Progressive limitation of knee flexion secondary to an accessory quinticeps femoris muscle in a child

A CASE REPORT AND LITERATURE REVIEW

We describe a symptomatic, progressive restriction of knee flexion due to an accessory quadriceps femoris in a nine-year-old girl. There was no history or findings of post-injection fibrosis, nor any obvious swelling of the affected quadriceps. At arthroscopy no intra-articular pathology was found. An accessory ‘quinticeps femoris’ was diagnosed by ultrasonography and MRI. Following excision of the muscle and tendon full flexion of the knee was regained and there was no recurrence of the contracture.

Although many accessory muscles have been reported in the lower limb, particularly in the foot and calf involving the soleus, accessory muscle bellies within the quadriceps femoris are rarely seen. Most reported cases are related to the vastus lateralis. Willan, Mahon and Golland investigated the variability of vastus in cadavers and noted an additional head in about one-third of the limbs and a separate deep tendinous lamina associated with vastus lateralis in 29% of cases. We report a previously undescribed accessory quadriceps femoris muscle causing restriction of knee flexion in a child.

Case report
A nine-year-old Caucasian girl presented with a three-year history of progressive limitation of flexion of her left knee. On examination there was no tenderness, swelling or effusion. There was full extension but flexion was limited to 90°. The right knee had a normal range of movement. She was able to walk normally without pain and had no symptoms of a mechanically deranged knee. Examination of the thigh showed no evidence of post-injection myofibrosis or of quadriceps wasting. There was no history of patellar dislocation and both patellae were normal in shape, size and position. Radiographs and MR scans of the knee were normal. An arthroscopy under general anaesthesia confirmed that the menisci, cruciate ligaments and articular cartilage were normal, and there were no loose bodies. It was also confirmed that knee flexion was limited to 90°. Synovial biopsies and neurophysiological studies were normal. She was treated with physiotherapy.

Two years later, her knee flexion was restricted to 60°. Ultrasonography of both thighs showed a hypoechoic band beneath the left vastus lateralis, apparently attached to a cortical cavity at the proximal third of the femur (Fig. 1). A CT scan was reported as showing a cortical appearance consistent with a tendinous insertion, and MRI confirmed a thick band, 18 cm long and of low signal intensity on the T1- and T2-weighted images, deep to the left vastus lateralis (Fig. 2). The band arose proximally from the cortical cavity on the lateral aspect of the femoral shaft below the origin of vastus intermedius, passing through that muscle belly to run under the vastus lateralis, and reach the patella via the common quadriceps tendon (Fig. 3).

The thigh was explored through the vastus lateralis. This revealed an accessory quadriceps femoris arising from a thick tendon on the lateral aspect of the femoral shaft, inferior and lateral to vastus intermedius. The accessory muscle was fusiform, easily dissected, and interposed between vastus lateralis and intermedius. The muscle belly was 2.4 cm wide, 1.1 cm thick, and constituted 44% of the length of the band, which was half the bulk of the rectus femoris (4.42 × 2.08 cm; Fig. 3). It was attached distally to the common quadriceps tendon by a long flat tendon > 2 cm wide, running close to the internal aponeurosis of vastus lateralis (Fig. 4). Flexion of the knee increased the tension in the accessory muscle, which slackened in extension. Following resection of the proximal tendon and muscle belly, knee flexion increased to 100°. Histological examination showed normal tendon and muscle.
One year post-operatively, she had no recurrence of the contracture and had regained full flexion of the knee.

**Discussion**

Bergman et al\(^1\) showed that all the vastus muscles may be bilaminar, and Nwoha and Adebisi\(^10\) in a cadaver study described a pair of accessory quadriceps femoris muscles with the appearance of a bilaminar vastus lateralis. Lewandowski\(^11\) in a study of 138 human fetuses recorded that the typical morphological traits of vastus lateralis and medialis included additional fleshy lamellae.

In our patient the accessory muscle appeared as an additional vastus intermedius and not as a bilaminated vastus intermedius or lateralis. Its tendons and muscle belly were completely separated from both vasti, and had proper proximal and distal tendinous insertions. It was also unusual as the tendon and muscle ran through the belly of another muscle. We believe this accessory muscle might be
more accurately described as 'quinticeps' femoris, and we have found no reports of such a muscle.

The other original aspect of this accessory muscle was that it was the direct cause of the mechanical disorder. An accessory muscle is usually asymptomatic, and any symptoms are due to its potential for nerve compression or localised compartment syndrome during exercise. In some cases it can mimic a soft-tissue tumour. We believe that the progressive restriction of knee flexion in our patient was due to the lack of elasticity of the accessory muscle, which became a tether as the femur grew. The muscle belly was short in proportion to its long tendon.

Almost all the reported symptomatic accessory muscles involve young adults aged between 23 and 25 years, and support the theory of a congenital origin. Our patient is one of the youngest cases described and the first to present with a symptomatic accessory muscle in the quadriceps. According to several reports excision is the recommended treatment for a symptomatic accessory muscle, and this treatment proved to be successful in our patient.

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References