Lateral epicondylitis is the most common affliction of the elbow. It occurs in middle-aged individuals and is self-limiting in the majority of cases. The etiology of the condition is not completely understood. Based on clinical, histologic, and imaging data, the tendinous origin of the extensor carpi radialis brevis is the most likely site of pathology. A variety of procedures have been described to treat epicondylitis. Most commonly, the extensor carpi radialis brevis tendon origin is debrided with either open or arthroscopic methods. Both techniques require a thorough understanding of the anatomy of the extensor tendon origin at the humeral epicondyle. Improvement is reported in the majority of cases treated surgically, although residual symptoms persist in a substantial number of patients.

From epidemiologic studies, it is clear that epicondylitis most commonly afflicts individuals of middle age between 35 and 60 years. It occurs 4 to 5 times more frequently in men than women and more commonly in the dominant arm. Interestingly, it is less common in black individuals. The condition typically begins insidiously, although it is frequently attributed to one event or activity. Lateral elbow pain is the most characteristic feature, commonly associated with diminished grip strength. Symptoms are aggravated by activities involving wrist extension against resistance or with applied load.

The pathology of epicondylitis has been attributed to a variety of conditions including bursitis, synovitis, and degenerative arthritis, among others. The tendinous origin of the extensor carpi radialis brevis (ECRB), however, is the most commonly identified source of pathology. Although imaging is not typically required to confirm the diagnosis, abnormal signal of the tendon origin has been confirmed by magnetic resonance scanning. Although irritation of the posterior interosseous nerve can coexist, this finding is relatively rare.
The source of elbow pain associated with lateral epicondylitis is poorly understood. Histologic studies have failed to identify inflammation of the extensor tendon origin. However, periostitis of the humeral epicondyle was identified microscopically as early as 1910. In addition, reactive granulation tissue containing nerve fibers has been reported in the subten-dinous space beneath the ECRB. Tendon degeneration (tendinosis) has also been cited as a potential source of pain.

In the vast majority of cases, lateral epicondylitis is self-limiting, clearing within 8 to 12 months. A variety of conservative measures have been reported to be beneficial, including various therapy modalities, counterforce bracing, and acupuncture. Unfortunately, at present there is insufficient scientific evidence to support any of these current treatment methods. It is clear that stretching and exercise conditioning are beneficial as opposed to immobilization. Cortisone injection to the epicondyle does provide short-term benefit, although it may not alter the natural history of the condition. Fortunately, once epicondylitis resolves, recurrence is rare, reported in less than 5% of cases.

**Operative Treatment: Open Methods**

Surgery is required in approximately 4% to 8% of reported cases. However, this probably represents a falsely high estimate, because not all individuals with the condition seek formal medical evaluation. The first effective surgical procedure reported for lateral epicondylitis dates back to 1873, when Runge used simple cautery to burn all tissue from the skin down to the humerus. Since that time, a number of surgical procedures have been described, including simple resection of the epicondyle, resection of the annular ligament and joint synovium, percutaneous or open division of the common extensor origin, distal tendon lengthening, denervation, radial nerve decompression, and epicondylar resection followed by aceno coverage. All methods have been reported to provide successful outcomes.

The most common technique currently used involves identification and excision of any abnormally identified tissue at the extensor tendon origin, with creation of a bony bed to promote healing, followed by reapproximation of the overlying aponeurosis. The procedure requires identification of the ECRB tendon.

The bony origin of the extensor brevis is beneath the lateral epicondylar prominence, along a longitudinally oriented ridge (Fig 1).

Distal to the epicondyle, the ECRB tendon lies beneath the extensor digitorum communis (EDC) and
its aponeurosis. The ECRB tendon covers the posterior fibers of the extensor carpi radialis longus (ECRL) muscle (Fig 2). It can most easily be identified by dissecting in an anterior to posterior direction, beginning at the junction between the ECRL and EDC aponeurosis (Fig 3). The undersurface of the brevis tendon can be elevated from the longus muscle in oblique fashion. The aponeurosis of the EDC lies on top of the brevis and is tightly opposed.

An alternative method of brevis tendon identification involves anterior elevation of the common tendon origin beginning at the midline of the radiocapitellar joint (Fig 4). This marks the posterior margin of the brevis tendon. Elevation posterior to the midline of the joint is unnecessary and puts the collateral ligament complex origin in jeopardy. The brevis undersurface is debrided, and the epicondylar origin is denuded or drilled. The fascia is then closed.

**FIGURE 2.** Anatomic specimen (right elbow) with the extensor tendon origins dissected. The ECRL is reflected anteriorly and the EDC posteriorly to reveal the ECRB tendon.

**FIGURE 3.** (A) Lateral view of the right elbow of an anatomic specimen. Needle is in the lateral epicondyle. The forceps is positioned along the interval between the EDC aponeurosis and the ECRL muscle belly. This marks the anterior margin of the ECRB tendon. (B) Reflection of the undersurface of the ECRB tendon from the posterior fibers of the ECRL. This interval is oblique, coursing from anterolateral to posteromedial. (C) Dissection of the EDC aponeurosis and muscle from the underlying ECRB tendon. (D) Posterior reflection of the EDC reveals the extent of the ECRB tendon beneath.
There has been recent interest in using arthroscopic methods to surgically treat lateral epicondylitis from within the joint. Cited advantages include the ability to debride the brevis tendon undersurface without dividing the common extensor apponeurosis, the ability to evaluate the joint for intra-articular pathology, and possibly a shortened rehabilitation period.26,27

The procedure requires a familiarity with arthroscopic instrumentation and techniques as applied to the elbow joint. A proximal medial portal for viewing and a lateral working portal are used. The lateral joint capsule must be resected to allow identification of the brevis tendon origin, which is extra-articular. Mechanical shavers can be used, but a radiofrequency ablation device with a small joint probe provides a more elegant dissection without obscuring tissue planes.

When the tendon origin and its relation to bony landmarks is understood, the brevis is released (Fig 5). The superior aspect of the capitellum marks the anterior margin of tendon resection. The collateral ligament origin marks the posterior margin. Care is taken not to violate the collateral ligament or the majority of the communis tendon (located superficial to the brevis tendon). No attempt is made to repair the tendinous origin of the ECRB after release. The epicondyle origin can then be decorticated mechanically with a shaver, burr, or handheld rasp.

The majority of retrospective studies report successful outcomes after surgical intervention, with 80% to 90% of patients having good and excellent results.22,28 The largest prospective series, however, which consisted of 57 patients followed up for approximately 5 years after an
open procedure, showed continued symptoms in many patients. In this study, moderate to severe pain was reported in 40% of patients at 6 weeks after surgery and in 24% at 1 year. At 5 years, although the majority of surgically treated patients were improved, 9% continued to experience moderate to severe pain, and 28% reported persistent low-grade symptoms.

The largest study comparing open with arthroscopic release reported good to excellent results in 10 of 15 patients treated with either method. The arthroscopically treated patients did report a more rapid recovery after surgery. However, 33% of patients in each group had results judged as fair to poor at a minimum 2-year follow-up.

SUMMARY

From a review of the literature, it is clear that surgical intervention for lateral epicondylitis is somewhat less predictable than other operative procedures about the elbow. Unfortunately, no variables predictive of success have been identified, including time between the onset of symptoms and surgery, occupation, grip strength, pain severity, limitation of motion, tenderness, age, number of cortisone injections, and the use of preoperative therapy. When surgery is offered, patients must be counseled on the possibility of a long recovery period with continued symptoms about the lateral elbow.

REFERENCES