

NERVE COMPRESSIONS AROUND THE ELBOW

NOT EVERYTHING IS TENNIS OR GOLF ELBOW!

– Written by Amir Adham Ahmad, Malaysia

INTRODUCTION

The most common diagnoses for elbow pain are tennis or golf elbow. While these conditions are named after tennis and golf, they can occur in individuals participating in a wide range of sports and recreational activities. Below are the types of athletes who may develop tennis elbow or golf elbow:

1. **Tennis players:** As the name suggests, tennis players are at risk of developing tennis elbow due to the repetitive arm motions involved in playing tennis. The backhand stroke, in particular, can place stress on the forearm tendons.
2. **Golfers:** Golfers can develop golf elbow, typically caused by the repeated gripping and swinging of golf clubs. The impact of striking the ball can also contribute to this condition.
3. **Baseball players:** Pitchers and other baseball players can experience these conditions due to the repetitive throwing motions and strain on the elbow joint.
4. **Racquet sports athletes:** Athletes who play sports like badminton, squash, and racquetball are also prone to tennis elbow because of the repetitive arm movements required in these sports.
5. **Weightlifters:** Weightlifters who perform exercises like bench presses or curls can develop these conditions due to the strain placed on the forearm and elbow during lifting.
6. **Swimmers:** Swimmers may experience these conditions because of the repetitive arm movements involved in swimming, especially in butterfly and freestyle strokes.
7. **Bowlers:** The repetitive motion of bowling can contribute to the development of these conditions, especially in recreational and professional bowlers.
8. **Martial artists:** Martial artists, especially those who practice striking techniques like punching and blocking, may be at risk of developing elbow pain.
9. **Rock climbers:** The repetitive gripping and pulling motions during rock climbing can lead to these conditions.
10. **Gardeners and manual laborers:** Individuals engaged in manual labor

or activities that involve repetitive gripping and lifting, such as gardening or construction work, may also be susceptible to these conditions.

However, in these athletes who frequently perform repetitive gripping, lifting, or arm movements, the situation often differs. Conditions like lacertus syndrome and radial tunnel syndrome, which involve nerve compressions at the elbow, can be frequently confused with golf elbow and tennis elbow due to the similarity of symptoms.

LACERTUS SYNDROME

The history and examination for proximal median nerve compression described in major textbooks do not represent the majority of the patients who are suffering from the condition. Thus, the rarity of diagnosing such patients. The paper that opened my eyes to how to properly diagnose patients with proximal median nerve entrapment was by Hagert¹. Her diagnosis was based on (1) weakness in median innervated muscles distal to the lacertus fibrosus; (2) pain upon pressure

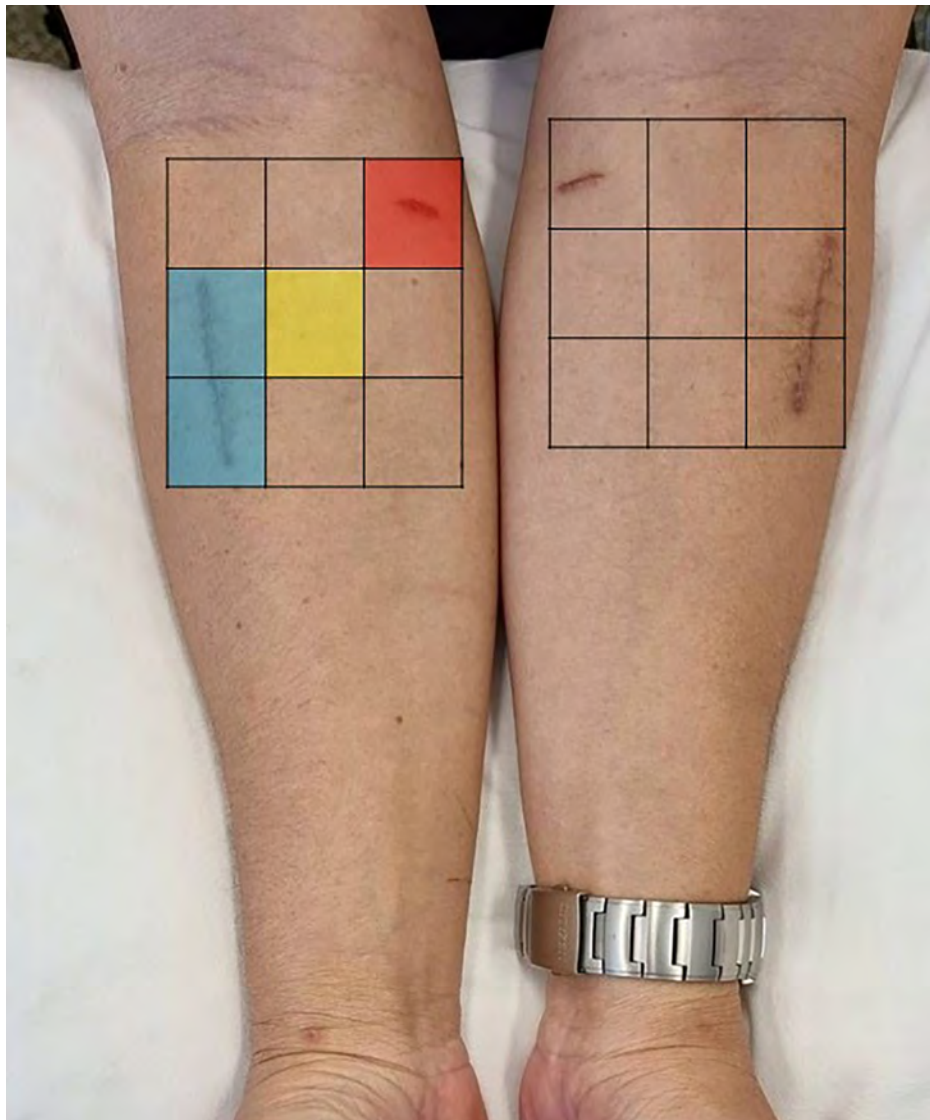


Figure 1: Patient with surgical scars after bilateral lacertus and radial tunnel release with 3x3 square box overlying proximal volar forearm. Tenderness over the proximal medial box (red) indicates lacertus syndrome. Tenderness over two distal lateral boxes (blue) indicates radial tunnel syndrome (copyright, Amir Adham Ahmad).

over the median nerve at the level of the lacertus fibrosus; and (3) a positive scratch collapse test. The diagnosis given for this condition was lacertus syndrome instead of the classical pronator teres syndrome.

Hagert and Lalonde also described this in their chapter in Neligan's Plastic Surgery text (2018)². Even Lalonde had his lacertus fibrosus released by Hagert under wide-awake local anesthesia with no tourniquet (WALANT) and experienced an immediate return of flexion power in his thumb and index finger. I personally have seen more than 500 patients in the past four years. My diagnosis was based on the three examination findings described by Hagert¹.

Commonly, individuals may experience pain in the inner part of the elbow and the volar aspect of the forearm, along with numbness in the palm and fingers, as well as a weakening of their grip or difficulty opening bottle caps.

Clinical examination shows:

1. Tenderness over lacertus fibrosus (Figure 1)¹
2. Weak thumb and index finger flexion (grade 4)³
3. Positive Scratch-Collapse-Test over the Lacertus Region⁴

RADIAL TUNNEL SYNDROME

Patients with radial tunnel syndrome will present with pain over the lateral elbow and dorsal forearm⁵. It may radiate to the wrist and dorsum of fingers. There are five possible sites of compression but the arcade of Frohse is the most common area where the radial nerve is compressed.

Clinical examination shows:

1. Tenderness over radial tunnel region (Figure 1)
2. Weak extensor carpi ulnaris (ECU)
3. Positive Scratch-Collapse-Test over the radial tunnel region

INVESTIGATION

Median and radial nerve compression in the forearm has been thought to be rare when compared to carpal tunnel syndrome and even cubital tunnel syndrome. This could be due to the inability to confirm the diagnosis by electrophysiological and imaging techniques. However, nerve compressions are mainly clinical diagnosis so clinicians must be well versed to differentiate the significant signs and symptoms related to the site of nerve compressions. Electromyography (EMG) and nerve conduction studies (NCS) are rarely indicated as both are often normal or inconclusive and have an unreliable specificity of 30 – 70%. Ultrasound and MRI findings are usually normal until there is apparent muscle wasting of the forearm¹. For this reason, clinical vigilance and acumen are crucial to optimizing patient outcomes.

TREATMENT

Treatment for lacertus and radial tunnel syndrome typically involves conservative measures, although in some cases, surgical intervention may be necessary. Here are some common treatment approaches:

1. *Rest and activity modification:* Initially, it is important to rest the affected arm and avoid activities that exacerbate symptoms. This may include avoiding repetitive pronation and supination of the forearm.
2. *Physical therapy:* Physical therapy can help improve symptoms and address muscle imbalances or tightness that may contribute to the compression of the median and radial nerve. Therapists may use techniques such as stretching, strengthening exercises, and manual therapy to relieve pressure on the nerve.
3. *Anti-inflammatory medications:* Non-steroidal anti-inflammatory drugs (NSAIDs) can help reduce pain and inflammation associated with lacertus or radial tunnel syndrome. These are available over the counter or by prescription.

4. *Steroid injections:* In some cases, a corticosteroid injection into the lacertus fibrosus or radial tunnel may be recommended to reduce inflammation and alleviate symptoms. This is typically done under ultrasound guidance.

5. *Ergonomic changes:* Adjusting your workspace or sports equipment to reduce repetitive movements or awkward wrist positions can help prevent further irritation of the median or radial nerve.

6. *Nerve gliding exercises:* These exercises involve gently moving the affected wrist and hand to encourage the median or radial nerve to glide more freely within the forearm. A physical therapist can
- teach you specific exercises tailored to your condition.

7. *Activity modification:* Changing your work or sports activities to reduce repetitive wrist movements or heavy gripping can help manage symptoms.

8. *Education:* Understanding proper body mechanics and techniques for your specific activities can help prevent the recurrence of symptoms.

If conservative treatments do not provide relief or if there is severe nerve compression, surgery may be considered. These surgeries are best done under WALANT as the return of muscle power and reduction in pain and numbness can be assessed immediately after release. However, the specific surgical
- approach will depend on the individual case and the surgeon's recommendations.

SURGICAL TREATMENT FOR LACERTUS SYNDROME
A 1-2 cm transverse skin incision is placed in the flexion crease of the cubital fossa (Figure 1), 2 cm lateral to the medial epicondyle and 2 cm medial to the bicep tendon with the forearm in supination. Careful dissection is done to protect the branches of the medial antebrachial cutaneous nerve before reaching the lacertus fibrosus. Once the lacertus fibrosus is identified and released (Figures 2 and 3), flexion of the thumb and index finger strength will return to grade 5. Some

TABLE 1

Diagnosis	Lacertus syndrome	Golf elbow	Radial tunnel syndrome	Tennis elbow
History	Numbness of fingers, hand, or upper limb; forearm pain; and muscle weakness	Pain, tenderness, and discomfort on the inner side of the elbow	Dorsal and radial proximal forearm aching pain, paresthesias over the dorsal thumb-index webspace	Pain, tenderness, and discomfort on the outer side of the elbow
Clinical examination	Tenderness over lacertus fibrosus	Tenderness over medial epicondyle,	Tenderness over radial tunnel region	Tenderness over lateral epicondyle,
	Weak FPL and FDP2	No muscle weakness,	Weak ECU, index and middle finger extension	No muscle weakness,
	Positive scratch-collapse-test	Negative scratch-collapse-test	Positive scratch-collapse-test	Negative scratch-collapse-test

Table 1: Summary of differential diagnosis of elbow pain.

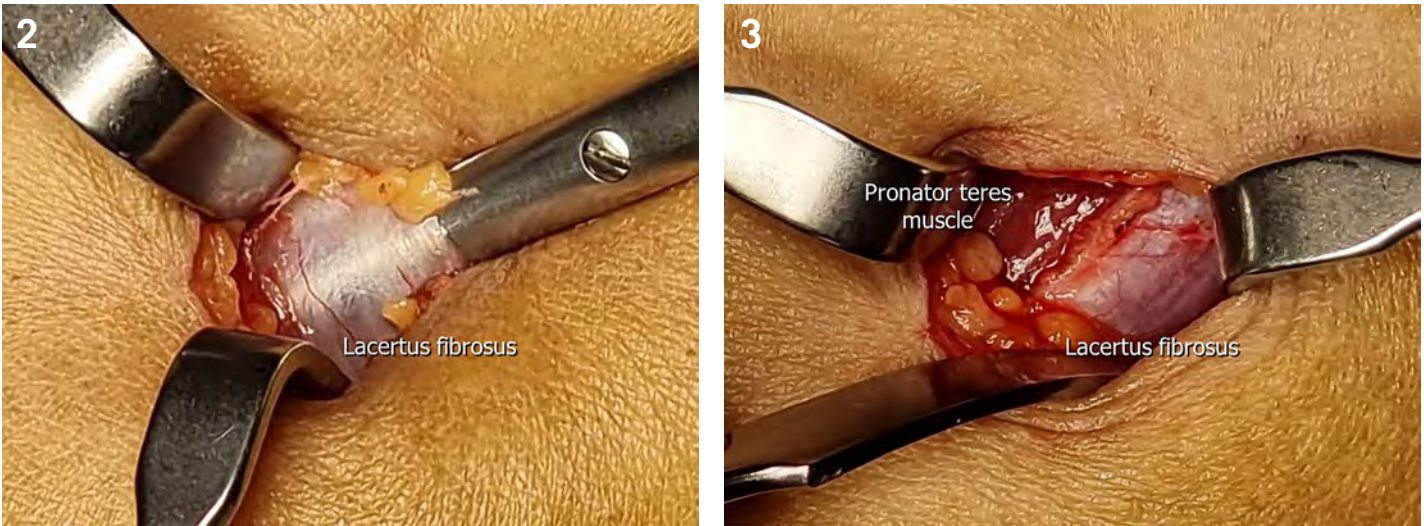


Figure 2: Tight and thickened lacertus fibrosus (copyright, Amir Adham Ahmad)⁶.
Figure 3: Pronator teres muscle underneath the lacertus fibrosus after release (copyright, Amir Adham Ahmad)⁶.

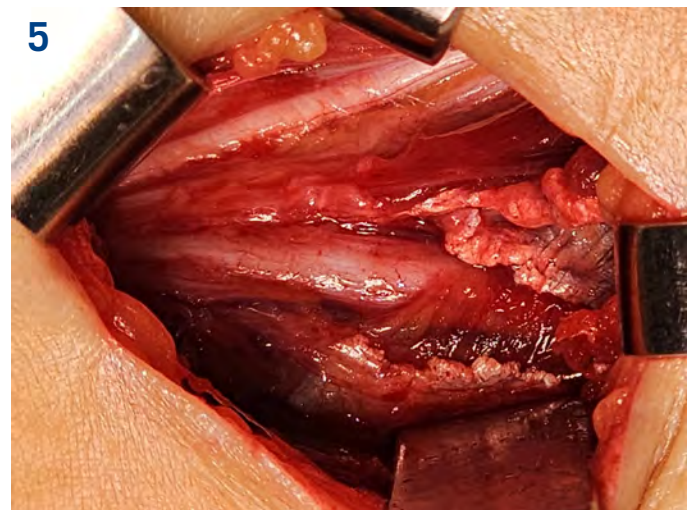


Figure 4: The tight arcade of Frohse is seen compressing the posterior interosseous nerve (copyright, Amir Adham Ahmad).

Figure 5: Compression over the posterior interosseous nerve was relieved after the release of the arcade of Frohse (copyright, Amir Adham Ahmad).

patients would describe a resolution of pain and heaviness in their neck and shoulder after release. There will be no more numbness over the median nerve distribution distally.

SURGICAL TREATMENT FOR RADIAL TUNNEL SYNDROME

A 5-6 cm vertical skin incision is placed along the groove between the brachioradialis muscle and the extensor carpi radialis longus (ECRL) with the forearm in pronation. The incision is 5 cm distal to the lateral epicondyle. The incision is extended between the brachioradialis and ECRL. The first structure seen is the superficial radial nerve which is followed by the nerve to extensor carpi radialis brevis (ECRB). After this, the supinator muscle is seen and the arcade of Frohse is identified as a tendinous band at the proximal side of the supinator muscle (Figure 4). The posterior interosseous nerve (PIN) is usually compressed by the arcade of Frohse at this level. The arcade of Frohse is released together with the supinator (Figure 5). Immediately after release, ECU muscle power, index, and middle finger extension would return to normal (grade 5).

CONSIDERATIONS

Nerve compressions around the forearm are considered rare and this article is trying to change that by simplifying the examination and accurately localizing the compression site of each nerve at the forearm.

Even before that, history taking is of utmost importance. Patients with neck and

shoulder pain should be examined for other signs of nerve compression. Even though neck and shoulder pain are normally treated by spine and sports surgeons, I have patients referred to me by these surgeons with purely neck and shoulder pain. However, all the investigations including MRI did not show any pathology at the neck or shoulder. Upon examination, these patients have nerve compressions over the elbow and forearm.

Patients with multiple joint pains which are treated by rheumatologists are potential patients with lacertus or radial tunnel syndrome. Patients with persistent joint pains even after remission of the original disease should be examined for nerve compression syndromes. These are the patients who are underdiagnosed and can benefit from the proper treatment.

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