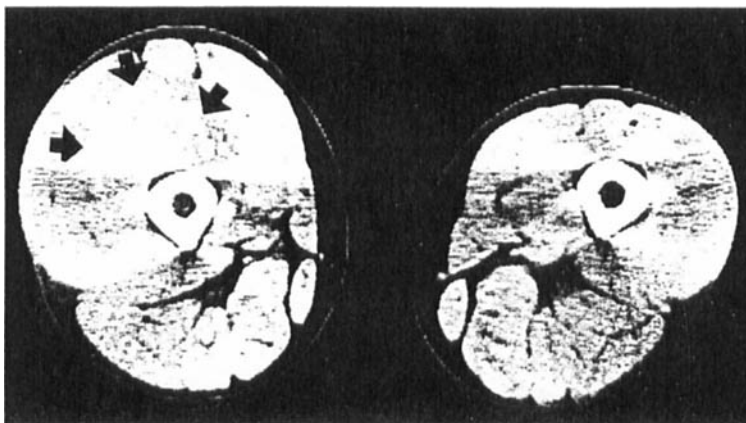


Figure 1. Case 1. CT 19 hours after the trauma. Hematoma in the right vastus intermedius (arrows).

about 500 ml of blood clots was removed from the vastus intermedius. Primary skin closure was performed. Postoperatively, the pain disappeared and 2 weeks later the patient walked normally. The active range of knee movement was then 0 to 140 degrees.

Case 2. While playing handball, a 26-year-old man was kneed on the right distal thigh, but continued to play for a time. Because of severe pain at rest, he was admitted to the hospital 3 hours after the trauma at which time the right thigh was swollen and hypertonic. He had no neurocirculatory deficit in the leg. The pressure in the distal vastus intermedius muscle was 10.7 kpa, and the patient underwent a fasciotomy and evacuation of 200 ml of blood clots from the vastus intermedius. Postoperatively, the pain disappeared. The wound had to be left open and 6 days later delayed primary skin closure was performed. Six weeks later, the patient walked normally and had an active range of knee movements from 0 to 120 degrees.

Discussion

Compartment syndrome due to hematoma is well known in hemophilia (Ahlberg 1965) and in patients treated with anticoagulants (Lancourt et al. 1977, Halpern et al. 1978). In the literature of sports traumatology, Pettersson & Renström (1983) mentioned that intramuscular hematomas can lead to increased pressure and ischemia, whereas O'Donoghue (1976) pointed out the risk of compartment syndromes after contusions to the lower leg.

Neither of my patients had a history of a bleeding diathesis. The trauma was moderate, allowing them to continue their sports activity. Conversely, major thigh muscle ruptures lead to immediate disability.

Severe pain at rest from an extremity after trauma could indicate high intramuscular pressure (Bauer 1980, Matsen 1980, Mubarak & Hargens 1981). In the present 2 cases, the increasing pain over the few hours following injury was probably due to increasing pressure secondary to continued bleeding and edema. In both patients the hematoma was confined to the vastus intermedius muscle, which is one of the muscles that constitute the anterior thigh compartment (Mubarak & Hargens 1981). This muscle lies in contact with bone throughout its length and is thus especially vulnerable to external compressive forces. The only nerve that passes the anterior thigh compartment is the femoral nerve and its end branch, the saphenous nerve; and neither needs to be clinically involved in a compartment syndrome (Mubarak et al. 1978).

Mubarak & Hargens (1981) recommended fasciotomy in intramuscular pressures above 4 kpa, whereas Matsen (1980) advised surgery if the pressure exceeded 6 kpa. Both of my cases had pressures well above these limits.

Residual symptoms, which sometimes occur after nonoperatively treated thigh muscle contusions, include knee stiffness and impairment of quadriceps function (Rothwell 1982). In some patients these symptoms may be the result of unrelieved compartment syndromes that have led to fibrosis and muscle shortening. Thus, in cases where progressive pain at rest develops after blunt muscle trauma, fasciotomy and evacuation of a hematoma should be considered even in the absence of distal neurologic symptoms. Measurement of muscle pressure is diagnostic and computed tomography can aid in the localization of an intramuscular hematoma.

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