Treatment of Tennis Elbow*

Use of a Special Brace

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Tennis elbow or humeral epicondylitis is a minor ailment, but to a tennis player, a golfer, a gardener, or a skier, it can be a threat to his way of life. The entity is therefore worthy of prevention and teatment. This is a report on the study of 174 patients with epicondylitis of the elbow, with special reference to the effective treatment by an elbow brace.

Although tennis elbow was first described by Runge [1] in 1873, almost 100 years ago, and its bibliography is long,[2] there is still no unanimity as to cause or treatment.

The literature relates tennis elbow to local trauma, contusion, or sprain,[2] soft-tissue calcification,[3] bursitis,[4] radiohumeral synovitis,[5] tear of the extensor carpi radialis brevis muscle,[6] avulsion of the tendon origin,[7] displacement of the orbicular ligament on the radial head,[8] or idiopathic spontaneous occurrence.[2]

The disease is thought to be self-limited, generally subsiding in 12 months,[2] yet cases lasting several years are not uncommon. A wide variety of treatment has been advocated, which probably indicates that no one treatment is uniformly effective. For example, where tennis was a causitive factor, professionals advise the use of a lighter or heavier racquet handle, or a narrower or thicker grip (P. Segura and P. Gonzales, personal communication, Nov. 11, 1964). Other reported methods of therapy include rest,[9] a cock-up splint,[7] manipulation,[6, 10, 11] roentgenotherapy,[3, 12, 13] ultrasound,[14] injection of hydrocortisone,[2, 15] and open operation.[16]

Surgical procedures include division of the tendinous origin from the lateral epicondyle excision of bursa or calcific deposits, division of the common extensor origin and the orbicular ligament, or lengthening of the extensor carpi radialis longus tendon.

Anatomy

The elbow is a hinge joint, the articular surfaces of which are connected by a capsule supported by medial or ulnar and lateral or radial ligaments. The annular ligament encircles the head of the radius holding it in contact with the radial notch of the ulna. The extensor muscles of the forearm (Fig. 1) are anchored to the lateral humeral epicondyle, the most frequent site of pain. The joint is thus dependent on ligamentous structures for stability and is especially vulnerable to lateral and rotary strains. It is also affected by diseases or injuries involving locally the articular cartilage, the muscles, ligaments, and joint synovia, as well as disease or injuries of the wrist, shoulder, and neck.

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Diagnosis

The diagnosis of epicondylitis or tennis elbow is made on the complaints of pain in the medial or lateral sides of the elbow, especially on making a fist, shaking hands, lifting a weight with the hand in supination, or resisting dorsiflexion of the wrist.

On examination there is localized tenderness over the lateral or medial epicondyles or the radiohumeral joint, usually over the orbicular ligament. There is discomfort on shaking hands or making a fist and on resisting dorsiflexion of the wrist. Lifting a weight is apt to be painful.

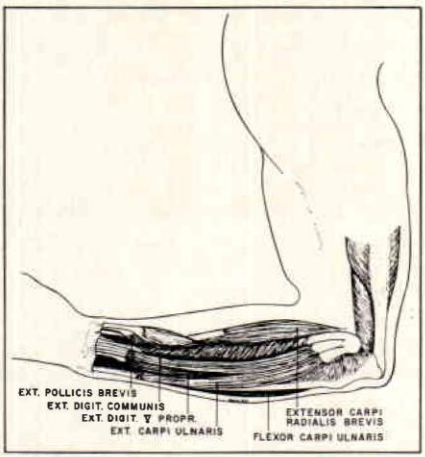

FIG. 1—The extensor muscles illustrating anchorage to the lateral epicondyle.

The pain is a steady, dull, ache in the elbow. It is worse on exertion such as gardening, housework, writing, typing, carpentering, or even holding the leash of a dog. It may be so severe as to disable a carpenter, typist, stenographer, plumber, or housekeeper, and it may interfere with sleep.

Composition of Series

In our series of 174 patients, there were 103 men and 71 women. Four patients were under 20 years of age, 31 between 20 and 30 years, and 139 were over 40 years of age. (The majority of patients are over 40 years of age.) The right elbow was involved in 124 patients, the left in 39, and both in 11; the lateral epicondyle was involved in 146, medial epicondyle in 19, and both medial and lateral epicondyles in 8.

The etiological factors are listed in Table 1. Direct trauma, tennis, and golf were the most frequent causes of epicondylitis of the elbow. One

TABLE 1

CAUSATIVE FACTORS IN TENNIS ELBOW (HUMERAL EPICONDYLITIS)

Etiology	*Incidence*	*Etiology*	*Incidence*
Trauma	51	Swimming	1
Tennis	43	Piano	1
Golf	18	Weight lifting	2
Gardening	3	Shooting craps	1
Bowling	2	Unknown	52

FIG. 2—Calcification lateral to radiohumeral joint. Symptoms were relieved by two injections of hydrocortisone.

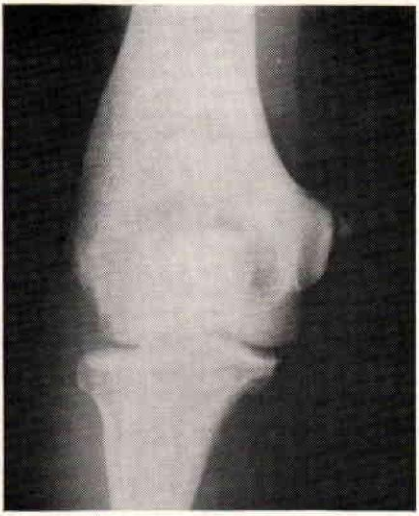

FIG. 3—Bone fragment near medial epicondyle of humerus. Symptoms were relieved by excision and brace.

woman who spent six hours in Las Vegas shooting craps developed a lateral epicondylitis. In almost one third of the patients there was no evident causative factor.

The duration of symptoms was under one month in 63 patients, between one and six months in 70, and over six months in 30.

X-ray film studies were done on 45 patients with positive findings in 11 patients, such as calcification in nine (Fig. 2), a questionable lateral spur in one, and a bone fragment in one (Fig. 3). X-ray films in the last patient, a physician, showed a medial bone fragment. Excision, followed by use of the brace, resulted in a cure.

Treatment

Miscellaneous.—Treatment in our patients was varied. Six were given local massage, with relief obtained in only one case; manipulation of the elbow gave poor results in eight patients. Five patients received x-ray therapy, all with poor results. Six patients had ultrasonic treatment with poor results in all instances. Three patients had elevated blood uric acid levels of 9.5, 6.1, and 9.7 mg/100 cc, respectively, but only the last responded to colchicine therapy. One patient obtained relief by holding 2-lb. weights at the level of the shoulder and letting the hands and weights fall down suddenly to snap the elbows. One patient obtained relief by taking hot showers. Several were personally instructed in the proper way to hit a tennis ball. One patient successfully changed to a heavier tennis racquet with larger grip. One patient is now receiving local applications of dimethyl sulfoxide with apparent relief. Only five have had surgery.

Steroid Therapy.—Most of our patients were treated by injecting the tender area with 15 to 25 mg of hydrocortisone, diluted with 3 to 4 cc of 1% lidocaine (Xylocaine) hydrochloride.[2] If one injection failed to relieve the pain, a second, a third, and occasionally more were given. A disadvantage of this method is the occasional severe pain after the injection.

In Table 2 the results of local treatment with steroid injections are listed. When one or two injections failed to relieve the pain, the efficacy of further injections became progressively less.

One patient was examined recently after 25 to 30 cortisone injections, which he had been given by another physician without relief. He was anxious to play golf and tennis; he was given a brace which enabled him to return to his games.

Treatment With a Brace.—When such conservative measures fail or when the patient does not wish to try drug injection treatment, a special brace is prescribed (Fig. 4). The brace is designed to support the elbow joint laterally, to prevent complete extension, and to limit forearm rotary motion. It is made of elastic material so woven that on flexion the crease is horizontally placed, and posteriorly the weave over the olecranon is longitudinal. Lateral metal strips with a hinge-stop support the elbow, preventing extension of the elbow beyond 160°. This light flexion of the elbow seems to relax the muscles and lessen the strain on the elbow joint. Posterior laces allow for easy fitting. A modification of the first brace substitutes cross-straps for the lateral stops to limit extension (Fig. 5). Upper and lower elastic straps adjust the circumference of the brace. Although more cumbersome, this crossing of the straps seems to be a better way of limiting elbow flexion and forearm rotation.

As an added bonus, the brace tends to improve the patient's tennis or golf technique by using the arm as a single unit. The added weight encourages the follow through after the ball is stroked. The brace is worn during the sport or, in the case of a carpenter or gardener, during the day at work. Most patients have been able to return to their sport with the help of the brace, with good results in 24, fair in 4, and poor in 8. Most of the patients with poor results complained that the brace was cumbersome and a bother to wear.

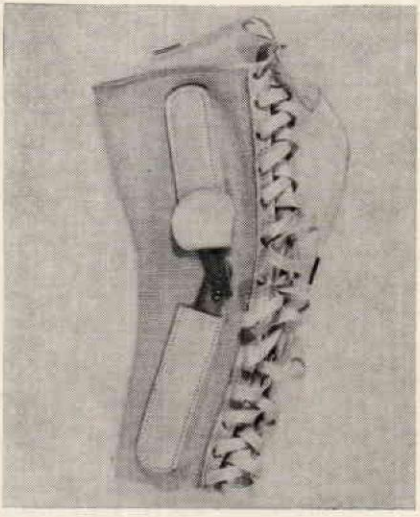

FIG. 4—Tennis elbow brace. Posterior laces allow for easy fitting. Lateral metal strips with a hinge-stop support elbow and prevent extension of elbow beyond 160°.

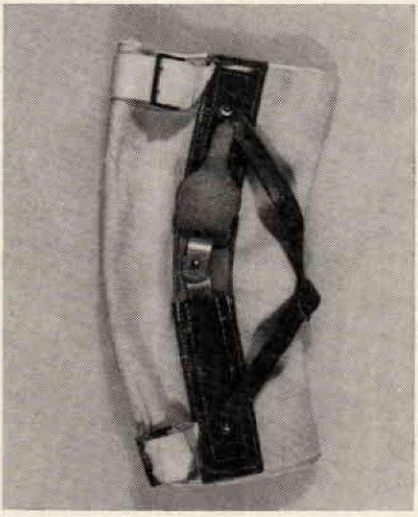

FIG. 5—Adjustable cross straps limit extension of elbow and forearm supination and pronation. Note upper and lower straps for better fitting.

Report of Cases

CASE 1.—A 37-year-old man, a tennis player, developed pain in the outer side of the right elbow. For three months he was given therapy elsewhere with heat, untrasound, and whirlpool, without relief. Two injections of hydrocortisone diluted with lidocaine hydrochloride and a wrist band did not help. A brace was prescribed. This gave him immediate and lasting relief of pain and has enabled him to play tennis regularly.

CASE 2.—A 47-year-old woman complained of pain on the lateral side of the right elbow of six months' duration, probably from gardening. One injection of hydrocortisone helped temporarily. The elbow brace immediately releived pain and has been worn while gardening and carrying water cans. After using the brace for eight weeks it was discarded. Follow-up reports two years later revealed no recurrence of symptoms.

CASE 3.—A 64-year-old golfer, unrelieved by three injections of cortisone and discontinuing golf for six months, was relieved by wearing the brace. Discontinuance of the use of the brace on three occasions was followed by recurrence of pain, which was promptly again relieved by wearing the brace. After using the brace for six weeks on the last occasion, recurrence of pain has not recurred in nine months.

CASE 4.—A 54-year-old physician, 11 years ago, developed lateral right epicondylitis. Hydrocortisone injections and x-ray therapy failed to relieve the pain. For five years the patient has successfully worn an elbow brace only while playing tennis. Without the brace the pain recurs and he is unable to play tennis.

TABLE 2

RESULTS OF STEROID THERAPY FOR TENNIS ELBOW (HUMERAL EPICONDYLITIS)

Number of Patients	*Number of Injections*	*Result*		
		Relief	*Failure*	*Unknown*
64	1	46	13	5
20	2	10	9	1
18	3	5	11	2
28	Over 3	8	19	1

Conclusion

Epicondylitis of the elbow can cause serious disability. It occurs one and a half times more frequently in men, four times more commonly in individuals over 40 years of age, involves the right elbow three times as often as the left, and the lateral epicondyle seven times as often as the medial epicondyle. It is usually traumatic in origin but can occur spontaneously. Symptoms are often relieved by local injections of hydrocortisone diluted with lidocaine hydrochloride. A brace that limits extension and forearm rotary motion and supports the elbow gave relief in 80% of cases in which other conservative methods of treatment had failed.

The brace in Fig. 4 is made by M. J. Benjamin Co., Los Angeles, and the brace in Fig. 5 is made by Lerman & Son, Beverly Hills, California.

Generic and Trade Names of Drug—Lidocaine hydrochloride—*Xylocaine Hydrochloride.*

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