JUMPER'S KNEE : RESULTS OF SURGICAL TREATMENT

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The clinical results of 31 knees in 29 patients treated surgically for patellar tendinitis were reviewed. All patients suffered from stage 3 patellar tendinitis according to Roels *et al.*, resistant to conservative treatment. A longitudinal strip of patellar tendon containing the pathologic tissue was resected in all cases without a bony procedure. Minimum follow-up time was 3 years (ranging from 3 to 6 years). The results were very good in 26 knees, good in 1 knee and poor in 4 knees. Persistent patellofemoral pain was considered the most important cause leading to a poor result. When patellofemoral pain due to maltracking is associated with patellar tendinitis, it seems logical that both pathologies should be addressed during surgical treatment.

Keywords : tendinitis ; jumper's knee.
Mots-clés : tendinite ; jumper's knee.

INTRODUCTION

Jumper's knee is a chronic overload lesion of the extensor mechanism of the knee. The term is used to describe both patellar ligament and quadriceps tendon disease (5, 8, 10, 16). In this paper we will only consider the tendinitis of the patellar ligament. Jumper's knee is most commonly seen in young sportsmen involved in repetitive eccentric overload injuries of the knee extensor mechanism such as jumping and running (10, 15, 18, 20, 24). This chronic tendinitis presents with obstinate pain at the inferior border of the patella, first after exercise and later also during normal activity.

On clinical examination, there is tenderness at the insertion of the patellar ligament on the distal patellar pole. Often a hard, painful nodule can be felt and sometimes localized swelling can even be seen in the acute stage. Initial treatment is a conservative program as proposed by Stanish *et al.* (11, 23) ; only when such a program fails is surgery to be considered.

The purpose of this paper is to present our clinical results with operative treatment of jumper's knee.

PATIENTS AND METHODS

In the period from January 1989 until December 1992, 31 knees in 29 patients were treated surgically for chronic persisting patellar tendinitis. In two patients the condition was bilateral.

There were 27 men and 2 women with a mean age of 29 years (ranging from 19 to 53 years). Follow-up ranged from 3 to 6 years (mean follow up 4 years, 3 months). Average duration of symptoms prior to surgery was 16 months (range 6 to 24 months). All 31 knees suffered from stage 3 jumper's knee according to Roels *et al.* (21).

Patient selection criteria for surgery were :

1. Failed nonoperative treatment.
2. Elicited tenderness at the inferior pole of the patella (most even with a palpable nodule).
3. Ultrasound scan showing thickening of the ligament, a hypoechogenic zone or cysts (3, 9, 14).
4. No previous surgery for patellar tendinitis.

All patients were involved in sports prior to the injury and had been unable to participate owing to knee pain. Details on sports involved are listed in table I.

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Table I. — Details on sports

Soccer	11
Volleyball	7 (two bilateral cases)
Running	5
Cycling	3
Gymnastics	1
Basketball	1
Tennis	1

Several variables were recorded by means of review of the preoperative clinical and radiological examination (plain radiographs and sonography) on a retrospective basis.

In all patients a comprehensive clinical examination of the knee was performed. In four patients an associated patellofemoral problem was suspected clinically, and a CT-scan was performed to evaluate the patellofemoral joint. In the same four patients, patellar subluxation and tilt were confirmed by the CT-scan.

SURGICAL TREATMENT

Several surgical procedures have been proposed in the treatment of jumper's knee including : multiple drilling of the distal patellar pole (22), excision of the distal pole of the patella and reinsertion of the patellar tendon (1), scarification of the patellar tendon, and excision of the devitalized ligamentous tissue (5, 10, 20, 21).

We resect the pathologic tissue in a longitudinal strip without a bony procedure, as reported previously (13, 18), as we believe the chronic inflammatory reaction in the tendon to be the cause of the symptoms.

The most difficult part in the procedure is usually the recognition of the damaged part of the tendon, as the most anterior fibers of the tendon are normally unaffected (2). Usually a hard nodule can be felt or seen just distal to the patella. We emphasize that all abnormal tissue should be debrided. The insertion site of the patellar tendon is abraded with a scalpel, but no real resection of the distal pole is performed.

Afterwards the defect is closed by suturing only the most anterior fibers of the tendon. Fascia and peritenon are closed in one layer before subcutis and cutis. We did not find any adverse effect on outcome from closing both fascia and peritenon as opposed to the findings of King *et al.* (16), who report that stripping the peritenon is mandatory to achieve good results.

The earliest four cases were protected in a long-leg cast for an average of 4 weeks. Because this slowed down the rehabilitation, and as we became more confident due to our experience with resecting part of the patellar tendon for ACL-reconstruction, the long-leg cast was discarded. From that moment on, patients started quadriceps setting and isometric quadriceps tonification the day after surgery. Full weight bearing was allowed immediately.

For the evaluation of the postoperative results each patient was asked to evaluate subjectively his or her knee with regard to pain and restriction of sports activity and activites of daily living. Patients were also evaluated objectively for tenderness at the distal pole of the patella, patellofemoral apprehension, patellofemoral maltracking and quadriceps atrophy. The overall result was then classified in the following groups :

1. Very good. No pain, tenderness, muscle wasting or limitation of activity. No tenderness at the distal pole of the patella and no patellofemoral apprehension. The patient would choose to have surgery again.
2. Good. Mild pain during vigorous activities but no restriction, slight patellofemoral tenderness and moderate wasting (< 2 cm). The patient would choose to have surgery again.
3. Poor. Moderate to severe pain after prolonged periods of sitting and during sports, limitation of activity, moderate to severe tenderness at the distal pole of the patella or at the patellofemoral joint and severe quadriceps wasting (> 2 cm). The patient would not choose to have surgery again.

RESULTS

We treated 31 knees surgically (29 patients) with a stage 3 jumper's knee (21) after a failed conservative treatment program (11, 23).

According to the above-mentioned criteria 4 knees (13%) were rated as poor, one (3%) was

rated as good, and 26 (84%) were rated as very good (including the 2 bilateral cases).

The patients with the very good results experienced no pain during sports and no limitation of activity whatsoever. Clinical examination at latest follow-up in those patients showed no tenderness elicited at the distal pole of the patella, and there was no patellofemoral apprehension. The average time for full return to sports was 18 weeks. The one patient with a good result experienced anterior knee pain during long distance running. She had no complaints during activities of daily living. Clinical examination at latest follow-up revealed quadriceps wasting (1.5 cm) and slightly painful patellofemoral crepitus. However, no tenderness at the distal pole of the patella was detected.

The 4 patients with poor results were unable to return to sports at their preinjury level. They all had severe anterior knee pain during prolonged sitting and while performing sports. None of them had tenderness at the distal pole of the patella, but they all had painful patellofemoral crepitus and a painful lateral patellar facet. During the passive patellar tilt test (17) the patella could not reach the horizontal plane indicating patellar tilt. In those 4 patients clinical examination and CT-scan had already confirmed preoperatively the associated patellofemoral tilt and subluxation. Histopathology in all cases showed mucoid degeneration and fibrinoid necrosis combined with vascular invasion, confirming the diagnosis of jumper's knee (19, 22).

DISCUSSION

Several operative procedures for the treatment of jumper's knee have been described. Smillie (22) in 1962 recommended multiple drilling of the distal pole of the patella to promote revascularisation. This technique however has never gained general acceptance (1, 2, 4, 10, 12).

Blazina *et al.* in 1973 (1) reported 5 good results in 5 patients after resecting the distal pole of the patella with reattachment of the involved tendon and reinforcement of the medial patellar retinaculum. Most outcomes using this technique however were unpredictable and disappointing (4, 10). Longitudinal excision of the necrotic zone in the tendon even without a bony procedure is generally accepted as a simple technique with few complications and reproducible good results (2, 12, 13, 18, 21). Between 80 and 93% good and excellent results are reported with this technique. The overall results in our series (87% good and very good results) were comparable with those from previous reports, even though we did not perform any bony procedures and we allowed early aggressive rehabilitation.

Feretti *et al.* (7) in their paper on epidemiology of jumper's knee reported extensor mechanism malalignment not to be a primary cause of jumper's knee. Our clinical data may however suggest the coexistence of painful patellofemoral maltracking and jumper's knee to have an adverse effect on outcome after treatment of patellar tendinitis by debridement of the patellar tendon only.

We therefore believe now that, as proposed by several authors (4, 6, 8), both the tendinitis and the patellofemoral malalignment should be addressed during surgery when both conditions coexist.

REFERENCES

1. Blazina M. E., Kerlan R. K., Jobe F. W., Carter V. S., Carlson G. J. Jumper's knee. Orthop. Clin. North Am., 1973, 665-678.
2. Colosimo A. J., Bassett F. H. Jumper's knee diagnosis and treatment. Orthop. Review, 1990, 19, 139-149.
3. Davies S. G., Baudouin C. J., King J. B., Perry J. D. Ultrasound, computed tomography and magnetic resonance imaging in patellar tendinitis. Clin. Radiol., 1991, 43, 52-56.
4. De Lee J. C., Drez D. Jr. Orthopedic sports medicine : Principles and practice, W. B. Saunders, 1994, pp. 1203-1208.
5. Duri Z. A. A., Aicroth P. M. Patellar tendinitis : clinical and literature review. Knee Surg., Sports Traumatol. Arthroscopy, 1995, 3, 95-100.
6. Ferretti A., *et al.* Jumper's knee. Am. J. Sports Med., 1983, 11, 58-62.
7. Ferretti A. Epidemiology of jumper's knee. Sports Med., 1986, 3, 289-295.
8. Ferretti A., Puddu G., Mariani P. P., Neri M. The natural history of jumper's knee. Int. Orthop., 1985, 8, 239-242.
9. Fritschy D., de Gautard R. Jumper's knee and ultrasonography. Am. J. Sports Med., 1988, 16, 637-640.

10. Fritschy D., Wallensten R. Surgical treatment of patellar tendinitis. Knee Surg., Sports Traumatol., Arthroscopy, 1993, 1, 131-133.
11. Fyfe I., Stanish W. D. The use of eccentric training and stretching in the treatment and prevention of tendon injuries. Clin. Sports Med., 1992, 11, 601-624.
12. Karlsson J., Lundin O., Wigerstad Lossing I., Peterson L. Partial rupture of the patellar ligament. Am. J. Sports Med., 1991, 19, 403-408.
13. Karlsson J., Kälebo P., Goksör L., Thomée R., Swärd L. Partial rupture of the patellar ligament. Am. J. Sports Med., 1992, 20, 390-395.
14. Kälebo P., Swärd L., Karlsson J., Peterson L. Ultrasonography in the detection of partial patellar ligament ruptures (jumper's knee). Skeletal Radiol., 1991, 20, 285-289.
15. Kelly D. W., Carter V. S., Jobe F. W., Kerlan R. K. Patellar and quadriceps tendon ruptures — jumper's knee. Am. J. Sports Med., 1984, 12, 375-380.
16. King J. B., Perry D. J., Mourad K., Kumar S. J. Lesions of the patellar ligament. J. Bone Joint Surg., 1990, 72-B, 46-48.
17. Kolowich P. A., Paulos L. E., Rosenberg T. D., Farnsworth S. Lateral release of the patella : Indications and contraindications. Am. J. Sports Med., 1990, 18, 359-365.
18. Martens M., Wouters P., Burssens A., Mulier J. C. Patellar tendinitis : pathology and results of treatment. Acta Orthop. Scand., 1982, 53, 445-450.
19. Martens M. Tendinitis of the patellar tendon. Acta Orthop. Belg., 1982, 48, 453-454.
20. Orava S., Österback L., Hurme M. Surgical treatment of patellar tendon pain in athletes. Brit. J. Sports Med., 1986, 20, 167-169.
21. Roels J., Martens M., Mullier J. C., Burssens A. Patellar tendinitis (jumper's knee). Am. J. Sports Med., 1978, 6, 362-368.
22. Smillie I. S. Injuries at the knee joint, Livingstone, Edingburgh, 1962, pp. 264-267.
23. Stanish W. D., Rubinovich R. M., Curwin S. Eccentric exercise in chronic tendinitis. Clin. Orthop., 1986, 208, 65-68.
24. Todd J. M., Fox J. M. Overuse injuries of the knee in basketball. Clin. Sports Med., 1993, 12, 349-362.

SAMENVATTING

F. VERHEYDEN, G. GEENS, G. NELEN. Jumper's knee.

De auteurs beschrijven de resultaten van de chirurgische behandeling van stadium 3 patellapeestendinitis, niet beantwoordend aan conservatieve therapie, in 31 knieën (29 patiënten). De chirurgische techniek bestond uit longitudinale resectie van de necrosehaard in de patellapees zonder een aanvullende beenderige procedure.
De follow-up varieerde van 3 tot 6 jaar met een gemiddelde van 4 jaar en 3 maanden. Wij vonden 87% goede en zéér goede resultaten en 13% slechte resultaten. De reden voor slechte resultaten was blijvende patellofemorale last zonder electieve drukpijn op de patellapees. Opmerkelijk was dat bij deze patiënten vaak reeds preoperatief patellofemorale pijn en maltracking vastgesteld was.

RÉSUMÉ

F. VERHEYDEN, G. GEENS, G. NELEN. Jumper's knee (Tendinite rotulienne).

Les auteurs présentent les résultats du traitement chirurgical de la tendinite rotulienne de stade 3, résistant au traitement conservateur, chez 29 patients (31 genoux). La technique chirurgicale a consisté en la résection longitudinale de la zone nécrotique du tendon rotulien sans aucun geste osseux. Le recul variait de 3 à 6 ans avec une moyenne de 4 ans et 3 mois.
Ils ont obtenu un résultat bon ou très bon dans 87% des cas. Les mauvais résultats (13%) correspondent à des plaintes concernant l'articulation fémoro-patellaire. Il faut remarquer que, parmi les mauvais résultats, des plaintes fémoro-patellaires et une anomalie de positionnement de la rotule existaient déjà avant l'intervention.