especially, orthopaedics, which most of us have
developed by years of co-operative working,
could well be endangered by the arrangements
large practices and districts might make with
individuals with lesser skill and interest but
lower costs. Conversely skilled surgeons who
undertake painstaking work on patients with
rheumatic diseases and then co-ordinate their
often long and time-consuming rehabilitation
programmes are likely to be castigated as 'over-
priced' when compared with their colleagues
who concentrate on easier surgery in fitter
patients. The accent on audit, a subject dear to
many rheumatologists' hearts, might be seen as
alleviating these anxieties, but the White Paper
appears to have considered only 'easy audit',
with easily quantifiable incidents such as surgery
being assessed using easily quantifiable out-
comes such as death. The difficulties of assessing
outcome of long term, non-curative treatment of
chronic disease is nowhere addressed. Our prob-
lems are not eased by the absence from the
Korner out-patient minimum data set of the
diagnostic information which is required for
even the simplest audit. The promised expendi-
ture on information technology is unlikely to be
helpful to us unless our data requirements are
more fully understood than at present.

The White Paper contains some good ideas,
but the associated Working Papers add little to
our understanding of how they will be translated
into practice. Many parts of the documents
appear to contain no understanding of the needs
and problems of patients with chronic diseases.
It is our professional duty to educate the decision
makers, and mould this set of proposals, which
could severely handicap rheumatological ser-
vices, so that the needs of our patients are not
forgotten during their implementation.

I. HASLOCK
Middlesbrough General Hospital, Ayresome
Green Lane, Middlesbrough, Cleveland
TS5 5A2

TENNIS ELBOW—A REAPPRAISAL

TENNIS elbow is one of the commonest lesions of
the arm. The first description is attributed to
Runge in 1873 [1] but the name derives from
Morris’ description of ‘lawn tennis arm’ in the
Lancet of 1882 [2]. It affects 1–3% of the popula-
tion [3,4], occurs mostly between 40 and 60 years
and usually affects the dominant arm. While
40–50% of tennis players suffer with it, especi-
ally older players [5,6], in clinical practice less
than 5% are related to the game [7], and it is
found more often in non-athletes. The majority
are not manual workers and many cannot
describe any precipitating factors [8].

Over 25 conditions have been suggested as
causes of tennis elbow [9] but many relate to the
use of the diagnosis as a non-specific term for
lateral elbow pain. Like other soft tissue condi-
tions, most cases of tennis elbow never come to
surgery and so pathological material for study is
relatively rare. Operative experience in rela-
tively few chronic cases has revealed a number of
apparent causes including periostitis [1], infec-
tion [9], bursitis [10], radiohumeral joint disease
including fibrillation of the radial head [11–16],
radio-ulnar joint disease [12], radial nerve
entrainment [17] and a lesion of the orbicular
ligament [18,19]. The majority of cases are
believed, however, to be due to a musculoten-
dinous lesion of the common extensor tendon at
or near the attachment to the lateral epicondyle;
the part of the tendon derived from extensor
carpi radialis brevis is particularly thought to be
involved [7,20].

At operation, tears are sometimes quite
marked in the common extensor tendon [7].
Prior, repeated use of hydrocortisone injections
may have affected these findings. Microfrac-
tures, cystic and fibrinoid degeneration and
round cell infiltrations, immature fibrous tissue
(once considered to be inflammatory granula-
tion tissue) [6–8] and attempts at repair have
been described [21]. Biopsies from patients com-
ing to surgery from our unit have shown no
evidence of inflammation. We have observed
instead, mesenchymal transformation occurring
within the tendon close to the insertion with
fibrocartilage, calcification and new bone forma-
tion. Such findings would be expected to result
from chronic traction, a cause previously sug-
gested [22]. There is an abundant nerve supply
to the attachment portion of the tendon [23].
Biopsies are obtained from chronic lesions and
we know little about changes associated with the
more common short history. Development of
the lesion may relate to the characteristics of the
tenoperiosteal junction (enthesis), age and over-
use. The blood supply to the enthesis and nearby
tendon is a watershed of that derived from
muscle and bone and so is relatively avascular
and prone to ischaemic stress, partly because the
working muscle takes up the blood supply at the expense of tendon, but there are many other contributory factors.

Tennis elbow rarely occurs before the age of 30 and it is by mature adult life that alterations in collagen content, reduction in cells and ground substance and an increase in lipids are found in the enthesis which probably predispose it to injury [24]. Insufficient emphasis has been given to the elasticity of tendons, which is partly the result of the intrinsic elasticity of the fibres themselves and partly their reticular arrangement, the presence of interlinked elastic fibres and the presence of interposed cells, the fluid of which acts as a buffer. The onset of symptoms may be brought on by overuse. It is more often seen in the active middle aged than the less active elderly. Relative overuse of wrist and finger extensors may precipitate tennis elbow in manual workers [4] and the dominant arm is more usually affected, although in a few the condition is bilateral. The development of bilateral tennis elbow may be due to increased stress placed on the unaffected arm, but the high incidence of medical epicondylitis, shoulder tendinitis and other soft tissue lesions observed in some studies remains as yet unexplained [6,8,25]. Enthesopathy has been suggested as a unifying concept [24].

Pain is localized to the lateral epicondyle but may spread up and down the upper limb. Grip is impaired due to the pain and this may restrict daily activities. Tenderness over the epicondyle is usual although other nearby sites may sometimes be maximally tender [19,20]. Pain will increase on resisting wrist dorsiflexion with the elbow in extension, and symptoms may also be precipitated by extending the elbow with the wrist palmar flexed and by extending the middle finger against resistance.

The range of movement of the elbow is usually normal but loss of a few degrees of extension is found in some severe and chronic cases. Exclusion of other conditions producing elbow pain is necessary, especially referred pain from the cervical spine, and arthritis of the elbow is usually obvious. X-rays of the elbow may be helpful to exclude joint disease and may occasionally show lateral soft tissue calcification [26]. An important differential diagnosis is the radial tunnel syndrome and compression of the posterior interosseus nerve [6,17,27]. Diffuse pain, sensory signs and symptoms distal to the lateral epicondyle and the presence of muscle weakness may be useful distinguishing features and electromyography may be helpful. Although suggested as being a fairly common cause of 'resistant tennis elbow' [6], it is generally thought to be uncommon [28].

Like other soft tissue conditions the assessment of severity and response to treatment is difficult to measure quantitatively. In addition to grading pain, tenderness and pain on resisted wrist dorsiflexion, other clinical tests have been developed and used successfully in monitoring patients. These include lifting graded weights and measuring grip strength [29,30]. Clinical features do show some variability both with regard to the site of tenderness and degree of involvement of supination and pronation. While these differences may have pathological significance, they do not appear to have prognostic importance. Infrared thermography of the affected elbow shows a discrete localized area of increased heat near the lateral epicondyle in 98% of affected elbows, and analysis of the gradient across the abnormal area showed correlation with clinical severity [29].

Over 40 suggested treatment regimens have been described which have ranged from the extremes of 'prolonged observation' [9] to X-ray therapy [31]. Reduced activity may result in resolution of symptoms in a few patients and may be effective in early cases [4,9,32]. While exercises to strengthen the forearm muscles are often prescribed in the USA, emphasis is generally placed on resting the elbow in the UK. Non-steroidal anti-inflammatory drugs are often used but evidence for their efficacy is tenuous. One study showed no difference from local steroid injection but little benefit resulted from either in this short-term trial [33]. Ultrasound, by its ability to cross myofascial planes and concentrate near bone has theoretical advantages [34]. A double blind controlled trial showed an advantage for ultrasound treatment and 63% improved [30]. Acupuncture has also been used in treatment [35].

Local injections of various substances have been used and corticosteroids since the early 1950s have been the commonest and most satisfactory [36] although superiority over saline and local anaesthetics has only recently been demonstrated [25]. The claims for the superiority of methylprednisolone and triamcinolone over hydrocortisone [37,38] have not been proven and they may lead to loss of subcutaneous fat with dimpling and depigmentation, especially with repeated injection. There remains no overall agreement in the literature as to the best
steroid preparation, the correct dosage, and the best form of administration (single spot or multiple punctures) [4,32,37–39]. If there is no response to two injections then further attempts are unlikely to be effective [40].

Tennis elbow may be a self-limiting disorder, patients improving with or without treatment within a year [20]. This good prognosis contrasts with reported relapse rates of between 18% and 50% at 6 months after conservative treatment [37,38]. A recent study [8] of 125 patients, found that 90% improved after a steroid injection but relapse was frequent (26%). Over 40% had prolonged minor discomfort which affected some activities, in some persisting for 5 years. This minor disability was not considered severe enough to require therapy but lasted for longer than is generally recognized. Recurrence of severe disability was usually associated with resumption of the activity which induced the initial pain. Manual workers, especially mechanics, builders and domestic workers were the groups most susceptible to recurrence and tended to seek medical or fringe medical care in an attempt to continue their occupation. Whether early treatment may improve prognosis has yet to be confirmed [41]. Firm strapping of the forearm muscles just distal to the elbow joint, or the use of one of the commercially available elbow splints may also be helpful and patients should avoid straining the arm for at least 3 months.

It has been suggested that 10% of patients fail to respond to ultrasound and injections [32]. Options other than surgery are limited. The Mills manipulation technique has been advocated by some [9,42] but its usefulness is disputed [31]. Interestingly, Mills originally described the technique for use in acute cases, envisaging turning a partial tear into a complete one [43]. Wadsworth [32] has suggested anaesthetizing the patient, injecting steroid and manipulating. He describes his experience in treating over 100 patients and describes an audible snap which he attributes to tearing the common extensor tendon or breaking down adhesions. Attempts at trying to stimulate healing of the tendon lesion using low dose pulsed electromagnetic fields have not really met with success, although an improvement may have been masked by the splinting effect of wearing the treatment apparatus for prolonged periods [44,45].

Approaches to surgical management have attempted to correct the presumed pathology. Excision of tissues around the epicondyle have been advocated [1,10,26,46], while removal of a synovial fringe of the radiohumeral joint [12] or resection of the orbicular ligament [19,47] despite the risk of instability [48] are favoured by others. Denervation of the lateral epicondyle has been used to relieve symptoms in a few cases [49]. Other procedures have perhaps more reasonably been applied to the most likely musculo-tendinous case. Repair of tears has been undertaken [7] but in most cases surgery aims to effectively lengthen the extensor muscle tendon complex either by the less favoured tenotomy [16] or division of the common extensor origin [50]. Lateral release has been successful in 90% of cases and is as good as that for more extensive procedures [40]. It is probably the surgical management of choice.

In order to try to improve conservative management in the future, a greater understanding of the pathophysiology at the tissue level is required. Further histological study of biopsies of chronic cases coming to surgery can be of help but may not reflect that of earlier lesions. Another approach is to try to understand basic changes in tendon with age and disease at a cellular level. Failure of tendon fibroblasts to maintain the normal integrity of the tendon in the face of stress and repetitive minor trauma may be important. It is now possible to isolate adult human tendon fibroblasts [51] which means that assessment of growth characteristics and cellular function is now possible and preliminary studies have been undertaken [52]. Unfortunately, biopsy of early acute cases of tennis elbow is unlikely ever to be feasible. The newer non-invasive radiological methods of investigations, particularly magnetic resonance imaging with its potential to assess internal biochemistry as well as structure, may contribute to our understanding of soft tissue rheumatism.

M. D. CHARD, B. L. HAZLEMAN Rheumatology Research Unit, Addenbrooke’s Hospital, Cambridge, UK

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