Abstract
Fractures involving the tibial tuberosity are relatively uncommon. When they do occur they almost always affect adolescents usually between the ages of 12 and 16 and tend to involve the proximal physis.

The fracture usually propagates along the anterior physeal extension beneath the tuberosity, resulting in a Salter Harris type III injury. These represent less than 1% of all Salter Harris type fractures.

We report a case of a 13-year-old boy with a left knee injury.

Case Report
A 13-year-old boy presented to A+E with an injury to his left knee sustained during a rugby match. The mechanism of injury was a fall directly onto both knees and then another player tackled him from behind and put most of his weight on the back of the left knee causing flexion with the knee in a fixed position.

He was assessed using ATLS protocols, which revealed no compromise of ABCs and no signs of head injury or neurological damage.

He presented with pain and swelling of the knee. He was tender particularly over the anterior surface of the knee. He was able to bear weight with difficulty and was holding the knee in 25 degrees of flexion. He was unable to extend the knee fully and could not raise the straight leg.

While the injury was closed, pressure on the skin could be seen from bony fragments below.

There was an obvious effusion. There was no obvious medial or lateral collateral ligament instability. Cruciate ligaments could not be formally assessed due to the injury. The contralateral knee was uninjured and there were no other injuries.

Initial lateral X-ray revealed a displaced fracture of the tibial tuberosity extending through the physis into the knee joint. There was hinging of this fragment so that the distal point was endangering the skin. This could be classified as an Ogden type 3A fracture. (See fig 1)

Fig. 1
The first action was to extend the knee and make an attempt at reducing risk to the skin. This was performed and the patient placed in a rigid knee brace. Repeat X rays including AP films showed a little improvement (See fig 2) but it was felt that there was still significant skin risk so it was decided to take him to theatre for an open reduction and internal fixation of the fracture.
This was performed with a midline incision to the anterior surface of the knee. The fracture fragment was exposed and the surfaced cleaned and curetted. The fracture fragment was then reduced and fixed to the main body of the tibia with two cancellous screws. The aim was to place one screw in the epiphyseal section and one in the metaphyseal section. This was successful. (See fig 3 and 4). The wound was then closed in a standard fashion.

He was placed in a long leg plaster, which was converted to a cylinder after a few days. He mobilised with crutches. Two week X-rays were satisfactory. He remained in a cylinder cast for a further 4 weeks after which he was referred to physiotherapy where he is currently progressing well. (See fig 5.)

**Discussion**

Fractures involving the tibial tuberosity are relatively uncommon. When they do occur they almost always affect adolescents between the ages of 12 and 16 and tend to involve the proximal physis. The fracture usually propagates along the anterior physeal extension beneath the tuberosity, resulting in a Salter Harris type III injury. They represent less than 1% of all Salter Harris type fractures.

The injury should be differentiated from Osgood-Schlatter disease, which is a type of juvenile traction osteochondritis and is a partial avulsion only affecting the anterior surface of the apophysis with no physeal involvement. A true fracture of the tibial tuberosity may however be associated with previous Osgood-Schlatter disease.

These fractures were originally classified by Watson-Jones\(^1\) in 1955 into three main types:

Type 1 – Avulsion of a small fragment of the distal portion of the tubercle

Type 2 – The secondary ossification centre is hinged upwards with the apex of angulation at the level of the proximal physis

Type 3 – The fracture line extends through the proximal tibial epiphysis

This classification was further modified in 1980 by Ogden et al, who commented that the original classification did not intraarticular extension of the fracture in the type 2 and 3 injuries. They subdivided each of the three types further into type A and B.

**Odgen classification**

Type 1A – Distal to the ossification centre with minimal displacement

Type 1B – Distal to the ossification centre with anterior and proximal displacement

Type 2A – Fracture at the junction of the ossification centre in line with transverse continuation of the physis

Type 2B – Comminuted tuberosity fragment with more proximal displacement of the distal fragment

Type 3 – Fracture line extends through the proximal physis into the knee joint and is divided into:

Type 3A – Tuberosity and anterior aspect of physis are a single fragment

Type 3B – Comminution of the fragment usually at the level of the ossification centre

**Conclusions**

This type of injury is rare. It occurs in young adolescents before fusion of the physis. This case was unusual because the tibial physis had almost fused. It was also interesting because of the level of hinging of the free fragment leading to danger to the skin.

The literature reports that these injuries can be managed conservatively or operatively. The classification of the fracture plus the degree of displacement should be taken into account. The pull of the patellar tendon may encourage anterior displacement and hinging of the distal fragment as in this case.

Most class 1 fractures can be managed in a cast. Most class 2 and 3 fractures need operative treatment although some minimally displaced class 2A fractures may do well with conservative management.

Operative management will usually take the form of screw fixation; however wire fixation can be used. After this the patient is treated in a cylinder cast for around six weeks. Physiotherapy can then be commenced.

Treatment in this case has been highly successful and the patient should return to normal activity soon.

**References**


Many thanks to the patient and family