



Posterolateral Rotatory Instability of the Elbow: Diagnosis and Surgical Treatment

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Posterolateral rotatory instability of the elbow occurs secondary to disruption of the lateral stabilizers of the elbow, including the lateral collateral ligament and extensor tendon origins. Although trauma is the most frequent cause for posterolateral rotatory instability, other nontraumatic factors may also play a role. Primary repair of the lateral ligament complex is advocated in the acute setting, whereas graft reconstruction is recommended in chronic instability.

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Introduction

With posterolateral rotatory instability (PLRI) of the elbow, the proximal ulna and radius subluxate away from the distal humerus when axially loaded in supination. This occurs as a consequence of insufficiency of the ligamentous and muscular support of the lateral aspect of the elbow.¹

Disruption of the lateral stabilizers of the elbow usually occurs as a consequence of dislocation or fracture-dislocation of the elbow. Most frequently, injury to these structures occurs with a combination of axial compressive, external rotatory, and valgus forces applied to the elbow, in which the body internally rotates with respect to the affected extremity.^{2,3} Less frequently, instability may result as a consequence of a varus deforming force applied to the extended elbow.⁴

Although simple dislocations of the elbow in most instances resolve with a favorable outcome after nonoperative treatment, up to 8% of patients may complain of residual chronic instability.⁵ In this setting, patients may complain of frank giving way or apprehension, especially during axial loading in extension and supination, as done when pushing oneself up from a chair. However, frequently, patients with PLRI do not describe these distinct symptoms of instability. In most instances, patients present with painful snapping, clunking, or clicking of the elbow, with occasional locking near the

terminal extension of the elbow with the forearm in supination. To further challenge the diagnosis of PLRI in these patients, a history of a discrete traumatic event is often not present. Patients may have a history of nonremitting lateral epicondylitis, with or without a history of previous local steroid injections.⁶ Patients with a history of failed surgery for lateral epicondylitis or those having undergone surgery to the radial head may have underlying iatrogenic lateral elbow instability.⁷ Lastly, the condition has been reported in patients with a chronic cubitus varus deformity of the elbow.⁸

Lateral Elbow Anatomy

Both ligamentous and musculotendinous restraints are responsible for stabilizing the relationship between the proximal forearm and the humerus. The ulnohumeral joint, the anterior bundle of the medial collateral ligament, and the lateral collateral ligament (LCL) complex have been shown to act as primary stabilizers of the elbow. Clinically, PLRI of the elbow requires insufficiency of both the ligamentous and musculotendinous origins about the lateral elbow. The most common mechanism involves proximal attenuation or avulsion of these structures from the lateral epicondyle during a traumatic event.⁹⁻¹²

The LCL complex arises from the base of the lateral epicondyle where it flattens onto the lateral aspect of the capitellum. The isometric origin of the LCL is located at the geometric center of the capitellum. Radiographically, this point can be identified by the intersection of a line projecting from

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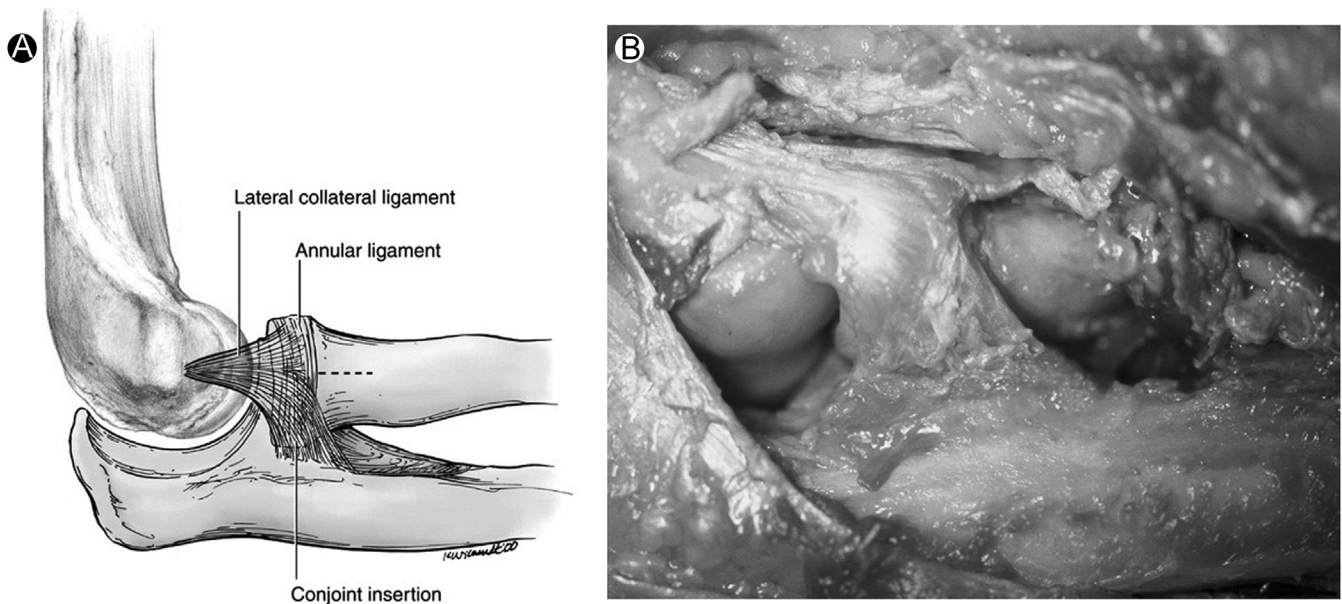


Figure 1 (A) Schematic drawing and (B) cadaveric specimen depicting anatomy of the lateral collateral and annular ligament complex. The overlying extensor muscles and supinator fibers have been removed. The collateral ligament originates at the base of the lateral epicondyle and fans out blending with the annular ligament. These form a broad conjoint insertion onto the proximal ulna along the supinator crest just posterior to the proximal radioulnar joint. (Copyright Mark S. Cohen, Chicago, IL.)

the anterior cortex of the humerus with the axis of the radial head when reduced.¹³ From its humeral insertion, the LCL extends distally, blending with the annular ligament to form a broad common insertion onto the proximal ulna along the supinator crest (Fig. 1).^{9,13} The posterior fibers of this complex have been termed the “lateral ulnar collateral” ligament.⁴ The conjoint insertion of the lateral collateral and annular ligament complex spans distally in either a single or a bilobed fashion.^{9,13} The proximal margin of the ulnar insertion is at the proximal border of the radial head and extends distally for approximately 2 cm. The fibers of the supinator cross obliquely from distal to proximal over this ligamentous complex. This deep tissue layer is then covered by the tendinous origins of the extensor muscles of the forearm.

The contribution of the LCL complex and overlying extensor tendon origins to lateral elbow joint stability has been clarified in the laboratory.^{9,14} The lateral collateral and annular ligament complex represents the primary stabilizer of the elbow laterally. This conjoint structure maintains the ulnohumeral and radiocapitellar joints in a reduced position when the elbow is axially loaded in supination. Principle secondary restraints consist of the extensor muscles with their fascial bands and intermuscular septae.⁹ The extensor muscles serve to independently support the forearm unit from laterally rotating away from the humerus by virtue of their course alone. In supination, they provide a static and dynamic vector supporting the lateral joint. The extensor carpi ulnaris muscle is the most proximal of the extensor muscles and thus has the best mechanical advantage in supporting the proximal forearm. This muscle has a consistent fascial band on its under-surface, which originates at the inferior aspect of the lateral epicondyle and inserts into the ulna approximately 5 cm distal

to the radial head. The extensor carpi ulnaris fascial band becomes taut in supination and with the extensor tendon origins and septae provides secondary resistance to lateral rotatory instability.⁴

Physical Examination

Physical examination in patients with PLRI is characteristically benign. Range-of-motion and grip strength are typically normal, although a slight loss of extension can be observed. If the initial injury was remote, patients may only have minor discomfort on palpation about the lateral elbow. Infrequently, a fluid collection representing a synovial fistula may be observed.⁶

Owing to apprehension and guarding in the awake patient, it is often difficult to elicit frank posterolateral instability in the office, especially in muscular individuals. However, subtle subluxation of the elbow can be appreciated with the appropriate provocative maneuvers. The elbow may be examined with the patient in the sitting position, the arm adducted and the forearm in supination, with the elbow flexed approximately 40°-45°. One hand is used to stabilize the humerus, with the fingers placed along the lateral ulnohumeral joint. The contralateral arm loads the proximal forearm in supination with slight axial and valgus force applied. Instability is appreciated as gapping at the ulnohumeral articulation occurs with radioulnar subluxation off the humerus. This results in a posterolateral prominence as the radial head subluxates with the ulna away from the capitellum. The ulnohumeral articulation can be reduced by pronation of the forearm and slight flexion of the joint. Reduction is occasionally accompanied by

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