Unusual presentation of more common disease/injury

Biceps femoris tendon injuries sustained while playing hockey

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A 42-year-old female nurse presented in March 2008 with a left proximal hamstring tendon injury sustained while playing hockey. At surgery, the proximal biceps femoris tendon and semitendinosus were found to be ruptured and were repaired. The patient made a good recovery but sustained a further hockey injury in January 2010 involving a complete tear and rupture of the biceps femoris tendon distally. This was managed conservatively and the patient was able to return to playing hockey 10 months later. Biceps femoris tendon injuries have been reported in sport but this is the first documented case of the injury occurring while playing hockey and is also the first reported case of a biceps tendon rupture proximally (hamstring tendon) followed by distal biceps femoris rupture at the knee in the same leg.

BACKGROUND

This case is important because we have found no previous report of injury to the distal biceps tendon while playing hockey, although this injury is seen in sports that involve explosive running and flexion of the knee joint.

This case is also unique in that the patient had a proximal hamstring biceps tendon avulsion while playing hockey in 2008, which was surgically repaired, followed by a subsequent distal biceps femoris tendon rupture 2 years later also while playing hockey. Both injuries occurred in the same

leg and involved the same muscle. Such a case of these consecutive injuries has never previously been reported in the literature. We reviewed the literature in order to find guidance as to how to best manage the distal biceps femoris tendon rupture in light of the previous proximal tendon avulsion and repair. However, we found no reports or guidance. Therefore, we felt that it was essential to report this case and how we managed it in order to document,

Figure 1 MRI (proton density fat suppressed sagittal image) showing lateral collateral ligament inserting into the fibula head and, posterior to it, ruptured biceps femoris tendon. A short distal stump of the biceps femoris tendon remains attached to the fibula head.

Figure 2 MRI (T1 weighted sagittal image) showing lateral collateral ligament inserting into the fibula head but absent biceps femoris tendon.

Figure 3 MRI (proton density fat suppressed axial image) showing haemorrhage around the distal biceps femoris muscle and tendon at the musculotendinous junction.

Figure 5 MRI (proton density fat suppressed axial image) showing haemorrhage around the distal biceps femoris muscle and tendon at the musculotendinous junction. The biceps femoris tendon is swollen and there is bright signal intensity within the tendon substance consistent with haemorrhage and oedema in the torn tendon.

Figure 4 MRI (proton density fat suppressed axial image) showing haemorrhage around the distal biceps femoris muscle and tendon at the musculotendinous junction. The biceps femoris tendon is swollen and there is bright signal intensity within the tendon substance consistent with haemorrhage and oedema in the torn tendon.

first, that these injuries can occur, and, second, that the outcome can provide guidance in the future to practitioners who encounter a similar case.

Figure 6 MRI (proton density fat suppressed axial image) showing haemorrhage around the distal biceps femoris muscle and tendon at the musculotendinous junction. The biceps femoris tendon is swollen and there is bright signal intensity within the tendon substance consistent with haemorrhage and oedema in the torn tendon. The haemorrhage and oedema is now shown spreading more interiorly towards the lateral patella ligament.

Figure 7 MRI (proton density fat suppressed axial image) demonstrating absence of the biceps femoris tendon on this slice due to the gap in the torn tendon distally.

Figure 8 MRI (proton density fat suppressed axial image) showing haemorrhage and oedema around the lateral patella retinaculum and absence of the biceps femoris tendon.

CASE PRESENTATION

A 42-year-old female nurse presented in March 2008 having sustained a muscle pull injury to the left hamstring while playing hockey. She experienced considerable pain at the posterior aspect of the left upper thigh radiating down the line of the hamstring to the knee. A transverse band of bruising was also present below the buttock level. On palpation the hamstring muscle tendons appeared in tact at the origin, but there was tenderness at the musculotendinous region more distally. MRI of the thigh and hamstring showed partial avulsion of the hamstrings involving primarily conjoint biceps and semitendinosus tendon with retraction of the musculotendinous junction. At surgery there was rupture of two-thirds of the combined biceps and semitendinosus

Figure 9 MRI (proton density fat suppressed axial image) showing haemorrhage and oedema around the lateral aspect of the knee joint.

Figure 10 MRI (proton density fat suppressed axial image) showing haemorrhage and oedema around the lateral aspect of the knee joint.

muscle and there was also rupture of the musculotendinous junction more distally. The tendon avulsion injury to the proximal hamstring was anchored back with soft tissue anchors and reinforced with ethybond sutures. The patient made a good recovery; however, in January 2010 she had a further hockey injury involving a tibial internal rotation sustaining a varus injury to the left knee. She felt a pop and developed pain over the lateral side of the knee with some bruising; however, there was no subsequent acute swelling. On examination there was tenderness over the posteriolateral joint line and over the head of

Figure 11 MRI (proton density fat suppressed axial image) showing haemorrhage and oedema around the lateral aspect of the knee joint at the level of the proximal fibula head.

Figure 12 MRI (proton density fat suppressed coronal image) showing intact lateral collateral ligament but absent biceps femoris tendon.

the fibula. MRI demonstrated complete tear and rupture of the biceps femoris tendon distally—20 mm from the fibula insertion (see figures 1–13). Ultrasound was also carried out and confirmed rupture of the biceps femoris tendon (see figures 14–16). In view of the patient's previous injury and proximal hamstring reconstruction in the same leg, it was decided to manage the distal biceps femoris tear conservatively.

INVESTIGATIONS

Following the first injury in 2008, the MRI scan of the left thigh and hamstring showed oedema at the ischial tuberosity insertion of the hamstring tendon within an attenuated

Figure 13 MRI (proton density fat suppressed axial image) showing haemorrhage and oedema around the lateral aspect of the knee joint.

Figure 14 Ultrasound scan demonstrating a gap in the torn distal biceps femoris tendon with a remnant of tendon remaining attached to the fibula head (right of the image).

Figure 15 Ultrasound scan of the distal biceps femoris. Ruler measuring the remnant of the biceps tendon that is still attached to the fibula head.

Figure 16 Ultrasound scan of the distal biceps femoris. Ruler measuring gap left by the ruptured and retracted biceps femoris tendon (approximately 40 mm).

and thinned biceps femoris and semitendinosus conjoined tendon. The appearance was suggestive of a partial avulsion of the hamstring involving primarily the conjoint biceps semitendinosus tendon.

MRI following the second injury in January 2010 demonstrated a complete full thickness rupture of the distal biceps femoris tendon 20 mm above the fibula head (see figure 1–13). Ultrasound scan 3 months later confirmed a complete rupture of the distal biceps femoris tendon with a 3.5 cm gap through the torn tendon. The proximal tendon was retracted and a 1.5 cm stump of remaining tendon attached to the fibula (see figure 14–16).

DIFFERENTIAL DIAGNOSIS

Regarding the injury in January 2010, the differential diagnosis included a lateral collateral ligament tear and a lateral meniscal tear.

TREATMENT

Following the first injury in 2008, surgical repair of the partial avulsion of the proximal hamstring tendon was carried out. The proximal hamstring was anchored back with soft tissue anchors and reinforced with ethybond sutures. Postoperatively the patient received physiotherapy, aqua aerobic workouts and other exercises. She made a good recovery and was able to return to playing hockey regularly.

Following the subsequent injury in January 2010, the patient was managed conservatively and was back playing hockey 10 months later.

OUTCOME AND FOLLOW-UP

Regarding the latest injury (January 2010) the patient has made a good recovery following conservative treatment. She has no pain or tenderness; however, she reports the hamstrings being tight and feeling a little weak in the affected leg. There is some difficulty with sprinting, although she believes this may be due to a reduced fitness level after her time out of sport. She has now returned to playing hockey 10 months from the date of injury.

DISCUSSION

The biceps femoris muscle consists of a long head originating proximally from the ischial tuberosity of the pelvis by a tendon common with the semitendinosus and a short head originating from the lateral lip of the linea aspera of femur, which extends superiorly almost to the level of insertion of the gluteus maximus. The distal tendon of the biceps femoris inserts into the lateral side of the head of the fibula.

The biceps femoris is the strongest hamstring muscle and its functions are to extend the hip and to flex and externally rotate the knee. Biomechanical studies report that if the tendon is resected and transferred to the anterior aspect of the thigh there is a 75% decrease in flexion activity.¹ The biceps femoris tendon is also a dynamic and static stabiliser of the knee.² Ours is the first reported case of both proximal biceps femoris tendon rupture then rupture of the biceps femoris tendon at the knee.

Management of biceps femoris and other hamstring tendon ruptures remains controversial with conflicting reports in the limited studies published to date.^{3–6} Kusma

*et al*⁶ reviewed cases in the literature of isolated avulsion of the biceps femoris from its fibular attachment. They found that eight cases of biceps femoris rupture (including their own) have been reported. The age range of patients was 21–44 years with a mean age of 37.6 years. In six of the eight cases the injury occurred during sport. The mechanisms leading to rupture were reported as hyperextension in 62.5% of cases, running in 25% and kicking backwards in 12.5%.³ None of the cases reported involved hockey as with the case we present. The most commonly reported sport resulting in this injury was football (soccer). All the cases previously reported were treated operatively except one, reported by Fortems *et al*, which was treated by immobilisation for 3 weeks.⁴ The result of non-operative treatment was only mild knee flexion deficit (measured with Cybex isokinetic dynamometry) compared to the operatively managed patients. Schlegel *et al*⁵ examined the success of non-operative management of adductor tendon ruptures in National Football League (NFL) athletes. Using the NFL Injury Surveillance System they identified adductor tendon ruptures in 19 NFL players from 1992–2004. These had been documented by MRI. Fourteen players had been treated non-operatively and five were treated with surgical repair using suture anchors. In both groups, all players eventually returned to play in the NFL. The mean time for return to play was 6.1±3.1 weeks for the non-operative group and 12.0±2.5 weeks for the operative group.⁵ The authors concluded that the non-operative treatment of proximal adductor tendon ruptures resulted in significantly faster return to play than operative treatment and avoids the risks associated with surgery. One player in the operative group had suffered the complication of a draining wound and heterotopic ossification.⁵ Both studies and our case demonstrate that non-operative treatment of biceps femoris rupture at the knee can achieve a successful outcome. In the case of our patient, she was able to return to playing hockey after 10 months. Contrary to the findings of the studies quoted above, Cooper *et al*⁶ reported the results of operative versus non-operative treatment of distal semitendinosus ruptures in elite level athletes. Of the 25 cases identified over a 14-year period, in the operative group that were followed up (12), 7 players recovered at an average of 10.4 weeks. Five patients who were initially managed non-operatively failed to recover and subsequently had surgery

Learning points

- ▶ Biceps femoris tendon ruptures, both proximal and distal, should be considered a possible injury in hockey players.
- ▶ Ultrasound and MRI are both suitable modalities for investigating proximal and distal biceps femoris tendon ruptures. The authors prefer MRI scan for the proximal tendon ruptures in order to obtain superior anatomic resolution of these deeper and more complex structures.
- ▶ Distal biceps femoris tendon ruptures may be managed conservatively with good outcome.
- ▶ The prognosis for distal biceps femoris tendon rupture is good despite a history of previous proximal hamstring rupture and repair.

to resect the torn tendon and surrounding scar tissue. The authors concluded that distal semitendinosus ruptures frequently (42%) do not recover after non-operative treatment. On the other hand, the acute surgery group had an average recovery of 6.8 weeks after surgery.⁶ However, the authors did not compare the long-term outcome of non-operative against acute surgical treatment.

Competing interests None.

Patient consent Obtained.

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