

PATELLAR TENDINITIS: PATHOLOGY AND RESULTS OF TREATMENT

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Patellar tendinitis can be considered as an overload lesion in athletes. Anatomical pathology reveals focal degeneration and microtearing at predisposed areas near the insertion of the quadriceps or patellar tendon. The prognosis and treatment are dependent on the stage of the affection. A program of conservative treatment is effective in the early stages of the disease but it fails in a high proportion (16/38) of cases in the later stages. Surgery directed towards the tendon, rather than a bony procedure, yielded favourable results in 27 out of 29 patients.

Key words: knee; patella; sports; tendinitis

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Patellar or quadriceps tendinitis is a lesion especially encountered in athletes who are involved in some type of repetitive activity such as jumping, running, bicycling or kicking.

Only a few studies (Smillie 1962, Blazina 1973, Grossman & Nicholas 1977) deal with this problem and data on pathology, treatment and especially results of treatment are scarce. Therefore the lesion is frequently overlooked or mistaken for bursitis or chondromalacia.

The purpose of this paper is to present the clinical, radiological and pathological data, as well as the results of conservative and operative treatment, in a group of 90 patients.

PATIENTS AND METHODS

For this study 90 patients were reviewed with a minimum interval of 2 years between treatment and follow-up. Table 1 presents the various sports activities in which the patients were involved. Although patellar tendinitis is seen in many sports disciplines, the two major groups of patients were involved in volleyball or soccer.

Most patients did not recall any trauma, 7 reported a direct blow on the knee and 17 a fall on the knee. The 4 patients who did not participate in sports on a regular basis reported an initial trauma.

For the classification of the patients according to their symptoms we used Blazina's (1973) stages with slight modifications (Table 2). Twelve patients (12/90) presented a bilateral patellar tendinitis making a total

Table 1. Sports activities of patients with patellar tendinitis

Sports activity	Number of patients
Volleyball	31
Soccer (European football)	29
Athletics	7
Physical education teacher	6
Basketball	4
Cycle racing	4
Tennis	2
Gymnastics	2
Judo	1
No sports	4
Total	90

Table 2. Classification of symptoms

Stage 1	Pain only after sports activity.
Stage 2	Pain at the beginning of sports activity, disappearing after warming up and reappearing at fatigue.
Stage 3	Constant pain at rest and during activity. Unable to participate in sports at previous level.
Stage 4	Complete rupture of the patellar tendon.

of 102 knees. The frequency of the different localisations of the tendinitis is shown in Figure 1.

Several patients suffered from tendinitis at multiple localisations. Tendinitis at the tibial insertion of the patellar tendon was only considered in adult athletes and was differentiated from Osgood-Schlatter's disease.

Clinical examination always showed local tenderness in the affected area and in some cases local swelling was noted. Associated findings at clinical examination were a hypermobile patella in 14 cases, chondromalacia patellae in 13 cases, quadriceps atrophy in 17 cases and genu recurvatum in one instance. The height was measured in all patients and also in a control group of athletes in order to see if tall athletes were predisposed to this lesion.

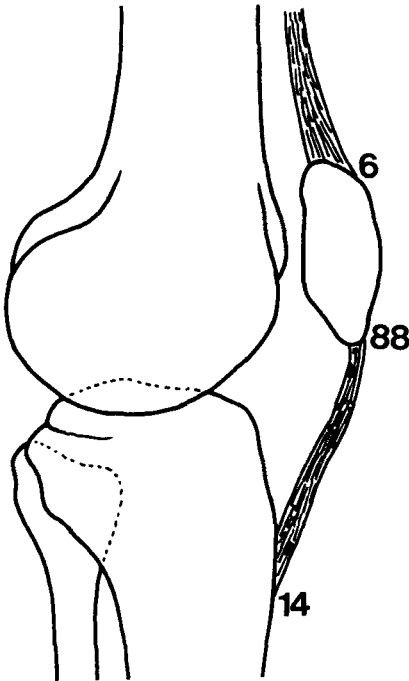


Figure 1. The number of cases at the different locations of "jumper's knee".

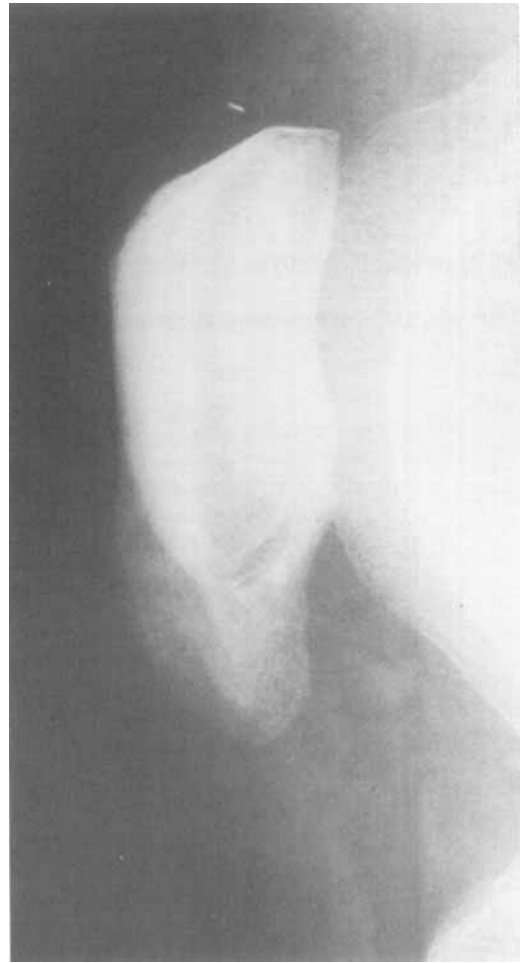


Figure 2. There is marked bone formation with elongation of the lower pole of the patella at the insertion of the patellar tendon.

X-rays of the patella were taken routinely but radiological changes in the patella itself were rarely noted. An elongation of the lower pole of the patella was observed in 6 cases (Figure 2), and an irregular contour and cystic radiolucent zones, also at the lower pole, were seen in 3 cases. In the tendon itself ossification near its insertion was seen in 7 cases.

TREATMENT

Table 3 presents the number of knees treated operatively or conservatively classified according to the stage of the disease. The treatment program for the different stages of the affection is shown in Table 4.

Table 3. Composition of the conservatively and operatively treated groups

Conservative treatment		Operative treatment	
	Number of knees		Number of knees
Stage 1	12	Stage 2	2
Stage 2	18	Stage 3	27
Stage 3	38	Stage 4	5
Total	68	Total	34
Average age 23 years 6 months (12 years to 50 years)		Average age 23 years 5 months (15 years to 32 years)	

The treatment program and the classification of patients according to the stage of the symptoms and the method of treatment (Table 3) reveal that the type of treatment is mainly conservative for stages 1 and 2. The two knees at stage 2 treated surgically (Table 3) were in athletes with bilateral patellar tendinitis who suffered from a stage 3 patellar tendinitis in the other knee. Because the symptoms in both knees had already resulted in a long interruption in their sports participation and because their engagement in sports was at a high level these two patients preferred bilateral surgery.

Patellar tendinitis at stage 3 is initially always approached conservatively as outlined in the treatment program. Operative treatment at this stage is only considered if conservative treatment fails and the symptoms persist for a long enough period, interfering with the sporting, professional or daily activities of the patients.

Table 4. Treatment program

Stage 1	– Adequate warming up. – Ice packs or ice massage after activity. – Local anti-inflammatory treatment and anti-inflammatory drugs for several weeks. – Physiotherapy including isometric quadriceps exercises. – Elastic knee support or patellar brace.
Stage 2	– Same as in stage 1. – Some form of heat before activity. – Period of rest.
Stage 3	– Same as stage 2 but also a prolonged period of rest. – No cast. – If conservative treatment fails either give up sports or consider surgery.
Stage 4	– Primary repair of the tendon.

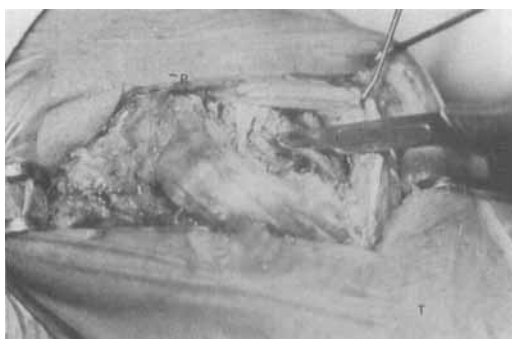


Figure 3. Peroperative picture after longitudinal splitting of the patella tendon showing intact superficial layers and fraying of the deep layers. (P = lower pole of patella; T = tibial tubercle)

The average duration of preoperative symptoms was 17 months, ranging from 6 months to 2 years.

The ultimate motivation for surgery was in most cases to regain their previous level of sports activities. Other patients had given up their sports for a long period, some for more than a year, but surgery was performed in these patients because of persistent pain interfering with daily activities.

Typical complaints for these patients were pain on climbing stairs, pain after long walks and an aching knee when sitting with knees bent (car driving, movie sign).

In contrast to Blazina (1973) and Grossman & Nicholas (1977), our surgical approach is directed solely at the tendon near its insertion. The overlying fascia is split and left open and the tendon is split longitudinally with resection of the degenerated or necrotic tissue in the tendon near its insertion (Figure 3). No drilling of the patella or any bony procedure is performed. Postoperatively the leg is placed in a cast for 5 weeks. After this period a rehabilitation program with quadriceps exercises is started and the patient may progressively resume sporting activities after 4 months within the limits of pain. The average time interval between surgery and resumption of sporting activities was 5 months ranging between 3 and 8 months.

In cases of a complete rupture of the patellar tendon a primary repair of the tendon is performed and a traction wire through the patella and tibial tubercle is used (Figure 4) to secure the patella in place and to avoid excessive stress on the sutured area.

RESULTS

The study of the height of the patients revealed that the average height of our group of patients did not differ significantly from a control group of



Figure 4. Primary repair is performed using a traction wire through longitudinal drill holes in the patella and a transverse drill hole at the tibial tubercle securing the patella in place.

athletes but that the height of basketball and volleyball players with and without complaints of jumpers' knee was significantly greater than that of the remaining patients in both groups.

Table 5. Criteria for evaluation of the results

Excellent:	No residual symptoms.
Good:	Marked improvement of symptoms Able to continue sports on the same level. Some stiffness or slight aching after sports activity.
Poor:	Residual complaints interfering with sports activity of the patient.

Table 5 shows the criteria for the rating of results of treatment. For the analysis of the results of treatment patients were classified according to the different stages of the lesion (Table 6).

Anatomical pathology

An anatomical pathological examination of the excised tendon tissue has been performed routinely. Consistent findings were mucoid degeneration and fibrinoid necrosis within the tendon.

Microtearing and areas of regeneration with proliferation of fibroblasts and thin-walled vessels were also seen (Figure 5).

DISCUSSION

Patellar tendinitis is a chronic overload lesion in the tendon near its insertion. Excessive stress in this part of the tendon during sports activities requiring repetitive movement of the extensor mechanism of the knee results in focal degeneration with fraying and microtearing within the tendon near the insertion at the upper and especially the lower pole of the patella or in some cases near the tibial insertion of the patellar tendon.

The insertion at the lower pole of the patella is the most frequent localisation (Figure 1). A hypermobile patella may predispose to this lesion. The quadriceps atrophy noted in 17 cases can be considered as a secondary effect of the tendinitis. Blazina (1973) stated that patients suffering from "jumper's knee" were usually tall athletes. By comparing the height of the patients with a control group of athletes we concluded that the height of the patients does not correlate with the disease but with a specific sport.

Table 6. Results of treatment

		Conservative treatment		Operative treatment	
Stage 1:	Excellent	2	Stage 2:	Excellent	2
	Good	8		Good	9
	Poor	2	Stage 3:	Excellent	16
				Good	9
Stage 2:	Excellent	2		Poor	2
	Good	12	Stage 4:	Excellent	3
	Poor	4		Good	1
Stage 3:	Excellent	7		Poor	1
	Good	15			
	Poor	16			

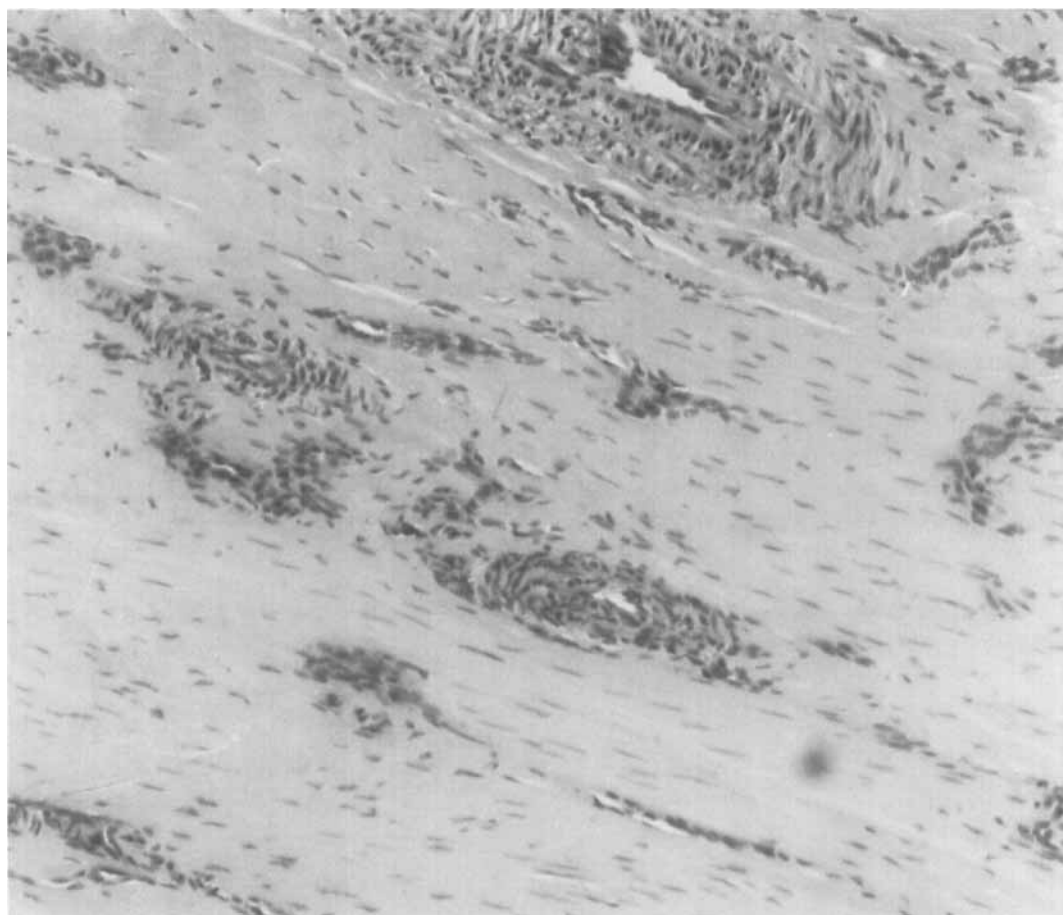


Figure 5. Microtears in the tendon showing a cellular contour. Proliferation of fibroblasts is also present (H.E. $\times 64 \times 5$).

The pathomechanics, pathology and anatomical pathological findings of patellar tendinitis are similar to those of tennis elbow, Achilles or adductor tendinitis. Operative and anatomical pathological examinations prove that the lesion in patellar tendinitis is situated at a predisposed area in the deep fibers of the tendon near its insertions. Therefore operative treatment should be directed towards the affected tendon rather than the bone at the patella or tibial tubercle as described previously (Smillie 1962, Grossman & Nicholas 1977).

The use of a cast or local cortisone injections are no longer part of our treatment program.

Our experience with immobilisation of the

knee in a cast has been disappointing. Cast treatment protracts an already long period of inactivity and does not yield a good lasting result in cases where other conservative means have failed.

The use of local steroid injections has to be discouraged because cortisone injections alone have never yielded a good lasting result and this treatment bears the hazards of tendon rupture. Four of the five complete ruptures had received local steroid injections because of symptoms of patellar tendinitis. Cortisone injections at the patellar tendon do not cure the lesion but only provide temporary pain relief. Repeated local steroids injections may not only weaken the ten-

don (Langhoff et al. 1971) but also permit the athlete to continue to overload and further damage the tendon because of the analgesic effect of the drug.

Stages 1 and 2 of the lesion are treated conservatively and also in stage 3 one should first try conservative treatment before considering surgery. Analysis of the results for the different stages demonstrates that a minority becomes symptom-free with conservative treatment and that the major group is rated as "good", experiencing some residual aching or stiffness. At stage 3 there is a marked shift towards "poor" results. Failure of conservative treatment at stage 3 implies a choice for the patient of giving up sports at his previous level or considering surgery. Finally "jumper's knee" is not essentially a self-

limiting phenomenon in athletes. There is often a progression through the different stages. Especially in phase 3 the condition frequently seems to be irreversible leading to failure of conservative treatment (16 cases out of a group of 38).

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