

that the diagnosis had not been changed in the clinician's mind but not the notes. Also in a substantial number of cases (about 20%) it was not possible to extract a principal diagnosis from the clinical notes. Nevertheless, it seems reasonable to conclude that diagnosis is still an imperfect art which can benefit from some sort of audit such as can be provided by the necropsy.

Further Study

We are now planning a prospective study involving two regions of the country which we hope will give more information of the degree of concordance between ante-mortem and post-mortem diagnosis. If this confirms our retrospective study, there will be a strong case for attempting to reverse the downward trend in necropsy rates.

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Hospital Topics

Fibrillation of Head of Radius as One Cause of Tennis Elbow

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Summary

Twenty-five patients with resistant tennis elbow were treated by exploration of the radio-humeral joint. Twenty cases showed abnormalities of the cartilage of the head of the radius. Division of the orbicular ligament and excision of the abnormal cartilage gave good results in 19 of the 20 cases seen recently. We believe fibrillation of the head of the radius is an important cause of tennis elbow, and the arguments to support this theory are enumerated.

Introduction

Many theories exist of the cause of tennis elbow, but few of the suggested pathological changes have subsequently been convincingly demonstrated. Osgood¹ considered it to be a bursitis and cured three patients by excising a radio-humeral bursa. Neither Hughes² nor Goldie³ could detect a bursa but both found abnormal granulation tissue beneath the extensor origin, and that its removal cured the patient. Many believe that pain arises from minute tears in the region of the extensor origin, but such lesions have rarely been demonstrated until recently.⁴

Hughes² was unable to find any abnormality of the extensor origin in 16 explorations, while Spencer and Hernod⁵ found specks of calcium in only two out of 49 cases, and no abnormality in the others. Moore⁶ believed that trapped synovial fringes were causative and found such a fringe in all 10 cases reported. Recently cases of tennis elbow have been attributed to a radial tunnel syndrome,⁷ and nerve decompression has resulted in symptomatic improvement.

Bosworth⁸ explored the lateral aspect of the elbow in 62 patients suffering from tennis elbow. In 25 cases thickening was noted in the extensor origin, in 32 cases degenerative changes were found in the orbicular ligament, and in 4 chondromalacia of the head of the radius was noted. However, this last pathological feature was not looked for as a routine. He concludes that symptoms arise from the degenerative changes in the orbicular ligament and believes that the "eccentric" nature of the head of the radius is responsible. We also believe that pain arises from the region of the orbicular ligament but that the most important initiating factor is the underlying fibrillation of the head of the radius.

Clinical Features

Fibrillation of the head of the radius presents in middle age as pain on the lateral aspect of the elbow, which is often precipitated by repetitive pronation and supination movements. The pain is worsened by active dorsiflexion of the wrist. This can result in apparent weakness of grip and thus inability to carry. We believe a characteristic of this condition to be that the tenderness is over the head of the radius and not over the lateral epicondyle. The head of the radius can be readily palpated, and the site of maximal tenderness is elicited by full pronation of

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the forearm, which brings the posteromedial segment of the head of the radius beneath the examining finger. This site is often acutely tender. The importance of this test has not been previously described. In tennis elbow, pain is produced by forced palmar flexion of the wrist with the forearm pronated. In this position the abnormal area of cartilage lies beneath the extensor aponeurosis and is compressed by it, with consequent discomfort. These observations serve to distinguish fibrillation of the head of the radius from other similar conditions.

Material

Many patients with tennis elbow recover without medical aid. Most of those receiving treatment require no more than a period of rest or a short course of injections of lignocaine and hydrocortisone. However, there remain a small group of people who are resistant to conservative treatment and who can benefit from surgery.

Twenty-five cases seen over a 10-year period have been treated by arthrotomy of their radio-humeral joint when conservative means have failed to relieve their symptoms. The group comprised 14 men and 11 women with an average age of 43 years. All had received injections of hydrocortisone pre-operatively and several had also been treated by other non-operative means (manipulation, immobilization, friction) but without relief of their symptoms. The average duration of symptoms before operation was 18 months.

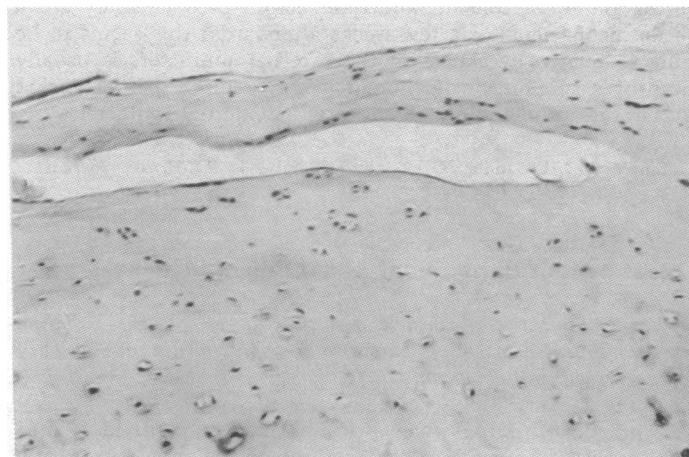
Pathology

The lesions referred to here have the characteristic surface degenerative changes described by Bullough and Goodfellow.⁹ Fibrillation denotes the condition in which the fibrous framework within the cartilage is exposed owing to loss of ground substance; while chondromalacia is defined as softening of articular cartilage in the presence of an intact linea splendens.

Table I shows that in 20 of the 25 elbows explored fibrillation or chondromalacia was noted in the cartilage of the head of the radius extending on to the articular circumference; in one case chondromalacia of the capitellum was present as well. Generally the excised cartilage was examined histologically and the

TABLE I—Pathological Findings in 25 Arthrotomies

Fibrillation or chondromalacia of head of radius	19
Chondromalacia of capitellum and radial head	1
Inflamed synovial fringe	1
No macroscopic abnormality	3
Unrecorded	1



Excised cartilage from a head of radius showing fibrillation. The linea splendens is disrupted, and there is chondrocyte proliferation.

abnormalities noted at surgery were confirmed. Most cases showed fibrillation (fig. 1), though in a few instances chondromalacia was noted, the cartilage showing oedema and chondrocyte proliferation, though the linea splendens was intact.

In a few instances part of the orbicular ligament has been excised and examined microscopically. In all cases this ligament has shown degenerative changes with abnormal oval nuclei and mucinous degeneration.

Operative Procedure

A lateral approach over the head of the radius was made and the extensor aponeurosis was divided in the line of its fibres. The orbicular ligament was then divided and the joint opened, thus allowing full inspection of the synovium and the head of radius. The forearm is pronated and supinated, enabling most of the rim of the head of the radius to be visualized. Any areas of abnormal cartilage, whether fibrillated or chondromalacic, are excised down to bone, and in a single case the raw bone was then drilled. The subcutaneous tissues and skin are then closed.

When no abnormality was found the extensor origin was released, and on two occasions this was done in addition to removing the abnormal area of cartilage.

Results

It can be seen from table II that all except one patient were improved by this surgical approach. The single failure was the case in which the head of the radius was drilled.

TABLE II—Results: 20 cases reviewed recently

Symptoms	Strength of grip
No symptoms 14	Normal 18
Minimal ache 5	Slight weakness 1
Unrelieved 1	Definite weakness 1

Twenty cases have been reviewed recently at an average of four years from operation. Fourteen of these had no symptoms, five had minimal discomfort, and one was still much inconvenienced by his elbow.

It has been suggested that weakness might result from dividing the orbicular ligament. The grip and power of wrist extension was measured in the patients seen recently. Since no preoperative figures were available, the power was compared with that on the nonoperated side. The man whose symptoms persist unabated had considerable weakness, and one woman had slight weakness. The remainder were at least as strong on the operated side, and it would not appear that this operative procedure weakens the arm.

Discussion

Good results have been obtained by many different methods of treating resistant tennis elbow. Releasing the common extensor origin,⁵ removing granulation tissue,³ lengthening of extensor carpi radialis brevis,¹⁰ dividing the orbicular ligament,⁸ and denervating the radio-humeral joint,¹¹ have all been shown to cure the majority of patients. It seems to us that any one of these procedures could be expected to relieve symptoms due to fibrillation of the head of the radius because all will reduce the friction between the abnormal cartilage and the overlying degenerate orbicular ligament.

There are other reasons why we believe that fibrillation of the head of the radius is the causative lesion in many cases of tennis elbow. Goodfellow and Bullough¹² have shown that degenerative changes occur in the articular cartilage of the head

of the radius in early adult life and progress with age. The changes are most marked in the posteromedial quadrant of the head of the radius and thus lie beneath the extensor origin when the hand is in the position of function—that is, pronated. It seems logical that repeated pronation and supination of an area of degenerate cartilage beneath the compressing force of the extensor musculature should cause wear changes in the interposed orbicular ligament. Such changes have been found.

The pain from which these patients suffer is worse when the abnormal cartilage of the posteromedial quadrant is compressed, either by the examining finger or by active dorsiflexion of the wrist in the pronated position. Injection of the radio-humeral joint with lignocaine and hydrocortisone gives instant relief of pain, and full comfortable wrist movements are immediately restored.

Conclusions

Probably several pathological entities can present as tennis elbow, and the time has come for the term to be abandoned in favour of more accurate descriptions of the pathology. Fibrillation of the head of the radius is an important contributing factor in many cases. We believe that the repetitive movement

of abnormal cartilage situated in the articular circumference of the radial head can cause pain on the lateral aspect of the elbow. Most cases respond to injections of hydrocortisone into the radio-humeral joint. When this treatment is unsuccessful a variety of surgical procedures will probably relieve the symptoms, but it seems logical to perform an exploratory operation, divide the orbicular ligament, and remove the degenerate cartilage.

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Any Questions?

We publish below a selection of questions and answers of general interest

Lactase Preparations for Lactose Intolerance

With lactose intolerance common in certain communities, have lactase tablets or capsules been developed which can be administered by mouth to sufferers?

No. It would probably be difficult to produce an active preparation since it is likely that each disaccharidase consists of several different enzymes. At present milk exclusion is the only treatment, but a search should always be made for potentially treatable conditions like coeliac disease and giardiasis which may have caused secondary lactose intolerance.

Is Bonfire Smoke Carcinogenic?

Is there any evidence that "bonfire smoke" is carcinogenic?

The emission of smoke from a bonfire shows that combustion in it is incomplete. Carcinogenic polycyclic aromatic hydrocarbons may be formed by pyrolysis under conditions of incomplete combustion of a wide range of organic materials such as wood, leaves, or paper. Chemical analysis would show traces of carcinogens of this type in the smoke from all bonfires. Theoretically, carcinogens of other types might be formed, particularly if synthetic materials were burned. Most of the particles in bonfire smoke, however, are very large and do not reach the lungs. On the other hand, irritant gases, such as certain oxides of nitrogen and aldehydes, may be inhaled. Frequent heavy exposure to ordinary bonfire smoke could well predispose to lung disease though probably not cancer. Smoke from bonfires where man-made chemicals are being destroyed might be more dangerous. Paradoxically, the blacker smoke is the less likely it is to be harmful because the colour is due to carbon which is a good absorber of noxious gases. Historically, the banning of bonfires increased problems associated with air pollution in Los Angeles.

Incontinence after Prostatectomy

What is the failure rate after prostatectomy?

I assume that by failure the inquirer means incontinence. In one recent English series¹ of 1154 prostatectomies—all for benign enlargement—13 became incontinent (1.1%). The risk of incontinence after an operation for malignant disease of the prostate is much higher because the external sphincter and posterior urethra become stiff and rigid from infiltrating tumour. There is little difference in the risk of incontinence whether the benign prostate is removed transurethrally or by an open enucleative procedure: in 935 transurethral resections nine became incontinent (0.9%)—and in all but two of these cases there was coexisting neurogenic disorder or a contracted bladder. In 219 open prostatectomies four became incontinent (1.8%). Many elderly patients who have had difficulty in urination for a considerable time before prostatectomy are a little incontinent for a few weeks afterwards: this seems to be due to relative weakness of the external sphincter. It usually improves spontaneously though it may require a brief period of faradic stimulation to re-educate the external sphincter.

¹ Singh, M., Tresidder, G. C., and Blandy, J. P., *British Journal of Urology*, 1973, 45, 93.

Treatment of Paroxysmal Atrial Fibrillation

What treatment is advisable for an elderly patient suffering from frequent attacks of paroxysmal atrial fibrillation—usually on getting up in the morning?

Treatment of paroxysmal atrial fibrillation is divided into two aspects: prevention, and control of the rate during any paroxysm that does develop. Prophylaxis can be achieved with either the beta-adrenergic-receptor-blocking agents, such as