controversial topics in surgery

Tennis elbow

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Tennis elbow is a common condition: one of those aches and pains of middle-aged collagen. Often provoked by overuse but sometimes spontaneous, it is usually a self-limiting condition. However, when symptoms are troublesome patients are likely to seek help at least to tide them over until it settles or if not, to provide a cure.

These two papers complement each other and help the reader to consider all the options. In the first article, Messrs Kumar and Stanley give a concise but comprehensive summary of the treatment options: non-operative, minimally invasive and surgical. They also introduce two relatively new techniques: platelet-rich plasma and arthroscopic release. Most readers will probably have heard about these; having read the article they will appreciate the evidence and understand the

indications. In the second article, Messrs Burke and Mullett address one of these newer approaches. The anatomy and surgical technique is elegantly described; the rationale and evidence for its use is presented.

Having read both articles, the reader who deals with tennis elbow will perhaps take a different perspective and consider other ways of treating this common but often disabling condition.

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Current thoughts on the treatment of tennis elbow

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Introduction

Lateral humeral epicondylitis was first described in the German medical literature by Rung in 1873.¹ In 1885 Morris showed an association with lawn tennis.² The incidence of the condition is about 4 to 7 per 1,000 per year in the general population³ but is up to 9.1% in tennis players.⁴ Most patients are in their fourth or fifth decade and there is an equal incidence in men and women.⁵

The most commonly affected structure is the origin of the *extensor carpi radialis brevis* (ECRB) but up to 50% of patients will also have degeneration of the *extensor digitorum communis*. Although the pathology was initially thought to be tendinitis, it is now known that it is a tendinosis with degeneration characterised by the presence of dense populations of fibroblasts, vascular hyperplasia and disorganised collagen. This constellation of findings has been termed angiofibrob-

lastic hyperplasia^{6,7} and as such the correct terminology of the condition is lateral epicondylitis.

Clinical features

The patient usually presents with lateral elbow pain, with the pain increasing on resisted wrist extension. Tenderness can be elicited over the lateral epicondyle on direct palpation. Radiographs may show minor calcification over the region of the lateral epicondyle. The differential diagnosis includes posterior interosseous nerve entrapment syndrome, an osteochondral lesion of the radiocapitellar joint, varus instability, osteoarthritis and referred pain from the shoulder or cervical spine.

Treatment

The treatment of tennis elbow is essentially non-operative, with 80% of patients having symptomatic improvement by one year.^{8–10}

The role of non steroidal anti-inflammatory medications (NSAIDs)

NSAIDs are currently the medication of choice although it has not been proved that they have a specific effect on fibroblast function or tendon healing.^{11,12} It has been suggested that although NSAIDs reduce inflammation by inhibiting the secretion of prostaglandin E₂, they also inhibit the synthesis of DNA, which is detrimental to the repair of the damaged tendon.¹³

Labelle and colleagues¹⁴ compared the effects of oral diclofenac (150mg daily) with cast immobilisation and placebo, and found that although diclofenac produced a significant reduction in pain when compared with a placebo, it did not produce a clinically significant improvement in grip strength or function of the involved upper limb when compared with placebo.

Considering the benefits and side effects of diclofenac, the authors were unable to recommend it in the treatment of this condition. They also noted a time-related significant improvement in pain, grip strength and function of the upper limb that is independent of the treatment received. They attributed this to the placebo effect, to the effect of rest to the extremity and to the natural history of the disease.

Role of splints and orthotics

A Cochrane review looking at orthotic devices that have been advocated in the treatment of tennis elbow could not draw any conclusions about the efficacy of these modalities of treatment.¹⁵ The devices described include elbow bandage, elbow band, elbow clasp and cast immobilisation.

Physiotherapy

Physiotherapy has long been established as one of the mainstays in the conservative treatment of tennis elbow.¹⁶ Standard physiotherapy included wrist extensor stretching, cross friction massage, heat, ice and wrist extensor strengthening. More recently the addition of eccentric wrist extensor exercise (wrist extensor strengthening) to standard physical therapy has been shown to improve all outcome measures for chronic lateral epicondylitis.¹⁷

Radiofrequency microtenotomy, extra-corporeal shock-wave therapy and laser therapy have been proposed as treatments but have not shown any consistent benefit.^{18,19}

The role of local steroid injection

Local corticosteroid injections have been found to be effective in the short term for up to 6 weeks. However, from 12 weeks to 12 months no benefit has been seen and patients can be worse than those receiving other treatment modalities.^{10,20}

Steroid injections do cause local complications including skin depigmentation, fatty atrophy, decreased collagen production and decreased tenocyte replication. Some authors consider a maximum course of 3 injections over a period of 12 months as acceptable treatment before considering more invasive measures.⁵

Platelet rich plasma (PRP)

Recently the use of platelet-rich plasma has evoked wide interest in the treatment of tennis elbow. Apart from their role in clotting, platelets also contain granules that contain growth factors. The growth factors act locally by attracting macrophages, mesenchymal stem cells and osteoblasts, which not only promote removal of necrotic tissue but also enhance tissue regeneration and healing.²¹ The principle involved is the local supply of a supra-physiological quantity of growth factors, which then stimulate healing of the local tissue. Previously Edwards and Calandruccio used the same principle but injected autologous blood.²² They reported success in 79% of patients although multiple injections were necessary in one-third.

PRP is defined as a volume of the plasma fraction of autologous blood having a platelet concentration above baseline.²³ Normally blood contains approximately 93% red blood cells (RBCs), 6% platelets and 1% white blood cells. In platelet-rich plasma the concentration of the platelets is increased at the expense of the RBCs. PRP devices can be divided into lower (2.5–3 times baseline concentration) and higher (5–9 times baseline concentration) systems.²⁴ It would seem logical to think that a higher platelet count would yield more growth factors and better clinical results. However, this has not yet been determined and in fact some authors have suggested that if the concentration of the platelets is 2.5 times above the baseline, it might have an inhibitory effect on the healing process.²⁵

Mishra and colleagues showed that patients treated with buffered PRP did significantly better at 4 and 8 weeks than control patients who received local anaesthetic injections. However, their study had a high attrition rate after 8 weeks.²⁶ Another recent double-blind study from the Netherlands, which looked at 100 consecutive patients, showed that those treated for chronic lateral epicondylitis with PRP had reduced pain and significantly increased function compared with those treated with corticosteroid injections.²⁷

Administration of PRP

The procedure is performed under local anaesthetic, which is infiltrated into the skin and subcutaneous tissue at the site of injection under aseptic precautions. Blood is drawn from the unaffected arm of the patient and mixed with citrate anticoagulant. This mixture is centrifuged for a fixed period of time (varies with manufacturer) and PRP that lies separate from the rest of the blood components is aspirated into a syringe. This is then mixed with sodium bicarbonate to make the pH to 7.4 and is injected into the common extensor origin with a single skin puncture and multiple punctures in the tendon. Anti-inflammatory medications are contraindicated for the pain after the injection.

The role of operative intervention in tennis elbow

It is estimated that approximately 4–12% of patients with tennis elbow undergo operative intervention.²⁸ It has also been recognised that in high-volume referral practices up to 25% of the patients may be candidates for surgical intervention.²⁹

The three commonly performed operations for tennis elbow are open, percutaneous or arthroscopic releases. The standard open technique involves release of the extensor

aponeurosis to expose the ECRB, debridement of the diseased tendon and decortication of the bone. The percutaneous release consists of a blind release of the ECRB tendon through a small incision without debridement of the affected tendon.

Arthroscopic release for tennis elbow is becoming increasingly popular and involves a routine diagnostic arthroscopy of the elbow followed by debridement of the affected ECRB tendon. Some authors perform plication of the tendon arthroscopically if the area of debridement exceeds 2cm.² The procedure is completed by decortication of the lateral epicondyle. The advantages of arthroscopic release include the complete intra-articular visualisation of the elbow. Baker *et al* reported a 69% incidence of associated intra-articular pathology at the time of arthroscopic tennis elbow release.³⁰

Cohen and Romeo studied 15 patients undergoing arthroscopic release and 15 undergoing open release with a minimum two-year follow-up. They concluded that there were no differences between the two procedures regarding outcomes, return of strength and post-operative symptoms. However, the arthroscopic group returned to sports and work much sooner, at 35 days compared with 66 days after open surgery.³¹ Although it is a safe procedure in experienced hands, there is a steep learning curve to acquire the necessary arthroscopy skills. In their review of operative treatment, Szabo *et al* concluded that open, arthroscopic and percutaneous releases for lateral epicondylitis were highly effective in the treatment of recalcitrant tendinosis of the ECRB.³²

Authors' preferred management

Patients referred to secondary care who have primarily undergone conservative treatment are given a single steroid injection to assess their response. A full explanation of the condition is given and they are referred for a short course of physiotherapy for three months. (Since the authors work in a tertiary referral centre most patients who are seen would have had conservative treatment for prolonged periods before they are seen). If they fail to respond to this regimen advice is given regarding surgical treatment.

Our surgical preference is an open procedure. Through a lateral Kocher incision the common extensor origin is identified. The ECRB is exposed and any degenerate tendon is excised. The attachment of the common extensor origin is examined and the sharp osteophytic ridges of bone are removed. The bone is then decorticated prior to repair of the common extensor origin. At present although administration of PRP is becoming more commonly used, we reserve it for those who refuse open surgery or those who are unfit for surgical treatment. We will also use it as a tertiary option for those with ongoing symptoms after operative treatment

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Arthroscopic tennis elbow release

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Introduction

Lateral epicondylitis is one of the most common pain syndromes of the upper extremity.¹ Approximately 90% of patients are successfully treated non-operatively but 10% may require surgical intervention due to residual symptoms impeding the patient's daily lifestyle activities.² Different surgical procedures have been described but there is no consensus on the best surgical option.⁵ Many authors advocate the arthroscopic treatment of lateral epicondylitis.^{4–8} This article will explain and review the current literature regarding this procedure and the potential benefits of this technique.

Arthroscopic tennis elbow release technique

The elbow joint is distended with 30ml of saline, which displaces the brachial artery and the median nerve anteriorly. This may further reduce the risk of injury to these neurovascular structures. Two standard arthroscopic portals are typically used. The proximal anteromedial portal is approximately 2cm proximal and 2cm anterior to the medial epicondyle and the proximal lateral portal is approximately 2cm proximal and 2cm anterior to the lateral epicondyle in the 'soft spot'. The relationship of extensor carpi radialis brevis (ECRB), extensor carpi radialis longus (ECRL) and capsule and instruments during elbow arthroscopy is shown in Figure 1. Cadaveric studies have verified the safety of these portal placements and safe zones for debridement.⁹

Using the proximal anteromedial portal, the undersurface of the ECRB tendon can be visualised. Baker *et al* (2000) described a classification system for the condition of the capsule: type 1 is an intact capsule; type 2 demonstrates a linear capsule rupture; and finally, type 3 shows a complete tear.⁴ The capsule is removed from the intra-articular aspect revealing the ECRB tendon, which can be followed up to its insertion on the lateral epicondyle. The ECRB is separated from the proximal origin to the border of the lateral intermuscular. Debridement of the pathological fibres is performed above the equator of the radial head (Figure 2). This prevents potential iatrogenic injury to the lateral ulnar collateral ligament and potential rotator instability of the elbow.¹⁰ Drilling or shaving of the lateral epicondyle is usually performed to stimulate a healing response although the benefits of decortication remain controversial.¹¹

Arthroscopic release allows for inspection of the elbow joint. The primary pathology of the lateral epicondyle may be

associated with intra-articular abnormalities. Studies show this may range from 19% to 69% of cases.^{4,6} Intra-articular pathology may include synovitis or synovial thickening, loose bodies or chondral defects.⁴ The presence of a hypertrophic capsular fold that impinges on the radial head and may interpose in the radiocapitellar joint can also be identified.¹² These can be easily managed with standard arthroscopic techniques.

Additional repair techniques include plication of the remaining ECRB to the overlying ECRL using an anchor in the anterior aspect of the lateral epicondyle or using absorbable sutures with a simple needle retriever technique.⁸ Management of lateral collateral ligament damage can also be addressed during arthroscopic tennis elbow surgery.⁸

The posterior elbow may also be inspected and posterolateral synovectomy or excision of meniscoid tissue may be performed. Closure of the portals is important to prevent possible sinus formation.

Outcomes of arthroscopic tennis elbow release

Currently studies that compare arthroscopic release for lateral epicondylitis with other treatment modalities are retrospective and non-randomised. Peart *et al* (2004) compared 29 arthroscopic releases with 46 open procedures.⁷ The overall post-operative outcomes were similar. However, for the arthroscopic group the time to return to work was 1.7 months compared with 2.5 months for the open group.

Szabo *et al* (2006) compared the open Nirschl procedure, percutaneous release and arthroscopic release for lateral epicondylitis.¹⁵ The mean follow-up was 48 months. There was no difference among the group for pre and post-operative Andrews–Carson elbow scores, visual analogue pain score, complication rate, recurrence or failure rates. 44% required treatment of intra-articular abnormalities, most commonly being a synovial plica. Of note, four patients underwent open on one side followed by arthroscopic release on the other and all were more satisfied with the arthroscopic procedure.

Owens *et al* performed arthroscopic release on 12 patients with a mean follow-up of 24 months.⁶ The patients' mean post-operative pain analogue score at rest was 0.58, for activities of daily living (ADL) was 1.58, and for work and sports was 3.25. 93% of patients reported feeling much better at 24 months. The mean time to unrestricted work in this military population was 6 days although the majority had desk jobs.