Management of Lateral Epicondylitis: Current Concepts

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Abstract

Lateral epicondylitis, or tennis elbow, is a common cause of elbow pain in the general population. Traditionally, lateral epicondylitis has been attributed to degeneration of the extensor carpi radialis brevis origin, although the underlying collateral ligamentous complex and joint capsule also have been implicated. Nonsurgical treatment, the mainstay of management, involves a myriad of options, including rest, nonsteroidal anti-inflammatory drugs, physical therapy, cortisone, blood and botulinum toxin injections, supportive forearm bracing, and local modalities. For patients with recalcitrant disease, the traditional open débridement technique has been modified by multiple surgeons, with others relying on arthroscopic or even percutaneous procedures. Without a standard protocol (nonsurgical or surgical), surgeons need to keep abreast of established and evolving treatment options to effectively treat patients with lateral epicondylitis.

Lateral epicondylitis affects 1% to 3% of adults each year.[1,2] The diagnosis was first made by Runge[3] in 1873 and was named "lawn-tennis arm" by Major[4] in 1883 due to its association with the sport. Despite its relatively high prevalence, the development of a single effective and consistent management of lateral epicondylitis remains an unrealized goal. Modalities such as botulinum toxin injection and shock wave therapy recently have been presented as novel nonsurgical treatments. Surgical approaches to tennis elbow now include well-described open and arthroscopic procedures.

Epidemiology

The characteristic patient with lateral epicondylitis is an adult in the fourth or fifth decade of life. Men and women are affected equally, with symptoms more commonly seen in the dominant arm. In his extensive study of lateral epicondylitis, Goldie[5] attributed the onset of symptoms to overexertion of the extremity with repetitive wrist extension and alternating forearm pronation/supination. A recent investigation identified as risk factors a history of manual labor with heavy tools and significant strain while performing repetitive tasks.[6]

The traditional teaching is that most patients with lateral epicondylitis will improve over time. Approximately 80% of patients with newly diagnosed lateral epicondylitis report symptomatic improvement at 1 year.[2,7-9] Although most patients may experience mild residual symptoms, only 4% to 11% who seek medical treatment will require

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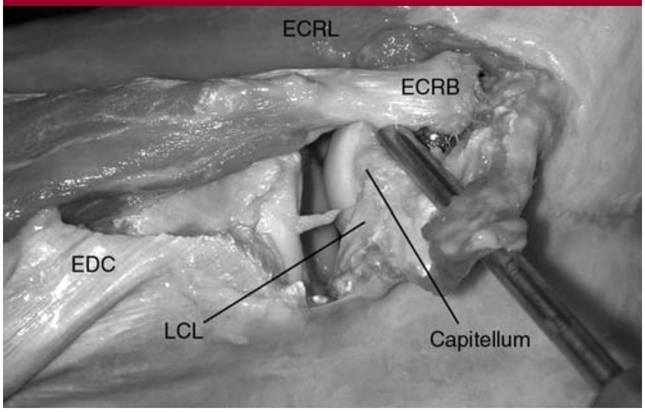
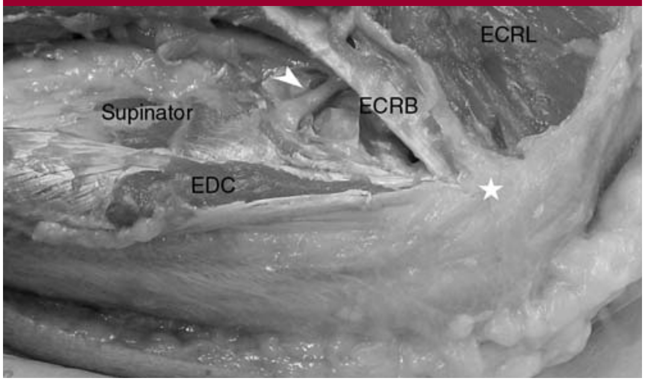
Figure 1



Lateral elbow dissection demonstrating the relationship of the extensor carpi radialis longus (ECRL), extensor carpi radialis brevis (ECRB), extensor digitorum communis (EDC [cut]), lateral collateral ligament (LCL [reflected]), radial head, and capitellum. The ECRL is seen as a muscular insertion proximal to the ECRB tendinous origin.

Figure 2



Location of the posterior interosseous nerve (arrowhead) crossing deep to the extensor communis radialis longus (ECRL) and extensor communis radialis brevis (ECRB), entering the supinator at the level of the radial head. The lateral epicondyle is marked with a star. The ECRB and extensor digitorum communis (EDC) have been separated to aid in visualization.

surgical intervention.[2,9-12] However, in referral practices, 25% or more of patients may be candidates for surgery.[13] Poor prognostic factors for successful nonsurgical treatment include manual labor, dominant arm involvement, long duration of symptoms with high baseline pain levels, and poor coping mechanisms.[7]

Lateral Epicondyle Anatomy

The lateral epicondyle morphology has been described as a pyramid-shaped bony prominence.[14] The anconeus muscle originates from its posterior face, and the extensor carpi radialis brevis (ECRB) and extensor digitorum communis (EDC) tendinous origins lie on the anterior face. The extensor carpi radialis longus (ECRL) and brachioradialis originate more cephalad along the anterior aspect of the supracondylar ridge. The ECRL muscular origin visibly contrasts with the tendinous ECRB (Figure 1).

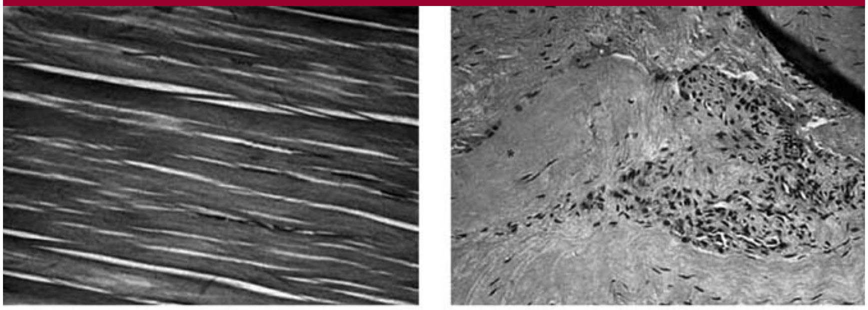
The common extensor tendinous origin is a composite of the ECRB and EDC. Lateral epicondylitis pathology occurs in the more superior and slightly deeper fibers of the ECRB. These extensors lie superficial to the supinator, which courses over the anterolateral aspect of the elbow capsule. The lateral collateral ligament complex originates from the apex of the epicondyle. This complex is composed of the lateral ulnar collateral ligament, the radial collateral ligament, and the annular ligament.[15]

Proximal to the elbow, the radial nerve is located between the brachialis and brachioradialis muscles. It divides into its terminal branches, the superficial radial nerve and the posterior interosseous nerve (PIN), at the level of the radial head. The PIN then enters the supinator muscle, or radial tunnel, where compression has been implicated in cases of refractory lateral epicondylitis[16] (Figure 2).

Sources of Pain

The etiology of pain generation in lateral epicondylitis is multifactorial. It is likely that both intra- and extra-articular structures produce symptoms and that the contribution of each varies between patients. Cinematographic and electromyographic evaluation of tennis players with lateral epicondylitis demonstrates altered swing mechanics and increased ECRB activity compared with asymptomatic controls.[17] This combination provides one explanation for the predilection for pathology in the ECRB.[17] In such a high-tension environment with repetitive microtrauma, the patient likely would benefit from the relative rest provided by forearm bands and wrist splints. Following the initial finding of free nerve endings in the aponeurosis and granulation tissue around the lateral epicondyle,[5] biochemical analysis has demonstrated neurokinin 1 (substance P) receptors within the extensor origin and increased levels of the excitatory neurotransmitter glutamate in patients with lateral epicondylitis.[18,19] Although not definitively linked to lateral epicondylitis, these findings provide a mechanism for neurogenic pain generation and offer one potential explanation for the relief provided by steroid injections into an area largely devoid of acute inflammation. The high incidence of intra-

Figure 3



A B

Histologic comparison of normal tendon insertion versus insertion in lateral epicondylitis. **A,** Normal tendon demonstrating uniform collagen without vascular structures (hematoxylin-eosin, original magnification ×100). **B,** Diseased tendon demonstrating angiofibroblastic hyperplasia (right) with disorganized fibroblasts abutting more normal tendon (left) (hematoxylin-eosin, original magnification ×100). (Reproduced with permission from Kraushaar BS, Nirschl RP: Tendinosis of the elbow [tennis elbow]: Clinical features and findings of histological, immunohistochemical, and electron microscopy studies. *J Bone Joint Surg Am* 1999;81: 259-278.)

Table 1

Conditions That Produce Symptoms Similar to Lateral Epicondylitis

Radial tunnel syndrome
Cervical radiculopathy
Osteochondral radiocapitellar lesion
Posterolateral elbow plica
Posterolateral elbow instability

articular pathology noted in several surgical series suggests that an intra-articular source of pain, such as a plical fold or synovitis, is another plausible cause of lateral elbow pain.[12,20,21] A variety of surgical approaches yield similar results; thus, it is possible that the responsible pathologic tissues are linked. By addressing one, the others may be treated concurrently.

Histology

The ECRB origin is the most commonly cited anatomic location of lateral epicondylitis pathology. Histologic sections of this area demonstrate noninflammatory angiofibroblastic tendinosis with neovascularization, a disordered collagen scaffold, and mucoid degeneration[12] (Figure 3). The overall presentation is consistent with a pattern of repetitive microinjury and healing attempts.[13] Notably, there is usually no evidence of acute inflammation. Nirschl and colleagues[12,22] have noted that 35% to 50% of patients also have degeneration within the EDC.

Patient Evaluation

History

Pain over the lateral aspect of the elbow is the most consistent symptom of lateral epicondylitis. This pain is usually sharp and is exacerbated by activities involving active wrist extension or passive wrist flexion with the elbow extended. A characteristic complaint is the inability to hold items (eg, a coffee cup) due to pain in the lateral elbow. Although there is often a history of repetitive activity, symptom onset is frequently insidious, with no clear inciting event.

Physical Examination

Typically, the patient presents with maximal tenderness slightly anterior and distal to the lateral epicondyle over the origin of the ECRB and the EDC muscles. Less frequently, localized tenderness is present at the apex of the bony lateral epicondyle. Rarely, this tenderness is accompanied by swelling, erythema, or warmth. Pain localized to the lateral epicondyle or just slightly distal to the extensor origin is often elicited with resisted wrist and digit extension.

Differential Diagnosis

Diagnosis of lateral epicondylitis should exclude several conditions that produce similar symptoms (Table 1). Radial tunnel syndrome, or compression of the posterior interosseous nerve, may be difficult to differentiate from lateral epicondylitis. Maximal tenderness in radial tunnel syndrome is typically noted 3 to 4 cm distal and anterior to the epicondyle over the mobile wad.[23] Resisted wrist extension may not be painful in radial tunnel syndrome, but it is painful in lateral epicondylitis. Resisted thumb and index finger extension may be painful in radial tunnel syndrome but not with lateral epicondylitis. Resisted forearm supination may be painful in radial tunnel syndrome because of compression of the radial nerve (PIN) within the supinator muscle. Lateral epicondylitis and radial tunnel syndrome may coexist in up to 5% of patients.[23] In each patient, the cervical spine and shoulder also should be examined to identify proximal radicular symptoms or pathologic findings.

A careful examination also is warranted to identify the patient with intra-articular pathology, such as radiocapitellar chondral lesions. Estimates of concurrent intra-articular pathology range from 11% to 69%.[12,20,24] Ruch et al[21] recently reported on 10 patients with a posterolateral plica causing refractory lateral elbow pain. The most suggestive physical examination findings included a painful clicking at terminal extension and forearm supination as well as maximal tenderness over the posterior radiocapitellar joint. Some patients initially diagnosed and treated nonsurgically for lateral epicondylitis have had unrecognized posterolateral rotatory elbow instability.[25]

Limited shoulder internal rotation was reported as a comorbidity in one series of patients with lateral epicondylitis.[26] Such restriction of motion during a tennis serve may require compensation via excessive wrist flexion, which would strain the ECRB and predispose these individuals to lateral epicondylitis.[26]

Imaging

Although lateral epicondylitis remains primarily a clinical diagnosis, several imaging modalities have been used to provide ancillary information. Plain radiographic examination occasionally shows calcifications within the extensor mass origin or intra-articular pathology.[5,12] Nirschl[27] has stated that such calcifications are associated with persistent disease and are present in approximately 20% of patients requiring surgical treatment.

Magnetic resonance imaging (MRI) may be used to evaluate a suspected intra-articular process, assess the competency of the radial collateral ligament complex, and define the extent of tearing of the extensor origin. Pretreatment MRI scans may demonstrate edema and thickening of the extensor origin in 90% of symptomatic patients.[28-30] With high-resolution and fine-cut imaging, the ECRB origin can be classified as separated away from the radial collateral complex, thinned, or partially versus completely torn.[29,31] Although an increased T2 signal at the ECRB origin does not correlate with symptom severity, the extent of tendon involvement has proved to be accurate at the time of débridement.[29] MRI has not been shown to provide useful information in determining response to treatment because increased T2 signal may persist weeks after symptom resolution.[31] MRI findings must be correlated with clinical examination since 14% to 54% of asymptomatic elbows will have edema in the common extensor origin.[28,30,31]

Ultrasound examination in lateral epicondylitis identifies focal hypoechoic areas, intrasubstance tears, peritendinous fluid, and thickening of the common extensor origin.[32] Ultrasound provides moderate sensitivity (64% to 88%) when evaluating the extensor origin architecture but is of variable specificity (36% to 100%), depending on the study.[33,34] Given the significant level of operator dependence, ultrasound is most useful when performed and interpreted by experienced individuals.

Treatment

A variety of treatment modalities has been proposed to address lateral epicondylitis. The basic premise behind each approach is the desire to aid or enhance natural healing. Nirschl and Ashman[22] suggested an ordered treatment progression to parallel the healing response. This approach begins with initial control of exudation and hemorrhage, followed by the promotion of tissue healing, encouragement of general fitness, and the control of force loading. The final step, necessary in only a minority of patients, is removal of the pathologic tissue.

Nonsurgical

Rest and Nonsteroidal Anti-inflammatory Drugs

Rest, consisting of varying degrees and duration of activity limitations, and nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used to manage acute lateral epicondylitis. These simple interventions reduce tendinous inflammation, relieve tendon strain, and provide time for tendon healing. Although lateral epicondylitis is characterized as a noninflammatory condition, NSAIDs may relieve pain from associated synovitis or acute inflammation in the surrounding supportive adipose, connective, and muscle tissue.[22]

The utility of topical NSAIDs has mixed support in the literature, with one study showing significant (P = 0.007) pain relief versus placebo.[35] However, another study showed no advantage of topical NSAIDs compared with other nonsurgical measures.[36]

In a multicenter double-blind randomized trial, Labelle and Guibert[37] compared 28 days of oral NSAID (diclofenac) use with placebo in 129 patients; both groups were temporarily immobilized. The treatment group reported less subjective pain. However, lack of improved grip and functional ability coupled with gastrointestinal side effects from the NSAIDs prevented the authors from endorsing oral NSAIDs for lateral epicondylitis. In a second randomized trial, a 2-week course of naproxen versus placebo failed to show treatment effect at 4 weeks, 6 months, and 12 months.[38]

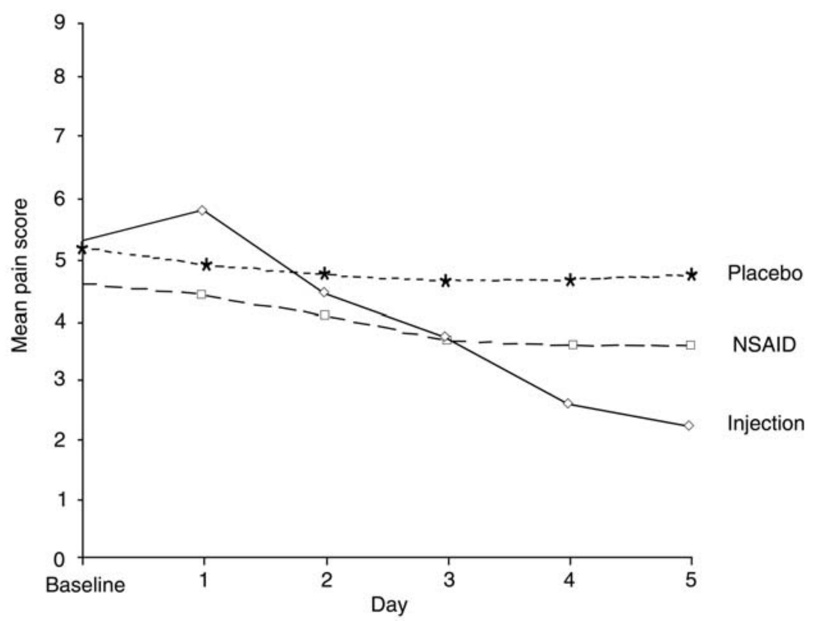
The only study to date comparing different oral NSAIDs (diflunisal and naproxen) did not find differences between the treatment groups.[39] In several trials, short-term pain relief from steroid injections has exceeded that of NSAIDs; however, the effects of the two treatments have been indistinguishable at 12 months.[8,38,40]

Physical Therapy

Physical therapy is often prescribed for lateral epicondylitis. The most effective mode of therapy and treatment duration are matters of debate. A classic therapy protocol described by Nirschl[41] focuses on increasing forearm strength, flexibility, and endurance. This protocol incorporates stretching of the extensor origin by bringing the wrist into flexion with the elbow extended and the forearm pronated, in addition to isometric and concentric strengthening exercises.

Recently, eccentric muscle training has gained attention. Theoretically, eccentric strengthening efficiently induces hypertrophy of the musculotendinous unit and increases its tensile strength, thereby reducing strain on the tendon.[42] In addition, eccentric contractions may provide the optimal stimulus for the tendon cells to produce collagen as well as to decrease the neovascularization that may contribute to painful tendinopathy.[43] Although eccentric training has become a proven modality for treating Achilles tendinopathy, its role in the treatment of lateral epicondylitis has been more difficult to substantiate. Eccentric therapy has demonstrated a positive treatment effect without causing more disability, but significant gains over stretching alone or stretching with concentric strengthening have not been demonstrated.[42,44]

Figure 4



Early (within 5 days) results of nonsurgical modalities for the treatment of lateral epicondylitis. NSAID = nonsteroidal anti-inflammatory drug. (Reproduced with permission from Lewis M, Hay EM, Paterson SM, Croft P: Local steroid injections for tennis elbow: Does the pain get worse before it gets better? Results from a randomized controlled trial. *Clin J Pain* 2005;21:330-334.)

Injection

Steroid injections have been used to treat the acute pain of lateral epicondylitis, allowing patients to begin rehabilitation. Several investigators have evaluated the efficacy of steroid injection versus NSAIDs and placebo.[8,38,40] After a brief period of postinjection discomfort, pain relief during early follow-up (5 days to 6 weeks) has been shown to be significantly ($P < 0.05$) better in the steroid group than in all others[8,9,38,40] (Figure 4). However, at longer follow-up (12 weeks to 12 months), results of those who received steroid injection were the same as, or worse than, those of the other treatment groups.[8,38] Potential explanations for this are that the injections may have weakened the tendon itself or that the patients may have further aggravated the tendon during the relatively painless period early after the injection.[8,40] Altay et al[45] found no difference in outcomes at 1 year when lidocaine injection (60 patients) was compared with lidocaine and steroid injection into the extensor origin (60 patients).

Recent data have highlighted the risks associated with steroid injection. In addition to the common side effects of skin depigmentation and fat atrophy, steroids have been shown to decrease collagen production as well as tenocyte replication.[46] Common extensor tendon rupture has been reported following local steroid injection.[47]

Botulinum toxin, a presynaptic acetylcholine blocker, has recently been proposed as a treatment for lateral epicondylitis. The reported mechanism is partial paralysis of the extensor apparatus, which allows the tendinous origin to heal in a less tensioned environment. Two recent studies compared a single injection of botulinum toxin with a placebo injection. Wong et al[48] reported pain scores with botulinum injection to be significantly ($P = 0.006$) lower than those of the placebo group at 12 weeks. Hayton et al[49] reported no significant difference between groups at 3 months. Although neither study found a difference in grip strength between the experimental and control groups, both reported weakness of finger and wrist extension in the treatment group that was clinically significant for patients who performed intricate work with their hands.[48,49]

Orthoses

Orthotic devices prescribed for patients with lateral epicondylitis include the proximal forearm band and the cock-up wrist splint. The goal of using these devices is to reduce tension at the extensor origin, allowing time for this area to heal. There have been conflicting studies regarding the efficacy of splinting for lateral epicondylitis, and some clinicians feel that splinting may even hinder recovery.[50] In addition, debate continues as to which device, forearm band or wrist splint, is more effective in providing extensor origin pain relief. Forearm bands (counterforce braces) theoretically limit muscle expansion and create a new origin, effectively redirecting muscle force.[41] Electromyographic analysis of tennis players has demonstrated reduced muscle activity during braced play.[51]

Cock-up wrist splints, however, are meant to prohibit contraction of the wrist extensors, thereby providing mechanical rest to the tendinous origin. To date, however, there have been no adequately powered studies to determine their efficacy. A review of the Cochrane database and a comparative study between forearm bands and wrist splints failed to definitively determine the superiority of one device over the other.[52,53] However, most practitioners prescribe a forearm (proximal) tennis elbow band for chronic lateral epicondylitis to increase the functional use of the involved limb.

Shock Wave Therapy

Extracorporeal shock waves (ECSWs) are single-pulsed sonic waves that dissipate energy at the interface of two substances with differences in acoustic impedance. The mechanism by which these waves produce symptomatic relief is not well understood, but potential explanations include the blockage of nociceptors, and the effects on tenocyte cell permeability, inducing a reparative response. Conflicting results are presented in two recent prospective randomized trials. In the larger of the two, in which 272 patients were enrolled, no significant difference was found between placebo and ECSW therapy delivered under local anesthesia.[54] In the second study, a significant ($P = 0.001$) difference in pain reduction was reported at 12 weeks in the treatment group.[55]

One difference between the studies is that local anesthesia was given before the ECSW in the study by Haake et al.[54] However, it is debatable whether this could diminish the therapeutic effect of ECSW. In a Cochrane review of nine trials that included 1,006 participants, Buchbinder et al[56] concluded that there was minimal benefit of ECSW over placebo in managing lateral epicondylitis, regardless of whether the treatment was given early or late.[56]

Other Modalities

The few reports on the use of noncoherent light, which is thought to act via improving local blood supply, are limited in terms of sample size.[57,58] Studies on laser light therapy and low-intensity ultrasound therapy have shown limited clinical usefulness.[59,60] The literature includes isolated reports of topical nitric oxide, iontophoretic dexamethasone, and autologous blood injection.[61-63] It is difficult to draw conclusions from these publications without further confirmatory reports. A classic work by Cyriax[64] describes the forceful manipulation of the lateral elbow, which is designed to convert a partial tear of the extensor origin into a complete tear to allow for healing in an elongated state. Such manipulation is not popular among orthopaedic surgeons today.

Surgical

Open Débridement

Surgical management of lateral epicondylitis is recommended when functional disability and pain persist after 6 to 12 months of nonsurgical management. A 3-cm incision is made, centered just distal to the lateral epicondyle. Sharp dissection continues to the site of the common extensor origin. This enthesis is incised in line with the fibers, revealing the ECRB, deep and posterior to the ECRL. Degenerative tissue within the ECRB, which often has a gray hue, is débrided, and the underlying epicondyle is decorticated. The remaining tendon is reattached as dictated by the extent of débridement.

Modified Techniques

Multiple modifications of open surgery for lateral epicondylitis have been proposed. Open release techniques vary, with debate regarding the need to incorporate an arthrotomy, repair the ECRB, lengthen the ECRB, or simultaneously decompress the radial nerve.[10,12,65-70] The ECRB also may be released percutaneously or endoscopically.[66,71] As an adjunct for chronic or recurrent cases, the anconeus flap has been used to provide coverage.[72] Indications for this flap include postoperative symptom recurrence, draining fistula, and infection; additionally, it may be used as an adjunct to wide excision of the extensor origin.[73]

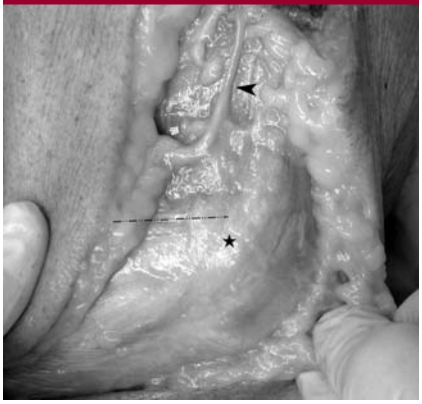
Postoperative Regimen

Splint or sling immobilization for 10 days following open release and extensor origin repair is common.[65,68] Range-of-motion exercises are then commenced, and strengthening is started after 6 weeks. Most surgeons use postoperative splinting protocols until strength is regained. We recommend a wrist support splint for 10 to 14 days and a gradual return to activities, including sports (eg, golf, tennis), no earlier than 6 weeks postoperatively.

Complications

Excessive débridement may compromise the lateral stability of the elbow, resulting in iatrogenic posterolateral rotatory instability. Neuroma of the posterior cutaneous nerve of the forearm is a potential source of persistent postoperative pain.[74] This cutaneous branch of the radial nerve crosses 1.5 cm anterior to the lateral epicondyle on the brachioradialis fascia (Figure 5). Evidence of nerve injury includes paresthesia and dysesthesia distal to the incision. The diagnosis can be confirmed with symptomatic relief as a result of local anesthetic block. This complication may be reliably treated

Figure 5



Location of the posterior cutaneous nerve of the forearm (arrowhead) over the lateral elbow. The lateral epicondyle (star) and the superior margin of the extensor carpi radialis brevis (dashed line) are indicated.

Table 2

Classification of the Arthroscopic Appearance of the Capsule in Lateral Epicondylitis[20]

Type	Appearance
1	Smooth capsule without irregularity
2	Linear or longitudinal tear in the capsule
3	Ruptured and retracted capsule with frayed extensor carpi radialis brevis visible

by neuroma excision with intramuscular implantation of the proximal nerve end. Reactive bone formation following open release has been reported; this may require surgical excision.[75]

Arthroscopic Débridement

The arthroscopic approach to lateral epicondylitis varies by surgeon. Some prefer to débride the lateral capsule and infolded tissue that may impinge within the radiocapitellar joint, while others focus débridement on the extensor origin.[20,76] The arthroscopic appearance of the lateral capsule has been classified by Baker et al[20] (Table 2).

Elbow arthroscopy can be performed with the patient in the prone, lateral decubitus, or supine position. One technique involves placing the patient in the supine position with an arm holder under general or regional anesthesia. The joint is first injected with 30 mL of saline to displace neurovascular structures away from portal sites and to facilitate arthroscope insertion. A proximal-medial portal is then established, inserting the cannulated trocar along the anterior humeral cortex. Return of saline confirms intra-articular placement. The radial head, capitellum, distal humerus, and anterolateral capsule are visualized through this medial portal. A superior-lateral portal is created as the working portal for a motorized shaver. The degenerative capsule and undersurface of the ECRB are then released off the lateral epicondyle. The distal extent of débridement remains parallel to the superior half of the radial head, and the proximal débridement ends at the muscular ECRL insertion (Figure 6). Respecting this distal margin reliably protects the origin of the lateral collateral complex (Figure 7).[76] The exposed epicondyle can be decorticated using a high-speed burr.

Postoperative Regimen

Postoperatively, the patient may be placed in soft bandages and a sling for comfort. Most authors report protocols incorporating range-of-motion exercises in the first few days postoperatively.[20,24,76] Some surgeons allow early strengthening

Figure 6

Arthroscopic view of a capsular tear via a medial portal in a right elbow. **A,** Initial view of the lateral capsule with a linear tear (Baker type 2). **B,** Normal extensor carpi radialis brevis (ECRB) tendon following débridement of degenerative deep tissue. **C,** Final view of the ECRB and extensor carpi radialis longus (ECRL), with a clear distinction marking the proximal extent of débridement.

Figure 7

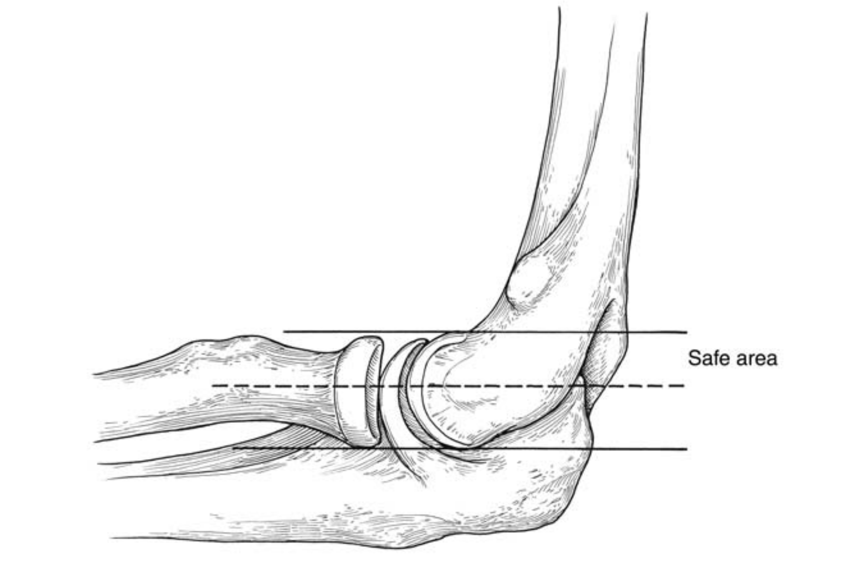


Diagram of the safe zone for débridement in the management of lateral epicondylitis. The safe zone is defined by an area superior to the dashed line bisecting the radial head. (Adapted with permission from Smith AM, Castle JA, Ruch DS: Arthroscopic resection of the common extensor origin: Anatomic considerations. *J Shoulder Elbow Surg* 2003;12:375-379.)

guided by comfort or the resolution of swelling, while others may postpone this phase of rehabilitation until 4 to 6 weeks postoperatively.

Complications

Complications following elbow arthroscopy include nerve injury, heterotopic ossification, and posterolateral rotatory instability following overly aggressive débridement.[77-79] Keeping débridement in line with the anterior half of the radial head prevents destabilization of the lateral elbow.[77]

Results

The surgical results for lateral epicondylitis are generally encouraging. The work by Nirschl and Pettrone[12] on lateral epicondylitis is widely referenced. Their 1979 case series reported excellent results in 66 of 88 patients who were treated with an open release and arthrotomy. An 11% incidence of intra-articular pathology was noted. Ninety-seven percent of patients were improved, and 85% fully resumed their preoperative activity.

Most surgical series confirm the results of Nirschl and Pettrone,[12] reporting predominantly good to excellent outcomes. However, a significant percentage of patients report persistence of mild, intermittent symptoms. A 2002 series of 19 patients treated with open extensor release and origin reattachment found that 18 of 19 patients were "better," yet 6 (60%) of those playing high-demand sports and 2 (15%) of those with high-demand employment changed sports or jobs postoperatively.[68] In a long-term prospective study of 63 patients following open release, 40% had persistent pain at 6 weeks postoperatively. This number decreased to 24% at 1 year and to 9% at 5 years.[80]

In three arthroscopic series, 93% to 100% of patients were "better" or "much better" at an average of 2 years postoperatively.[20,24,75] However, only 62% to 80% of patients experienced complete elimination of lateral elbow pain.[20,75] For these patients, the average time to return to work was 11 days (range, 0 to 42 days).[20,24,75]

Szabo et al[79] published the largest comparative series to date of surgical débridement techniques. Patients were followed for a minimum of 2 years after arthroscopic (n = 41), open (n = 38), or percutaneous (n = 23) lateral epicondyle release. No statistical difference in outcomes between the groups was identified. Overall, 5.8% of patients experienced a recurrence that was successfully treated with a cortisone injection; 5.8% of surgeries were classified as failures (three percutaneous, one arthroscopic, two open). Only the three patients who failed percutaneous release were successfully revised with an open procedure. Forty-four percent of those treated arthroscopically were found to have intra-articular pathology. One major limitation in this series is that it was a nonrandomized, retrospective evaluation.

Peart et al[65] reported another retrospective, comparative study of open (46 patients) versus arthroscopic release (29 patients). At 6 months, the procedures yielded statistically identical results, with nearly 70% good or excellent outcomes with each. Patients returned to work earlier following arthroscopic treatment. In the only prospective, randomized trial identified in our literature search, percutaneous release resulted in greater improvement than did open release in the Disability of the Arm, Shoulder, and Hand score, patient satisfaction, and quicker return to work.[66]

Summary

Lateral epicondylitis is a common source of morbidity in the general population. Although nonsurgical measures and time usually provide relief, a greater number of patients than previously assumed may continue to experience symptoms. The options for nonsurgical therapy are wide ranging and well published, both within and outside of the orthopaedic literature.

The initial treatment of lateral epicondylitis remains nonsurgical; however, no single nonsurgical approach has demonstrated superiority. In fact, the literature suggests that the best predictor of outcome is the amount of daily physical strain encountered as opposed to the specific treatment rendered. In our experience, most patients report symptomatic relief with nonsurgical measures. We provide steroid injection for pain relief at acute presentation before initiating physical therapy.

Surgical management of lateral epicondylitis is considered only in the small number of patients in whom a prolonged attempt with nonsurgical management is unsuccessful. Current data suggest that open and arthroscopic procedures are similarly effective. However, arthroscopic release tends to allow for a more rapid recovery. Our experience has been consistent with these results. Postoperatively, satisfactory results are obtained in most patients, with those treated arthroscopically experiencing a quicker return to function. The surgeon must individually determine the procedure that can be most confidently and safely performed.

References

Evidence-based Medicine: There are several level I (references 37, 48, 54, 55, 59, 61, and 62) and level II (references 7, 8, 35, 36, 38-40, 42, 44, 45, 49, 52, 53, 56, 58, 60, and 66) studies. Level III/IV cohort and case-control studies predominate.

Citation numbers printed in **bold type** indicate references published within the past 5 years.

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