

Distal patellar tendinosis: an unusual form of jumper's knee

Janne Sarimo · Jussi Sarin · Sakari Orava ·
Jouni Heikkilä · Jussi Rantanen · Mika Paavola ·
Timo Raatikainen

Received: 16 January 2006 / Accepted: 21 February 2006 / Published online: 6 July 2006
© Springer-Verlag 2006

Abstract Jumper's knee is a common problem in athletes participating in sports that involve running and jumping. Typically activity related pain is felt at the proximal insertion of the patellar tendon. Symptoms and findings in the more distal parts of the patellar tendon are unusual. All of the patients in this retrospective study were active athletes suffering from distal patellar tendinosis. There were 19 men and four women. The mean age of the patients was 24 years (range 12–32). All of the patients were operated on after conservative treatment lasting for an average of 23 months had failed. After a mean postoperative follow-up of 42 months 21 of the knees were rated good meaning that the athlete had returned to the prior level of activity without any symptoms. In three knees the result was fair as the patients benefited from the operation but there were some remaining symptoms. No poor results were reported. All patients were able to return to their previous level of sports 8–12 weeks after surgery. Operative treatment seems

to give good results in most cases after unsuccessful conservative treatment of the unusual distal patellar tendinosis in athletes.

Keywords Jumper's knee · Patellar tendon · Tendinopathy · Tendinitis · Anterior knee pain

Introduction

Patellar tendon pain is a common problem in athletes especially in those participating in sports characterized by high demands on speed and power for the leg extensors [5]. The most common location of pain and the pathologic lesion in jumper's knee is the proximal insertion of the patellar tendon. However, the distal insertion of the quadriceps tendon, the mid part of the patellar tendon, as well as the distal insertion of the patellar tendon can be affected.

There are only a few published reports describing tendinosis affecting the distal patellar tendon [3, 6, 7, 10]. To our knowledge there are no previously published follow-up studies presenting results of operative treatment of distal patellar tendinosis.

We present a retrospective series of 24 cases with distal patellar tendinosis treated surgically after unsuccessful conservative treatment.

Materials and methods

A total of 24 cases (23 patients; one bilateral) with distal patellar tendinosis were included in our study. There were 19 men and four women. The mean age of the patients was 24 years (range 12–32). The right knee

J. Sarimo (✉) · J. Sarin · S. Orava · J. Heikkilä ·
J. Rantanen
Mehiläinen Sports Trauma Research Center,
Mehiläinen Sports Clinic and Hospital,
Paavo Nurmi Center, Mehiläinen/Urheiluklinikka,
Kauppiaskatu 8, 20100 Turku, Finland
e-mail: janne.sarimo@mehilainen.fi

M. Paavola
Department of Orthopaedic Surgery, Jorvi Hospital,
Helsinki University Hospital, Helsinki, Finland

T. Raatikainen
Department of Hand Surgery, Helsinki University Hospital,
Helsinki, Finland

was affected in 13 cases and the left in nine cases. All of the patients were active athletes. The types of sports that the patients were involved in are presented in Table 1. In eight cases a direct blow to the anterior part of the knee preceded the onset of symptoms.

The clinical diagnosis of distal patellar tendinosis was based on the patient's complaint of exertional pain near the tibial tubercle and a finding of local tenderness in the distal patellar tendon. Plain radiographs were taken in all cases. In every patient the clinical diagnosis was confirmed using an ultrasound. In seven cases an additional MRI was done to confirm the diagnosis and to rule out other causes of anterior knee pain.

All of the patients were operated on after a conservative treatment lasting for an average of 23 months (range 4–60) had failed. The conservative treatment regimens had included rest, modifications in training, stretching, non-steroidal anti-inflammatory medication, cortisone injections, and various physiotherapy modalities such as eccentric and concentric exercises.

The operations were performed between 1986 and 2001. Preoperatively the tendon was palpated and the point of tenderness was marked. Spinal anesthesia was used in all cases. In the operation a vertical skin incision was done over the distal patellar tendon. The tendon was exposed and the lesion seen in the ultrasound and /or MRI was located using inspection and palpation as well as the preoperative marking. The tendon was split longitudinally directly over the lesion and the necrotic tissue was sharply excised. In most cases the excised lesion was sent for histological examination. The tendon was closed using absorbable sutures and the subcutaneous tissue and the skin were closed. In three cases additional drilling (4–6 drill holes using a 2 mm drill bit) of the tibial tubercle was done due to bone edema in the tibial insertion of the patellar tendon seen in MRI. No arthroscopic examinations of the knee were performed.

Table 1 The sports that the 23 patients with distal patellar tendinosis were involved in

Soccer	5
Volleyball	4
Long-distance running	4
Basketball	2
Orienteering	2
Ice-hockey	1
Floorball	1
Tennis	1
Weight-training	1
Decathlon	1
Hammer	1

Postoperatively weight-bearing and range of motion was allowed immediately as tolerated. The use of crutches was discontinued by 2 weeks and most patients needed crutches only for 1 or 2 days. Deep squatting (flexion more than 90°) was allowed only after 3 weeks. Isometric quadriceps and hamstring muscle training was started immediately after surgery. Swimming was allowed 2 weeks and cycling 3 weeks postoperatively.

Results

Plain radiographs were normal in all of the cases. No cases of Osgood-Schlatter's disease were seen in the patients included in our study. Ultrasound revealed a hypoechoic lesion suggestive of necrosis and scar tissue in the distal patellar tendon in all cases. The MRI in the seven cases supported the diagnosis of patellar tendinosis. In three cases bone edema in the tibial tubercle corresponding to the insertion of the patellar tendon was seen in the MRI. No additional pathologic findings were noted. In none of the eight patients with a prior trauma to the anterior aspect of the knee were any signs of partial or complete tear of the patellar tendon seen in the imaging studies.

Macroscopically the pathologic lesion of the patellar tendon that was removed was darker in color and less shiny than that of the intact tendon. The texture was also harder than the surrounding tendon. All of the lesions were located within 1.5 cm from the tibial tubercle and in the medial or central third of the tendon. The width of the lesions varied from 2 to 3 mm and the length from 3 to 5 mm. The histological findings included necrosis, degenerative tissue, and scarring.

After a mean postoperative follow-up of 42 months (range 6–96) 21 of the 24 knees were rated good as the patients had returned to their prior level of activity without any restrictions and residual symptoms. In three cases the result was rated fair as these patients benefited from the operation but there were some remaining symptoms in athletic activities such as mild pain in jumping. Two of these patients with a fair result were volleyball players and one was a soccer player. All of the patients in this study were able to return to their prior sporting activity between 8 and 12 weeks postoperatively. There were no complications in the operations.

Discussion

Distal patellar tendinosis is an unusual variant of jumper's knee. As the more classical form of jumper's

knee affecting the proximal part of the patellar tendon also distal patellar tendinosis causes significant and long lasting morbidity in athletes.

The diagnosis of distal patellar tendinosis as the other forms of patellar tendinosis should be based on the patient's symptoms and clinical findings. Ultrasound and MRI can be used to support the clinical diagnosis.

Cooper and Selesnick [2] reported of two patients with a partial rupture of the distal insertion of the patellar tendon. In both cases an acute injury had preceded the symptoms. In histological examination areas of acute tendon tearing as well as signs of tendinosis were seen. Eight patients in our series reported of a direct blow in the anterior aspect of the knee prior to the onset of the symptoms. In none of these cases was a partial or a complete rupture of the patellar tendon seen in the imaging studies or in the operation nor was it suggested in the histological examinations.

All of the patients in this series had undergone lengthy conservative treatment regimens (average of 23 months). The conservative treatment had consisted of the same methods described for proximal patellar tendinosis. During the course of this study there were very few patients with distal patellar tendinosis who were able to return to sports without operative treatment. It has been reported that approximately 15–23% of the cases with proximal patellar tendinosis are resistant to conservative treatment [4, 8]. Based on our experience it seems that distal patellar tendinosis is more resistant to conservative treatment than the more classical forms of jumper's knee.

Osgood-Schlatter's disease affecting mainly adolescent athletes can result in tendinosis or partial tear in the distal insertion of the patella [9]. In the current series no signs suggestive of Osgood-Schlatter's disease were seen in the clinical or radiological examinations.

The typical finding in the operation was a dense, hard, and rather small nodule. The nodule was not always palpable in the operation and was only seen after the longitudinal incision of the tendon was made. The histological findings resembled those seen in the classical forms of jumper's knee, i.e., necrosis and degeneration.

In a review of different studies on patellar tendinosis the outcome of surgery varied from 46 to 100% [1]. In our series all patients were able to return to full activity after surgery and 20 out of the 23 patients were able to do so without residual symptoms.

Distal patellar tendinosis, although uncommon, should be kept in mind when an athlete complains of anterior knee pain located near the tibial tubercle.

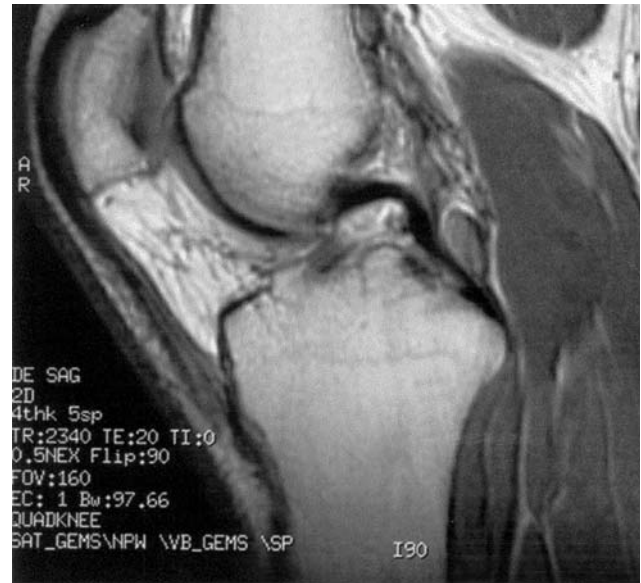


Fig. 1 Sagittal MRI image of distal patellar tendinosis with thickened distal patellar tendon



Fig. 2 Axial MRI image of distal patellar tendon. Tendinosis is seen in the medial part of the tendon

Based on our results we conclude that operative treatment seems to give good results in most cases of distal patellar tendinosis in athletes when conservative treatment has failed (Figs. 1, 2).

References

1. Coleman BD, Khan KM, Maffulli N, Cook JL, Wark JD (2000) Studies of surgical outcome after patellar tendinopathy: clinical significance of methodological deficiencies and guidelines for future studies. *Scand J Med Sci Sports* 10:2–11
2. Cooper ME, Selesnick FH (2000) Partial rupture of the distal insertion of the patellar tendon. *Am J Sports Med* 28:402–406

3. Duri ZAA, Aichroth PM (1995) Patellar tendonitis: clinical and literature review. *Knee Surg Sports Traumatol Arthrosc* 3:95–100
4. Ferretti A, Puddu G, Mariani PP, Neri M (1985) The natural history of jumper's knee. Patellar or quadriceps tendonitis. *Int Orthop* 8:239–242
5. Lian OB, Engebretsen L, Bahr R (2005) Prevalence of jumper's knee among elite athletes from different sports. *Am J Sports Med* 33:561–567
6. Martens M, Wouters P, Burssens A, Mulier JC (1982) Patellar tendonitis: pathology and results of treatment. *Acta Orthop Scand* 53:445–450
7. Myllymäki T, Bondestam S, Suramo I, Cederber A, Peltokallio P (1990) Ultrasonography of jumper's knee. *Acta Radiol* 31:147–149
8. Orava S, Österbäck L, Hurme M (1986) Surgical treatment of patellar tendon pain in athletes. *Br J Sports Med* 20:167–169
9. Orava S, Malinen L, Karpakka J, Kvist M, Leppilahti J, Rantanen J (2000) Results of surgical treatment of unresolved Osgood-Schlatter lesion. *Ann Chir Gynaecol Fenn* 89:298–302
10. Panni AS, Tartarone M, Maffulli N (2000) Patellar tendinopathy in athletes. *Am J Sports Med* 28:392–397