

Repair of partial quadriceps tendon rupture

Observations in 28 cases

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We operated on 28 patients with partial rupture of the quadriceps tendon. A simple excision of the scar tissue and closure of the tendon gave an excellent or

good result in 25 patients. Ultrasonography was useful to confirm the diagnosis.

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Submitted 93-03-17. Accepted 93-10-31

Jumper's knee is tendinopathy of the knee extensor mechanism (Blazina et al. 1973, Ferretti 1986, Karlsson et al. 1991). It is most commonly seen at the inferior pole of the patella at the origin of the patellar tendon, but in about one fourth of the cases it may be located at the insertion of the quadriceps tendon (Perugia et al. 1977). Conservative treatment is usually successful, but some cases progress to a chronic stage, with a partial or even complete rupture of the tendon, and operative treatment is required (Kelly et al. 1984). We report here the results of 28 cases, in which jumper's knee in the quadriceps tendon was treated surgically.

Patients and methods

The material consisted of 28 patients with partial rupture of the quadriceps tendon treated at our institutions 1980–1991. There were 26 men and 2 women, and they were all active in sports (Table 1). The average

age of the patients was 28 (16–46) years. The right knee was affected in 21 patients, the left knee in 6, and in 1 patient the lesion was bilateral.

Pain along the upper pole of the patella during and/or after the activity was the typical symptom, common to all our patients. Especially jumping and kneeling were provoking factors for pain. Swelling was usually not present. The duration of the symptoms before the operation varied from 4 months to 10 years (mean 17 months). The onset was usually gradual but in 5 cases there was a history of knee trauma.

The quadriceps tendon insertion was tender to palpation along the medial side or in the middle third of the tendon in all cases. In one case, a palpable nodule in the tendon was found. Radiography was used in 12 cases, but it gave no specific findings. Ultrasonographic examination was added in the latter part of the study, and it revealed a hypoechoic focus in all 21 tendons examined (Figure 1). In addition, a small calcification at the tendon-bone junction was seen in 6 knees (Table 1).

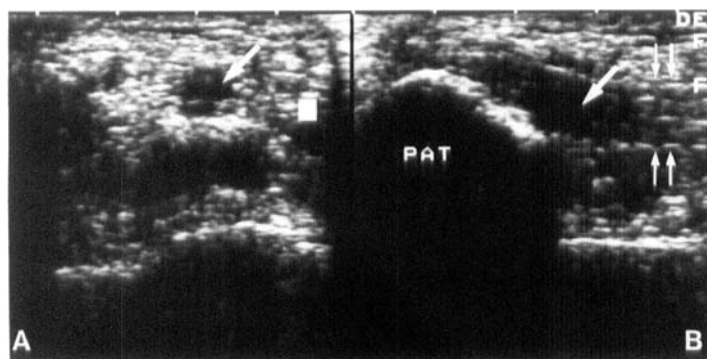


Figure 1. Ultrasonography (7.5 Mhz probe) showing a partial rupture (arrows) of the quadriceps tendon. Transverse (A) and longitudinal (B) projections. PAT patella. Quadriceps tendon (small arrows).

Table 1. Description of the patients

Age	Sex	Sport	Interval between symptoms and operation (months)	Conservative treatment ^a	Ultrasonography ^b	Radiography ^b	Follow-up period (years)	Result (Table 2)	Remarks
34	M	Volleyball	12	N	1	1	5	E	calcification
23	M	Weight-lifting	16	N, C, P	2	1	1.5	G	
46	M	Volleyball	36	N, A, P	1	3	4	E	
16	M	Long-jumping	10	N	1	1	5	P	trauma
31	M	Volleyball	36	N, A	2	1	4	E	
31	M	Volleyball	36	N, P	4	3	3	G	bilateral
25	F	Orienteering	18	N	1	1	5	G	trauma, calcification
27	M	Volleyball	4	C, P	2	1	3	E	trauma
31	M	Hammer	8	N	2	1	5	E	
25	M	Finn. baseball	6	N	1	1	3	F	quadriceps atrophy
30	M	Running	5	A	1	1	4	E	
23	M	Volleyball	8	N	1	1	3	E	calcification
33	M	Volleyball	12	N, P	4	3	2	E	
28	M	Volleyball	24	N, C	2	1	2.5	E	five C injections
27	M	Volleyball	10	N, P	2	1	5	E	palpable nodule
22	M	Running	12	N, P	2	1	4	E	
30	M	Weight-lifting	6	N	2	1	3.5	E	trauma
35	M	Weight-lifting	120	N, C, A, P	4	3	3	E	exostosis
23	M	Volleyball	8	N, C	4	3	3	F	
25	M	Discus	6	A	2	5	3.5	G	trauma
30	M	Bandy	7	A	2	1	2	G	
25	M	Power-lifting	6	N	2	1	2	E	
29	M	Volleyball	14	N, A	2	5	2.5	G	
39	M	Bodybuilding	16	N, A, P	2	5	1.5	E	
25	M	Volleyball	13	N, C	2	5	2	G	
25	M	Volleyball	7	N	2	5	1	E	
18	F	Sprinting	6	N	2	5	2	E	
24	M	Decathlon	12	N, P	4	3	0.5	G	

^a N non-steroid anti-inflammatory drug, C corticosteroids, A Arterparon®, P physical therapy.

^b Ultrasonography and radiography: 1 not performed, 2 partial rupture, 3 calcification, 4 partial rupture and calcification, 5 normal.

All the patients were treated conservatively before surgery with rest from athletic activities for at least 4 months. 24 patients had received non-steroid anti-inflammatory medication, 8 had been given several local glycosaminoglycan-polysulphate (Arterparon®) injections peritendinously, and 6 patients had had local corticosteroid injections. Physical therapy with eccentric knee exercises had been given to 10 patients.

Surgical procedure

The tendon was exposed through a transverse skin incision at the upper pole of the patella, using spinal anesthesia and bloodless field. It was then palpated and divided longitudinally over the nodule, which was sharply excised and removed. In one patient a bony exostosis at the superior corner of the patella was resected. The tendon fibers were closed with absorbable sutures after meticulous hemostasis, and the wound was dressed with a smooth elastic bandage. The knee was mobilized immediately after the operation, but the patients were advised to use the bandage for 2 weeks, after which bending exercises of the knee were encouraged. Athletic activities were restricted for additional 10 weeks.

A palpable nodule inside the insertion of the quadriceps tendon either in the medial or in the middle third could be palpated during the operation in all 28 knees. Fibrotic scar tissue, varying in size from 5–10 mm times 15 mm, was found in every case. Typically, it was located in the posterior half of the tendon but in one case the lesion was superficial. In addition, calcification could be seen in 9 tendons, and in one tendon a bony spur protruded into the scar from the superior pole of the patella. In one patient, who had received 5 local corticosteroid injections, a necrotic cavity-like lesion was found, containing loose connective tissue.

The histology of the scar, examined in 13 cases, revealed fibrous scar tissue in all cases as the main finding, with an excessive amount of fibroblasts. Increased vascularization, small calcifications and mild or moderate inflammatory changes were also seen, consistent with a chronic inflammation caused by a partial rupture of the tendon.

The patients were re-examined and interviewed by one of the authors 3 (0.5–5) years postoperatively on the average. Their current symptoms as well as sporting activity and ability were asked about.

Table 2. Postoperative results

Result	n	Classification
Excellent (E)	17	No pain, full return to preinjury level of activity
Good (G)	8	Mild to moderate pain but full return to preinjury level of activity
Fair (F)	2	Moderate pain or minimal decrease in level of activity
Poor (P)	1	Severe pain or significant decrease or no return to preinjury activity level

Results

25 patients had an excellent or good result at the follow-up (Table 2). One patient with a fair result developed a marked quadriceps muscle atrophy. No other evident reason for the fair and poor results could be detected.

Discussion

In the early stage, jumper's knee usually responds well to conservative treatment (Ferretti et al. 1983), but some cases become chronic. A typical history and the localization of the pain should lead to the diagnosis but, because of rareness of this entity, the diagnosis of partial rupture of the quadriceps tendon may be delayed. Fritschy and de Gautard (1988) recommended ultrasonography, which was also useful for confirming the diagnosis in this study. Plain radiographs were not usually informative.

Kelly et al. (1984) repaired the partial quadriceps tendon ruptures with nonabsorbable sutures passed through patellar drill holes. Although the number of cases was small in their study, their results of surgical treatment of partial rupture of the quadriceps tendon were inferior to those of the patellar tendon. Ferretti et al. (1983) advocated multiple drilling of the proximal pole of the patella, in addition to removal of the tendon tissue and lateral release. Our study shows, however, that a smaller operation with a simple excision of the scar, followed by suture of the healthy tendon, gives excellent results as well.

References

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