

# Patellar Tendon Ruptures in a Pair of Brothers

HY Tiong, S S Dhillon, J N Davison

## ABSTRACT

The patellar tendon does not easily rupture due to its considerable high tensile strength. Therefore, in normal individuals, ruptures of the patellar tendon are uncommon. We report three episodes of patellar tendon ruptures in two normally fit and healthy brothers; postulating the possibility of inherent weakness. The treatment options for these injuries are discussed.

**Keywords:** patellar tendon rupture

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## INTRODUCTION

The rupture of the patellar tendon is uncommon. It usually occurs spontaneously or with minimal trauma in patients with metabolic and inflammatory conditions, including renal failure, rheumatoid arthritis, lupus erythematosus and hyperparathyroidism, as well as steroid use<sup>(1)</sup>. Rarely, it can also occur in apparently healthy individuals following repetitive strain injuries. We report a case of patellar tendon ruptures in two brothers without associated systemic or local disease.

## CASE REPORT

Child A, a 15-year-old Afro-Caribbean boy, first presented with a painful left knee following a simple trip and fall. On examination, the left knee was swollen and a palpable defect in the patellar tendon was present. Child A was unable to straight leg raise and X-rays confirmed a high-riding patella (Fig. 1); hence, the diagnosis of patellar tendon avulsion was made. No other bony injuries were seen. As it was his initial injury, his knee was treated conservatively in an above knee Plaster of Paris, with X-rays demonstrating good positioning of the patella. He was allowed to mobilise partial weight bearing. Unfortunately, after four weeks in plaster, he developed considerable pain and swelling of his left ankle and thigh, and the plaster had to be removed and changed to a lightweight above knee scotchcast brace. After a further six weeks, the injury was judged to be clinically and radiologically healed, but he had significant knee stiffness. Intense physiotherapy was



**Fig. 1** Lateral radiograph of Child A's left knee shows a high-riding patella.

carried out for one month and he achieved full range of knee movement.

Six months later, Child A sustained the same injury on the right knee whilst he was high jumping at a school competition. Surgical repair was advocated as the right patella was thought to be too far elevated for conservative management. Through a midline incision, the avulsion of the patellar tendon from the tibial tuberosity was confirmed (Fig. 2) and repaired with a small fragment bone screw and transosseous Ethibond sutures. Post operatively, the leg was protected with a long-leg cylindrical cast and he was mobilised partial weight bearing for six weeks. The cast was then removed and with physiotherapy, he again attained a full range of knee movement at three months post operation.

His 13-year-old brother, Child B, subsequently developed the same injury on his left knee, and

Department of  
Surgery  
National University  
Hospital  
5 Lower Kent  
Ridge Road  
Singapore 119074

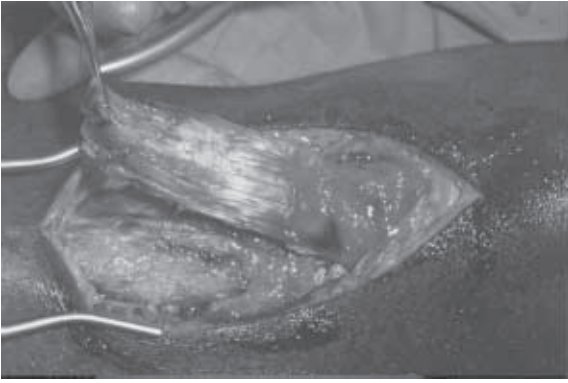
H Y Tiong,  
BM. BS, MRCS  
Registrar

Department of  
Orthopaedics  
Leicester Royal  
Infirmary  
Leicester LE1 5WW  
United Kingdom

S S Dhillon, Mb ChB,  
MRCS  
Registrar

J N Davison, FRCS  
Consultant

**Correspondence to:**  
Dr H Y Tiong  
Tel: (65) 6779 5555  
Email: hoyee2@  
yahoo.com



**Fig. 2** Photograph showing the avulsed patellar tendon.



**Fig. 3** Lateral radiograph of Child B's left knee post patellar tendon repair, with the bone screw in position.

interestingly, also whilst high jumping at the same regional school athletics competition one year later. Further questioning revealed that both brothers represented their school in high jumping and had been training for the last four years. They were however only jumping once a week, doing about five to 10 jumps per session. They received training from the school coach and both brothers never had any knee problems prior to the accidents. With the background of his brother's injury, operative treatment as described above was performed to repair the patellar tendon avulsion (Fig. 3). Following repair, the knee was again protected with an above knee plaster of Paris for six weeks, and allowed to partial weight bear. Following removal of plaster at

six weeks, Child B underwent intense physiotherapy and was able to achieved full range of knee movements at three months.

## DISCUSSION

In patients without associated systemic or local diseases or steroid use, rupture of the patellar tendon occurs as a result of violent contraction of the extensor mechanism resisted by a fixed position of the leg and foot. This mechanism is implicated in injuries associated with activities such as jumping, twisting, and weight lifting, or trip-and-fall accident<sup>(1)</sup>. However, a healthy tendon should not rupture under physiologic loads<sup>(2)</sup>. McMaster<sup>(3)</sup> showed that the normal tendon has considerable tensile strength and the forces needed for tendon rupture was calculated by Zernicke et al. to be 17.5 times body weight<sup>(4)</sup>. It generally does not rupture unless weakened by a degenerative process. This was subsequently confirmed by Kannus and Jozsa; who found histopathological evidence of pre-existing pathological changes in all of 891 specimens examined<sup>(5)</sup>. The above findings suggest that repetitive strain alone is not sufficient to result in rupture of the tendon in apparently healthy individuals and that there needs to be preceding asymptomatic tendon degeneration. The etiologic factors leading to these degenerative changes remain elusive, but it may be inherited weakness. This is suggested by the above case report, and to date, the authors have not found other reports of patellar tendon ruptures in families. Further studies will need to elucidate this. However, for a patient with unilateral patellar tendon rupture and a sibling with similar problem, they should be counselled about the possibility of bilateral rupture and should probably refrain from high-risk activities.

Conservative treatment is not ideal for early mobilisation and in Child A, his left leg was splinted for a longer period of time compared with the other leg and developed more problems in terms of pain, swelling and quadriceps wasting. Surgical treatment of patellar tendon ruptures traditionally involves primary suture repair of the defect augmented by a cerclage of wire, suture or screw, as in our cases<sup>(6)</sup>. Post-operative splinting of the knee may last for as long as six weeks before starting motion. Recent studies have shown that simple primary repair without augmentation and early motion uniformly produces good results without the need for manipulation or hardware removal<sup>(7)</sup>. Both brothers tolerated surgical treatment well and achieved good range of knee movements with minimal post-operative problems. However, in view of latest studies, their repair could have been achieved without a bone screw which could decrease their time in splintage to allow for quicker mobilisation.

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