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A prospective, randomised study to compare extracorporeal shock-wave therapy and injection of steroid for the treatment of tennis elbow

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We undertook a prospective, randomised study to compare the analgesic effect of injection of steroid and of extracorporeal shock-wave therapy (ESWT) for the treatment of tennis elbow. Group 1 received a single injection of 20 mg of triamcinolone with lignocaine while group 2 received 2000 shock waves in three sessions at weekly intervals. After six weeks there was a significant difference between the groups with the mean pain score for the injection group falling from 66 to 21 compared with a decrease from 61 to 35 in the shock-wave group (p = 0.05). After three months, 84% of patients in group 1 were considered to have had successful treatment compared with 60% in group 2.

In the medium term local injection of steroid is more successful and 100 times less expensive than ESWT in the treatment of tennis elbow.

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Tennis elbow, lateral epicondylitis of the humerus, has been recognised for over 100 years and is an enthesopathy of the common extensor origin at the elbow of unclear pathogenesis. It is a painful condition which affects four adults per 1000 annually.[1] Many treatments have been proposed including rest, modification of activity, splints, analgesic and anti-inflammatory drugs, physiotherapy, acupuncture, injections and surgery. The choice is empirical and based on personal experience.

Although several comparative studies have been published, the optimum treatment is still uncertain. In 1992, Labelle et al[2] described a meta-analysis of the treatment of lateral epicondylitis. They found 18 trials with a mean of 57 patients in each study. Injection of steroid was of positive therapeutic value whereas ionisation and ultrasound therapy had a definite placebo effect. Most trials had very low scientific validity scores and the difficulty in assessing the placebo effect as well as the natural history of the condition was highlighted. Price et al[3] showed widespread preference for the use of injections of steroid in the management of tennis elbow. They concluded from their studies that triamcinolone was the preparation of choice. Verhaar et al[4] carried out a prospective, randomised trial on 106 patients to compare the effect of local injection of steroid with Cyriax-type physiotherapy. They used triamcinolone with lignocaine and concluded that the injections were more effective than physiotherapy. Injections of steroid give a typical pattern of relief of symptoms regardless of which local anaesthetic preparation is given in combination.[5] Hay et al[1] reported a study of 164 patients randomised to steroid injection, non-steroidal anti-inflammatory medication or a placebo. The injections gave rapid resolution of symptoms, but did not influence the long-term outcome. At one year there was no difference between the groups.

Extracorporeal shock-wave therapy (ESWT) has been used by urologists in the treatment of calculi of the urinary tract for the last 20 years.[6] More recently, it has been employed in orthopaedic and traumatic conditions including calcific tendonitis, tennis elbow, plantar fasciitis, chronic Achilles tendonitis, patellar tendonitis, nonunion of fractures and pseudarthroses, as well as myositis ossificans and avascular necrosis. Shock waves have a dose-dependent analgesic effect and are used to provoke painful levels of stimulation to relieve pain by so-called hyperstimulation analgesia. The control of pain by intense stimulation is ascribed to mechanisms in the brain stem which exert a descending inhibitory control of transmission through the dorsal horns as well as higher levels in the somatic projection system.

Rompe et al[7,8] have described the use of low-dose ESWT in patients with chronic tennis elbow. There was a signficant reduction in pain and increase in grip strength in the group which received shock-wave therapy (3000 impulses of 0.08 MJ/mm^2) compared with the control group.

We have therefore compared ESWT with injection of steroid in a prospective, randomised study of patients with tennis elbow.

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Patients and Methods

Over a period of two years we recruited patients from referrals by general practitioners to the orthopaedic departments at two general hospitals. Approval was obtained from the local Ethical Committee. Patients were included if they were over 18 years old with a classic history of tennis elbow for longer than four months and no surgical intervention or injection in the previous year. Positive clinical findings of tenderness over the lateral epicondyle of the humerus and reproducible pain with resisted finger and wrist extension were essential.

They were excluded if they had any evidence of dysfunction of the shoulder, neck or thorax, local arthritis, generalised polyarthritis, generalised neurological abnormality, nerve entrapment in the upper limb, pregnancy, infection, tumour, a clotting disorder, were on anticoagulant therapy or had a cardiac pacemaker.

All patients were told the nature and purpose of the study and all signed a consent form. They were asked to quantify their pain on a visual analogue scale in which 0 was no pain and 100 the worst pain imaginable.

The patients were randomised using closed unmarked envelopes into group 1, for treatment with steroid injection, and group 2, for treatment by ESWT. Information sheets were provided for both groups and the procedures were fully explained to the patients. Group 1 received an injection of 20 mg of triamcinolone made up to 1.5 ml with 1% lignocaine using an aseptic technique, into the point of maximal tenderness at the extensor origin of the lateral epicondyle of the humerus. Group 2 received three sessions of ESWT at weekly intervals. Treatment was provided by an ultrasonographer from United Medical Systems using the portable Storz Minilith SL1 lithotripter. A total of 2000 shock waves (maximum 0.1 MJ/mm^2) was administered at each session with inline ultrasound guidance. No patient required local anaesthesia. Both groups were advised to rest and moderate their activities to avoid aggravation of their symptoms.

All patients were reviewed at six weeks and three months after the end of treatment. They were assessed clinically and their visual analogue pain scores were recorded.

In total, 111 patients were referred. Of these, nine did not attend their appointment, five were excluded because of an incorrect diagnosis or anticoagulant treatment and four declined to take part and were not randomised. This left 93 in the study. Of the 51 patients randomised to ESWT, three withdrew and 48 (25 men and 23 women) completed their treatments. Of the 42 patients randomised to receive the injection, 17 refused this after randomisation with 25 (13 men and 12 women) continuing in the study. There was an equal distribution of men and women, and the mean age of the patients was 49 years (27 to 69).

Results

Six weeks after injection the mean visual analogue score had fallen from a pretreatment level of 67 to 21. At three months it had decreased to 12. The mean score for the ESWT group fell from 61 before treatment to 35 at six weeks after the end of treatment (tailed *t*-test, $p = 0.052$) and to 31 at three months.

Using a reduction of pain of 50% as a criterion of success at three months after the end of treatment, 21 (84%) of group 1 had reduction of pain of 50% or greater compared with 29 (60%) of group 2 (chi-squared test, $p < 0.05$).

After clinical assessment at three months, ten of the 19 patients classified as failure of ESWT and two of the four classified as failure of injection were referred for surgical release.

Discussion

Our results have shown that injection of steroid and local anaesthetic was more effective than ESWT in the treatment of lateral epicondylitis, although both treatments relieve symptoms. The latter may have a place in the management of tennis elbow, but the indications must be defined. Further studies with a more lengthy follow-up are needed to assess the long-term effect of treatment as well as to identify which groups of patients will benefit most, for example, those with an acute presentation, chronic resistant pain with failed injections or surgery, or those with a sedentary lifestyle.

In these days of increasing accountability the price of the various options for treatment must be justified with respect to the clinical benefit. A course of ESWT costs about £300 and the components of an injection amount to £3. This considerable difference in cost must be taken into account in the planning of treatment.

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