

## EVIDENCE SUMMARY

# Elbow Instability

title: "Elbow Instability" slug: elbow-instability region: elbow audience: patient mesh\_terms: ["Joint Instability", "Elbow Joint", "Collateral Ligaments", "terrible triad", "posterolateral rotatory instability", "PLRI", "elbow dislocation"] article\_count: 94 model\_used: Qwen3.6-35B-A3B-Q8\_0.gguf generated\_at: '2026-06-14T15:33:13+00:00' key\_articles: - title: "Complex instability of the elbow" ref\_num: 1 evidence\_tier: paper doi: 10.1016/j.injury.2013.09.032 year: 2017 - title: "Combined posterolateral and posteromedial rotatory instability of the elbow" ref\_num: 2 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.injury.2007.01.039 year: 2007 - title: "Simple Elbow Dislocation" ref\_num: 3 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.hcl.2015.06.002 year: 2015 - title: "Elbow Instability: Anatomy, Biomechanics, Diagnostic Maneuvers, and Testing" ref\_num: 4 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jhsa.2016.11.025 year: 2017 - title: "Lateral Collateral Ligament Instability of the Elbow" ref\_num: 5 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.hcl.2007.11.001 year: 2008 - title: "Complex Elbow Instability" ref\_num: 6 evidence\_tier: paper evidence\_level: 5 doi: 10.5435/00124635-200605000-00003 year: 2006 - title: "Does sonography allow an objective and reproducible distinction between stable, hypermobile, and unstable elbow joints?" ref\_num: 7 evidence\_tier: paper evidence\_level: 3 doi: 10.1016/j.jse.2020.11.023 year: 2021 - title: "Treatment of elbow instability: state of the art" ref\_num: 8 evidence\_tier: paper evidence\_level: 5 doi: 10.1136/jisakos-2019-000316 year: 2021 - title: "Lateral Ulnar Collateral Ligament Repair With Suture-Tape Augmentation for Traumatic Elbow Instability" ref\_num: 9 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.jhsa.2022.10.016 year: 2023 - title: "Surgical Treatment of Posterolateral Rotatory Instability of the Elbow" ref\_num: 10 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.arthro.2014.02.029 year: 2014 - title: "Ligamentous repair of acute lateral collateral ligament rupture of the elbow" ref\_num: 11 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.jse.2013.06.018 year: 2013 - title: "Residual increased valgus stress angulation and posterolateral rotatory translation after simple elbow dislocation" ref\_num: 12 evidence\_tier: paper evidence\_level: 4 doi: 10.1007/s00167-016-4176-0 year: 2016 - title: "Instability After Total Elbow Arthroplasty" ref\_num: 13 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.hcl.2007.11.002 year: 2008 - title: "Magnetic Resonance Imaging Findings in Acute Elbow Dislocation: Insight Into Mechanism" ref\_num: 14 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.jhsa.2013.11.031 year: 2014 - title: "Valgus Extension Overload: Arthroscopic Decompression in the Supine-Suspended Position" ref\_num: 15 evidence\_tier: paper doi: 10.1016/j.eats.2016.04.005 year: 2016 - title: "The posterolateral ligament of the elbow: anatomy and clinical relevance" ref\_num: 16 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.jse.2023.08.033 year: 2024 - title: "Reconstruction of the lateral ulnar collateral ligament of the elbow: a comparative biomechanical study" ref\_num: 17 evidence\_tier: paper

evidence\_level: 5 doi: 10.1007/s00167-015-3627-3 year: 2015 - title: "Arthroscopic R-LCL plication for symptomatic minor instability of the lateral elbow (SMILE)" ref\_num: 18 evidence\_tier: paper evidence\_level: 4 doi: 10.1007/s00167-017-4531-9 year: 2017 - title: "Lateral collateral ulnar ligament reconstruction techniques in posterolateral rotatory instability of the elbow: A systematic review" ref\_num: 19 evidence\_tier: paper evidence\_level: 1 doi: 10.1016/j.injury.2020.11.010 year: 2022 - title: "Clinical Presentation of Posterolateral Rotatory Instability of the Elbow in Children" ref\_num: 20 evidence\_tier: paper evidence\_level: 4 doi: 10.2106/jbjs.l.00623 year: 2013 - title: "Systematic Review of Elbow Instability in Association With Refractory Lateral Epicondylitis: Myth or Fact?" ref\_num: 21 evidence\_tier: paper evidence\_level: 1 doi: 10.1177/0363546520980133 year: 2021 - title: "Alteration of Stress Distribution Patterns in Symptomatic Valgus Instability of the Elbow in Baseball Players" ref\_num: 22 evidence\_tier: paper evidence\_level: 4 doi: 10.1177/0363546515624916 year: 2016 - title: "Elbow Lateral Collateral Ligament Injuries" ref\_num: 23 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jhsa.2012.10.030 year: 2013 - title: "Stress Ultrasound Evaluation of Medial Elbow Instability in a Cadaveric Model" ref\_num: 24 evidence\_tier: paper evidence\_level: 5 doi: 10.1177/0363546514542805 year: 2014 - title: "Delayed valgus instability and proximal migration of the radius after radial head prosthesis failure" ref\_num: 25 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jse.2010.04.046 year: 2010 - title: "Lateral Elbow Laxity Is Affected by the Integrity of the Radial Band of the Lateral Collateral Ligament Complex: A Cadaveric Model With Sequential Releases and Varus Stress Simulating Everyday Activities" ref\_num: 26 evidence\_tier: paper evidence\_level: 5 doi: 10.1177/03635465211018208 year: 2021 - title: "Importance of radial head on elbow kinematics: radial head prosthesis" ref\_num: 27 evidence\_tier: paper evidence\_level: 5 doi: 10.1007/s00402-006-0164-z year: 2006 - title: "Biomechanical Characteristics of Osteochondral Defects of the Humeral Capitellum" ref\_num: 28 evidence\_tier: paper evidence\_level: 5 doi: 10.1177/0363546513490652 year: 2013 - title: "The circumferential graft technique for treatment of multidirectional elbow instability: a comparative biomechanical evaluation" ref\_num: 29 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jse.2015.07.016 year: 2016 - title: "A Biomechanical Comparison of 2 Hybrid Techniques for Elbow Ulnar Collateral Ligament Reconstruction" ref\_num: 30 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jhsa.2014.07.040 year: 2014 - title: "The Wrightington Approach to the Radial Head: Biomechanical Comparison With the Posterolateral Approach" ref\_num: 31 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jhsa.2007.08.009 year: 2007 - title: "The contribution of the posterolateral capsule to elbow joint stability: a cadaveric biomechanical investigation" ref\_num: 32 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jse.2018.02.045 year: 2018 - title: "Intra-articular findings in symptomatic minor instability of the lateral elbow (SMILE)" ref\_num: 33 evidence\_tier: paper evidence\_level: 3 doi: 10.1007/s00167-017-4530-x year: 2017 - title: "Effect of coronal shear fractures of the distal humerus on elbow kinematics and stability" ref\_num: 34 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jse.2010.02.002 year: 2010 - title: "Testing of a Novel Method for Securing Ligaments Against Bone During Simultaneous Medial and Lateral Elbow Ligament Reconstruction" ref\_num: 35 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jhsa.2023.02.008 year: 2024 - title: "Kinematics of the ligamentous unstable elbow joint after application of a hinged external fixation device: A cadaveric study" ref\_num: 36 evidence\_tier: paper evidence\_level: 5 doi: 10.1016/j.jse.2006.07.012 year: 2007 - title: "Biomechanical Evaluation of the TightRope Versus Traditional Docking Ulnar Collateral Ligament Reconstruction Technique" ref\_num: 37 evidence\_tier: paper evidence\_level: 5 doi: 10.1177/0363546513482567 year: 2013 - title: "Fixation Versus Replacement of Radial Head in Terrible Triad: Is There a Difference in Elbow Stability and Prognosis?" ref\_num: 38 evidence\_tier: paper evidence\_level: 3 doi: 10.1007/s11999-013-3331-x year: 2014 - title: "Stability of severely stiff elbows after

complete open release: treatment by ligament repair with suture anchors and hinged external fixator” ref\_num: 39 evidence\_tier: paper evidence\_level: 4 doi: 10.1016/j.jse.2014.03.013 year: 2014 - title: “Valgus Laxity of the Ulnar Collateral Ligament of the Elbow in Collegiate Athletes” ref\_num: 40 evidence\_tier: paper evidence\_level: 3 doi: 10.1177/03635465010290050601 year: 2001 - title: “Are bone bruises a possible cause of osteochondritis dissecans of the capitellum? a case report and review of the literature” ref\_num: 41 evidence\_tier: case\_report evidence\_level: 5 doi: 10.1007/s00402-005-0018-0 year: 2005 - title: “Direct Repair for Managing Acute and Chronic Lateral Ulnar Collateral Ligament Disruptions” ref\_num: 42 evidence\_tier: paper evidence\_level: 3 doi: 10.1016/j.jhsa.2014.02.011 year: 2014 synthesis\_version: “v2” verifier\_status: skipped

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## Overview

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- Complex instability of the elbow involves important osseous and ligamentous stabilizers [1].
- Management protocols exist for common patterns of complex elbow injury [1].
- Combined posterolateral and posteromedial rotatory instability requires surgical addressing of both directions to restore elbow stability [2].
- Effective treatment of simple elbow dislocations requires a detailed clinical assessment [3].
- Effective treatment of simple elbow dislocations requires sequential radiographic follow-up [3].
- Patients with lateral collateral ligament instability had resolution of symptoms and regained a near full arc of elbow flexion and forearm rotation [5].
- Long-term outcomes with surgical management of complex elbow injuries are unknown [6].
- Treatments for elbow instability remain challenging in demanding cases, with high rates of persistent instability, post-traumatic arthritis, stiffness, and pain [8].
- Ligament repair with suture-tape augmentation of the lateral ulnar collateral ligament results in acceptable functional outcomes for complex elbow instability [9].
- Ligament repair with suture-tape augmentation of the lateral ulnar collateral ligament results in a reoperation rate comparable with other joint stabilization procedures for complex elbow instability [9].
- Lateral collateral ligament repair provides satisfactory outcomes for acute posterolateral rotatory instability of the elbow [11].
- Instability is the major complication of unlinked total elbow arthroplasty, often requiring revision [13].
- Linked total elbow arthroplasty is preferred for patients with posttraumatic articular damage, ligamentous instability, deformity, or bone loss [13].
- All reconstruction methods for the lateral ulnar collateral ligament were able to sufficiently restore posterolateral rotatory stability of the elbow over the full range of motion [17].

# Anatomy & Pathophysiology

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- The elbow consists of static and dynamic stabilizers that function in synchrony to prevent elbow instability [4].
- Complex instability of the elbow involves important osseous and ligamentous stabilizers [1].
- Both posterolateral and posteromedial rotatory instability directions must be addressed surgically to restore elbow stability [2].
- A distinction between healthy and hypermobile elbow joints is not possible via sonography, making complete clinical history and examination vital [7].
- Posterolateral rotatory instability (PLRI) of the elbow remains to be fully understood [10].
- Varus loads simulating everyday activities produce changes in varus joint angulation that are linearly dependent on the applied moment and persist after release of lateral stabilizing structures [26].
- Proper balancing and adequate bone resection from the radial head are mandatory for obtaining normal elbow kinematics during radial head arthroplasty [27].
- Elbow valgus torque increases contact pressure in the radiocapitellar joint [28].
- The circumferential graft technique for multidirectional elbow instability was evaluated for stability against valgus and varus/posterolateral rotatory forces [29].
- Proximal docking and single-point fixation hybrid ulnar collateral ligament reconstructions provided sufficient joint stability and strength compared to intact elbows, except for the proximal docking method at low flexion angles [30].
- The Wrightington approach to the radial head is biomechanically superior to the posterolateral approach regarding changes in elbow laxity after surgery to the radial head [31].
- Radial head displacement is greater after a simulated osteochondral lesion (OCL) at 30° to 60° of flexion compared with the intact elbow, but not as great as seen with sectioning of the lateral collateral ligament complex (LCLC) [32].
- The capitellum alone does not contribute to elbow stability, whereas the trochlea has an important role [34].
- A novel method for securing ligaments against bone during simultaneous medial and lateral elbow ligament reconstruction successfully prevented graft slippage without excessive construct displacement during static and dynamic testing [35].
- The Orthofix elbow external fixator stabilizes the ligamentous unstable elbow joint efficiently but decreases the range of motion and constrains extension [36].
- Both TightRope (TR) and traditional docking (DO) ulnar collateral ligament reconstruction techniques restored native joint kinematics from 15 to 75 degrees of flexion under low loading conditions [37].

## Classification

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- Complex instability of the elbow involves important osseous and ligamentous stabilizers [1].

- Combined posterolateral and posteromedial rotatory instability requires surgical addressing of both directions to restore stability [2].
- Simple elbow dislocations require detailed clinical assessment and sequential radiographic follow-up for effective treatment [3].
- The elbow consists of static and dynamic stabilizers that function in synchrony to prevent instability [4].
- Lateral collateral ligament instability can result in symptoms of instability that resolve with treatment, allowing near full arc of elbow flexion and forearm rotation [5].
- Long-term outcomes with surgical management of complex elbow injuries are unknown [6].
- Sonography does not allow an objective and reproducible distinction between healthy and hypermobile elbow joints [7].
- Treatments for elbow instability remain challenging, with high rates of persistent instability, post-traumatic arthritis, stiffness, and pain in demanding cases [8].
- Instability is the major complication of unlinked total elbow arthroplasty, often requiring revision [13].
- Linked total elbow arthroplasty is preferred for patients with posttraumatic articular damage, ligamentous instability, deformity, or bone loss [13].
- Acute elbow dislocations are traumatic events often resulting in pan-ligamentous disruption, suggesting the most common injury pattern may begin with medial-sided ligamentous disruption [14].
- The posterolateral ligament of the elbow has a significant role in the elbow's posterolateral stability [16].
- Stress ultrasonography shows different amounts of gapping with sectioning of the medial elbow stabilizers [24].

## Clinical Presentation

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- Complex instability of the elbow involves important osseous and ligamentous stabilizers [1].
- Combined posterolateral and posteromedial rotatory instability requires surgical addressing of both directions to restore stability [2].
- Effective treatment of simple elbow dislocations requires a detailed clinical assessment and sequential radiographic follow-up [3].
- The elbow consists of static and dynamic stabilizers that function in synchrony to prevent instability [4].
- Patients with lateral collateral ligament instability had resolution of symptoms and regained a near full arc of elbow flexion and forearm rotation [5].
- Long-term outcomes with surgical management of complex elbow injuries are unknown [6].
- Sonography cannot objectively distinguish between healthy and hypermobile elbow joints, making complete clinical history and examination vital [7].
- Treatments for elbow instability remain challenging with high rates of persistent instability, post-traumatic arthritis, stiffness, and pain in demanding cases [8].

- Patients after conservatively treated simple elbow dislocations show good clinical and functional results [12].
- Acute elbow dislocations are traumatic events often resulting in pan-ligamentous disruption, suggesting the most common injury pattern may begin with medial-sided ligamentous disruption [14].
- Elbow arthroscopy is a useful tool for managing valgus extension overload when conservative treatments have failed [15].
- The posterolateral ligament of the elbow has a significant role in the elbow's posterolateral stability [16].
- Posterolateral rotatory instability of the elbow exists in children but may be masked by contracture, with radiographs potentially showing evidence of instability [20].
- Instability can coexist and may be associated with refractory lateral epicondylitis [21].
- Symptomatic ulnar collateral ligament insufficiency in baseball players is associated with characteristic high-stress distribution patterns on the anterolateral part of the capitellum and the anterolateral part of the ulna [22].
- Almost one half of patients suffering from recalcitrant lateral epicondylitis display signs of lateral ligamentous patholaxity [33].
- Over 85% of patients with symptomatic minor instability of the lateral elbow (SMILE) demonstrate at least one intra-articular abnormality [33].

## Investigations

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- Effective treatment of simple elbow dislocations requires a detailed clinical assessment [3].
- Effective treatment of simple elbow dislocations requires sequential radiographic follow-up [3].
- The elbow consists of static and dynamic stabilizers that function in synchrony to prevent elbow instability [4].
- A distinction between healthy and hypermobile elbow joints is not possible using sonography [7].
- Obtaining a complete clinical history and examination is vital because sonography cannot distinguish between healthy and hypermobile elbow joints [7].
- Posterolateral rotatory instability of the elbow exists in children but may be masked by contracture [20].
- Radiographs may show evidence of instability in children with posterolateral rotatory instability [20].
- Instability can coexist and may be associated with refractory lateral epicondylitis [21].
- Symptomatic ulnar collateral ligament insufficiency is associated with characteristic high-stress distribution patterns on the anterolateral part of the capitellum and the anterolateral part of the ulna [22].
- Different amounts of gapping are seen on stress ultrasonography with sectioning of the medial elbow stabilizers [24].
- No numerical value can confidently determine the pathologic status of the ulnar collateral ligament of the elbow when using stress radiography [40].

- An MRI should be performed if healing does not occur by a reasonable time despite successful bony healing to assess potential cartilage damage [41].

## Treatment

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- Effective treatment of simple elbow dislocations requires a detailed clinical assessment and sequential radiographic follow-up [3].
- Patients after conservatively treated simple elbow dislocations show good clinical and functional results [12].
- Both directions of instability must be addressed surgically to restore elbow stability in combined posterolateral and posteromedial rotatory instability [2].
- Ligament repair with suture-tape augmentation of the lateral ulnar collateral ligament results in acceptable functional outcomes and a reoperation rate comparable with other joint stabilization procedures for complex elbow instability [9].
- Satisfactory outcomes are obtained with lateral collateral ligament repair for acute posterolateral rotatory instability of the elbow [11].
- All patients in the series had resolution of their symptoms of instability and regained a near full arc of elbow flexion and forearm rotation following treatment for lateral collateral ligament instability [5].
- R-LCL plication produces subjective satisfaction and positive clinical results in patients presenting with symptomatic minor instability of the lateral elbow (SMILE) at 2-year median follow-up [18].
- Both Jobe and Docking techniques are safe and effective in the treatment of posterolateral elbow instability [19].
- Treatment of late instability is focused on lateral ligament reconstruction from the humerus to the ulna using tendon grafts with reasonably good outcomes [23].
- Elbow arthroscopy is a useful tool for managing diseases of the elbow, including valgus extension overload, when conservative treatments have failed [15].
- Ligament repair with suture anchors and hinged external fixator could be an option for treating ankylosed, severely or very severely stiff elbows after complete open release [39].
- Instability is the major complication of unlinked total elbow arthroplasty, often requiring revision [13].
- Linked arthroplasty is preferred for patients with posttraumatic articular damage, ligamentous instability, deformity, or bone loss [13].
- Despite progress in surgical techniques and rehabilitation, treatments for elbow instability remain challenging with high rates of persistent instability, post-traumatic arthritis, stiffness, and pain in demanding cases [8].
- Long-term outcome with surgical management of complex elbow injuries is unknown [6].

# Complications

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- Complex elbow instability involves important osseous and ligamentous stabilizers [1].
- Combined posterolateral and posteromedial rotatory instability requires surgical addressing of both directions to restore stability [2].
- Effective treatment of simple elbow dislocations requires detailed clinical assessment and sequential radiographic follow-up [3].
- The elbow consists of static and dynamic stabilizers that function in synchrony to prevent instability [4].
- Patients with lateral collateral ligament instability had resolution of symptoms and regained near full arc of elbow flexion and forearm rotation [5].
- Long-term outcomes with surgical management of complex elbow injuries are unknown [6].
- Sonography cannot objectively distinguish between healthy and hypermobile elbow joints, making complete clinical history and examination vital [7].
- Ligament repair with suture-tape augmentation of the lateral ulnar collateral ligament for complex elbow instability results in acceptable functional outcomes and a reoperation rate comparable with other joint stabilization procedures [9].
- Posterolateral rotatory instability (PLRI) of the elbow remains to be fully understood [10].
- Satisfactory outcomes were obtained with lateral collateral ligament repair for acute posterolateral rotatory instability of the elbow [11].
- Patients after conservatively treated simple elbow dislocations show good clinical and functional results [12].
- Instability is the major complication of unlinked total elbow arthroplasty, often requiring revision [13].
- Linked arthroplasty is preferred for patients with posttraumatic articular damage, ligamentous instability, deformity, or bone loss [13].
- Acute elbow dislocations are traumatic events often resulting in pan-ligamentous disruption, suggesting the most common injury pattern may begin with medial-sided ligamentous disruption [14].
- R-LCL plication produces subjective satisfaction and positive clinical results in patients presenting with symptomatic minor instability of the lateral elbow (SMILE) at 2-year median follow-up [18].
- Ligaments of the elbow may not heal or tighten sufficiently over time, and removal of a radial head prosthesis may give rise to problems, even up to 5 years after prosthetic removal [25].
- Longer-term studies are required to ascertain whether the apparent benefits of radial head arthroplasty are offset by late complications such as loosening [38].

# Recovery

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- Effective treatment of simple elbow dislocations requires a detailed clinical assessment and sequential radiographic follow-up [3].

- Patients after conservatively treated simple elbow dislocations show good clinical and functional results [12].
- Residual increased valgus stress angulation and posterolateral rotatory translation can occur after simple elbow dislocation [12].
- Ligaments of the elbow may not heal or tighten sufficiently over time, and removal of a radial head prosthesis may give rise to stability problems even up to 5 years after prosthetic removal [25].
- For complex elbow instability, ligament repair with suture-tape augmentation of the lateral ulnar collateral ligament results in acceptable functional outcomes [9].
- Ligament repair with suture-tape augmentation of the lateral ulnar collateral ligament for complex elbow instability has a reoperation rate comparable with other joint stabilization procedures [9].
- Direct repair of traumatic tears of the lateral ulnar collateral ligament yields satisfactory outcomes for acute posterolateral rotatory instability of the elbow [11].
- No significant difference in clinical outcome or range of motion was observed after direct repair of traumatic tears of the lateral ulnar collateral ligament between acute and delayed treatment cohorts [42].
- R-LCL plication produces subjective satisfaction and positive clinical results in patients presenting with symptomatic minor instability of the lateral elbow (SMILE) at 2-year median follow-up [18].
- Treatment of late instability is focused on lateral ligament reconstruction from the humerus to the ulna using tendon grafts, which yields reasonably good outcomes [23].
- All patients in a series of lateral collateral ligament instability cases had resolution of their symptoms of instability and regained a near full arc of elbow flexion and forearm rotation [5].
- Treatments for elbow instability remain challenging with high rates of persistent instability, post-traumatic arthritis, stiffness, and pain in demanding cases [8].
- Long-term outcome with surgical management of complex elbow injuries is unknown [6].

## Key Evidence

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- [Paper] This article discusses the important osseous and ligamentous stabilizers of the elbow joint and provides management protocols for the common patterns of complex injury encountered by the practising surgeon. ([10.1016/j.injury.2013.09.032](https://doi.org/10.1016/j.injury.2013.09.032))
- [L4] Both directions of instability must be addressed surgically to restore elbow stability. ([10.1016/j.injury.2007.01.039](https://doi.org/10.1016/j.injury.2007.01.039))
- [L5] Effective treatment of simple elbow dislocations requires a detailed clinical assessment and sequential radiographic follow-up. ([10.1016/j.hcl.2015.06.002](https://doi.org/10.1016/j.hcl.2015.06.002))
- [L5] The elbow consists of static and dynamic stabilizers that function in synchrony to prevent elbow instability. ([10.1016/j.jhsa.2016.11.025](https://doi.org/10.1016/j.jhsa.2016.11.025))
- [L4] All patients in the series had resolution of their symptoms of instability and regained a near full arc of elbow flexion and forearm rotation. ([10.1016/j.hcl.2007.11.001](https://doi.org/10.1016/j.hcl.2007.11.001))

- [L5] Long-term outcome with surgical management of complex elbow injuries is unknown. ([10.5435/00124635-200605000-00003](#))
- [L3] Nevertheless, a distinction between healthy and hypermobile elbow joints is not possible, and therefore, obtaining a complete clinical history and examination is vital. ([10.1016/j.jse.2020.11.023](#))
- [L5] Despite progress in surgical techniques and rehabilitation, treatments for elbow instability remain challenging with high rates of persistent instability, post-traumatic arthritis, stiffness, and pain in demanding cases. ([10.1136/jisakos-2019-000316](#))
- [L4] For complex elbow instability, ligament repair with suture-tape augmentation of the lateral ulnar collateral ligament results in acceptable functional outcomes and a reoperation rate comparable with other joint stabilization procedures. ([10.1016/j.jhsa.2022.10.016](#))
- [L4] PLRI of the elbow remains to be fully understood. ([10.1016/j.arthro.2014.02.029](#))
- [L4] We obtained satisfactory outcomes with lateral collateral ligament repair for acute posterolateral rotatory instability of the elbow. ([10.1016/j.jse.2013.06.018](#))
- [L4] Patients after conservatively treated simple elbow dislocations show good clinical and functional results. ([10.1007/s00167-016-4176-0](#))
- [L4] Instability is the major complication of unlinked total elbow arthroplasty, often requiring revision, whereas linked arthroplasty is preferred for patients with posttraumatic articular damage, ligamentous instability, deformity, or bone loss. ([10.1016/j.hcl.2007.11.002](#))
- [L4] Acute elbow dislocations are traumatic events often resulting in pan-ligamentous disruption, suggesting that the most common injury pattern may begin with a medial-sided ligamentous disruption. ([10.1016/j.jhsa.2013.11.031](#))
- [Paper] Elbow arthroscopy is a useful tool for managing diseases of the elbow, including valgus extension overload, when conservative treatments have failed. ([10.1016/j.eats.2016.04.005](#))
- [L4] The PLL of the elbow has a significant role in the elbow's posterolateral stability. ([10.1016/j.jse.2023.08.033](#))
- [L5] All reconstruction methods were able to sufficiently restore posterolateral rotatory stability of the elbow over the full range of motion. ([10.1007/s00167-015-3627-3](#))
- [L4] R-LCL plication produces subjective satisfaction and positive clinical results in patients presenting with a symptomatic minor instability of the lateral elbow (SMILE) at 2-year median follow-up. ([10.1007/s00167-017-4531-9](#))
- [L1] This systematic review showed that both Jobe and Docking techniques are safe and effective in the treatment of posterolateral elbow instability. ([10.1016/j.injury.2020.11.010](#))
- [L4] Posterolateral rotatory instability of the elbow exists in children but may be masked by contracture; radiographs may show evidence of instability. ([10.2106/jbjs.l.00623](#))
- [L1] Instability can coexist and may be associated with refractory lateral epicondylitis. ([10.1177/0363546520980133](#))

- [L4] Symptomatic UCL insufficiency was associated with characteristic high-stress distribution patterns on the anterolateral part of the capitellum and the anterolateral part of the ulna. ([10.1177/0363546515624916](#))
- [L5] Treatment of late instability is focused on lateral ligament reconstruction from the humerus to the ulna using tendon grafts with reasonably good outcomes. ([10.1016/j.jhsa.2012.10.030](#))
- [L5] The results suggest that different amounts of gapping are seen on stress ultrasonography with sectioning of the medial elbow stabilizers. ([10.1177/0363546514542805](#))
- [L5] This case illustrates that sometimes ligaments of the elbow may not heal or tighten sufficiently over time and that despite a careful examination elbow and forearm stability, removal of a radial head prosthesis may give rise to problems, even up to 5 years after prosthetic removal. ([10.1016/j.jse.2010.04.046](#))
- [L5] Varus loads simulating everyday activities produce changes in the varus joint angulation of the elbow that are linearly dependent on the applied moment and persist after release of the lateral stabilizing structures. ([10.1177/03635465211018208](#))
- [L5] Proper balancing and adequate bone resection from radial head is mandatory for obtaining normal elbow kinematics during the radial head arthroplasty procedure. ([10.1007/s00402-006-0164-z](#))
- [L5] Elbow valgus torque increases contact pressure in the radiocapitellar joint. ([10.1177/0363546513490652](#))
- [L5] The study evaluated stability against valgus and varus/posterolateral rotatory forces in cadaveric elbows. ([10.1016/j.jse.2015.07.016](#))
- [L5] Both the proximal docking and the single-point fixation hybrid reconstructions provided sufficient joint stability and strength compared to the intact elbows, with the exception of the proximal docking method at low flexion angles. ([10.1016/j.jhsa.2014.07.040](#))
- [L5] These results suggest that the newly described Wrightington approach is biomechanically superior to the posterolateral approach with regard to changes in elbow laxity after surgery to the radial head. ([10.1016/j.jhsa.2007.08.009](#))
- [L5] The degree of radial head displacement is greater after a simulated OCL at 30° to 60° of flexion compared with the intact elbow but not as great as seen with sectioning of the LCLC. ([10.1016/j.jse.2018.02.045](#))
- [L3] Almost one half of patients suffering from recalcitrant lateral epicondylitis display signs of lateral ligamentous patholaxity, and over 85% demonstrate at least one intra-articular abnormality. ([10.1007/s00167-017-4530-x](#))
- [L5] While the capitellum alone does not contribute to elbow stability, the trochlea has an important role. ([10.1016/j.jse.2010.02.002](#))
- [L5] This method of fixation to the proximal ulna for the simultaneous reconstruction of medial and lateral elbow ligaments successfully prevented graft slippage without excessive construct displacement during static and dynamic testing. ([10.1016/j.jhsa.2023.02.008](#))
- [L5] The Orthofix elbow external fixator stabilizes the ligamentous unstable elbow joint efficiently but at the expense of changes in the normal motion pattern, specifically decreasing the range of motion and constraining extension. ([10.1016/j.jse.2006.07.012](#))

- [L5] Both the TR and DO techniques restored native joint kinematics from 15 to 75 degrees of flexion under low loading conditions. ([10.1177/0363546513482567](#))
- [L3] Longer-term studies will be required to ascertain whether the apparent benefits of radial head arthroplasty are offset by late complications of arthroplasty, such as loosening. ([10.1007/s11999-013-3331-x](#))
- [L4] This could be an option for treating ankylosed, severely or very severely stiff elbows. ([10.1016/j.jse.2014.03.013](#))
- [L3] No numerical value can confidently determine the pathologic status of the ulnar collateral ligament of the elbow when using stress radiography. ([10.1177/03635465010290050601](#))
- [Case\_report] The authors recommend performing an MRI if healing does not occur by a reasonable time despite successful bony healing to assess potential cartilage damage. ([10.1007/s00402-005-0018-0](#))
- [L3] No significant difference in clinical outcome or range of motion was observed after direct repair of traumatic tears of the lateral ulnar collateral ligament between acute and delayed treatment cohorts. ([10.1016/j.jhsa.2014.02.011](#))

## References

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- [1] Complex instability of the elbow. *Injury*. 2017. DOI: 10.1016/j.injury.2013.09.032 [2] Combined posterolateral and posteromedial rotatory instability of the elbow. *Injury Extra*. 2007. DOI: 10.1016/j.injury.2007.01.039 [3] Simple Elbow Dislocation. *Hand Clinics*. 2015. DOI: 10.1016/j.hcl.2015.06.002 [4] Elbow Instability: Anatomy, Biomechanics, Diagnostic Maneuvers, and Testing. *The Journal of Hand Surgery*. 2017. DOI: 10.1016/j.jhsa.2016.11.025 [5] Lateral Collateral Ligament Instability of the Elbow. *Hand Clinics*. 2008. DOI: 10.1016/j.hcl.2007.11.001 [6] Complex Elbow Instability. *Journal of the American Academy of Orthopaedic Surgeons*. 2006. DOI: 10.5435/00124635-200605000-00003 [7] Does sonography allow an objective and reproducible distinction between stable, hypermobile, and unstable elbow joints?. *Journal of Shoulder and Elbow Surgery*. 2021. DOI: 10.1016/j.jse.2020.11.023 [8] Treatment of elbow instability: state of the art. *Journal of ISAKOS*. 2021. DOI: 10.1136/jisakos-2019-000316 [9] Lateral Ulnar Collateral Ligament Repair With Suture-Tape Augmentation for Traumatic Elbow Instability. *The Journal of Hand Surgery*. 2023. DOI: 10.1016/j.jhsa.2022.10.016 [10] Surgical Treatment of Posterolateral Rotatory Instability of the Elbow. *Arthroscopy*. 2014. DOI: 10.1016/j.arthro.2014.02.029 [11] Ligamentous repair of acute lateral collateral ligament rupture of the elbow. *Journal of Shoulder and Elbow Surgery*. 2013. DOI: 10.1016/j.jse.2013.06.018 [12] Residual increased valgus stress angulation and posterolateral rotatory translation after simple elbow dislocation. *Knee Surgery, Sports Traumatology, Arthroscopy*. 2016. DOI: 10.1007/s00167-016-4176-0 [13] Instability After Total Elbow Arthroplasty. *Hand Clinics*. 2008. DOI: 10.1016/j.hcl.2007.11.002 [14] Magnetic Resonance Imaging Findings in Acute Elbow Dislocation: Insight Into Mechanism. *The Journal of Hand Surgery*. 2014. DOI: 10.1016/j.jhsa.2013.11.031 [15] Valgus Extension Overload: Arthroscopic Decompression in the Supine-Suspended Position. *Arthroscopy Techniques*. 2016. DOI: 10.1016/j.eats.2016.04.005 [16] The posterolateral ligament of the elbow: anatomy and clinical relevance. *Journal of Shoulder and Elbow Surgery*. 2024. DOI: 10.1016/j.jse.2023.08.033 [17] Reconstruction of the lateral ulnar collateral ligament of the elbow: a comparative biomechanical study. *Knee Surgery, Sports Traumatology, Arthroscopy*. 2015. DOI: 10.1007/

s00167-015-3627-3 [18] Arthroscopic R-LCL plication for symptomatic minor instability of the lateral elbow (SMILE). *Knee Surgery, Sports Traumatology, Arthroscopy*. 2017. DOI: 10.1007/s00167-017-4531-9 [19] Lateral collateral ulnar ligament reconstruction techniques in posterolateral rotatory instability of the elbow: A systematic review. *Injury*. 2022. DOI: 10.1016/j.injury.2020.11.010 [20] Clinical Presentation of Posterolateral Rotatory Instability of the Elbow in Children. *The Journal of Bone and Joint Surgery-American Volume*. 2013. DOI: 10.2106/jbjs.l.00623 [21] Systematic Review of Elbow Instability in Association With Refractory Lateral Epicondylitis: Myth or Fact?. *The American Journal of Sports Medicine*. 2021. DOI: 10.1177/0363546520980133 [22] Alteration of Stress Distribution Patterns in Symptomatic Valgus Instability of the Elbow in Baseball Players. *The American Journal of Sports Medicine*. 2016. DOI: 10.1177/0363546515624916 [23] Elbow Lateral Collateral Ligament Injuries. *The Journal of Hand Surgery*. 2013. DOI: 10.1016/j.jhsa.2012.10.030 [24] Stress Ultrasound Evaluation of Medial Elbow Instability in a Cadaveric Model. *The American Journal of Sports Medicine*. 2014. DOI: 10.1177/0363546514542805 [25] Delayed valgus instability and proximal migration of the radius after radial head prosthesis failure. *Journal of Shoulder and Elbow Surgery*. 2010. DOI: 10.1016/j.jse.2010.04.046 [26] Lateral Elbow Laxity Is Affected by the Integrity of the Radial Band of the Lateral Collateral Ligament Complex: A Cadaveric Model With Sequential Releases and Varus Stress Simulating Everyday Activities. *The American Journal of Sports Medicine*. 2021. DOI: 10.1177/03635465211018208 [27] Importance of radial head on elbow kinematics: radial head prosthesis. *Archives of Orthopaedic and Trauma Surgery*. 2006. DOI: 10.1007/s00402-006-0164-z [28] Biomechanical Characteristics of Osteochondral Defects of the Humeral Capitellum. *The American Journal of Sports Medicine*. 2013. DOI: 10.1177/0363546513490652 [29] The circumferential graft technique for treatment of multidirectional elbow instability: a comparative biomechanical evaluation. *Journal of Shoulder and Elbow Surgery*. 2016. DOI: 10.1016/j.jse.2015.07.016 [30] A Biomechanical Comparison of 2 Hybrid Techniques for Elbow Ulnar Collateral Ligament Reconstruction. *The Journal of Hand Surgery*. 2014. DOI: 10.1016/j.jhsa.2014.07.040 [31] The Wrightington Approach to the Radial Head: Biomechanical Comparison With the Posterolateral Approach. *The Journal of Hand Surgery*. 2007. DOI: 10.1016/j.jhsa.2007.08.009 [32] The contribution of the posterolateral capsule to elbow joint stability: a cadaveric biomechanical investigation. *Journal of Shoulder and Elbow Surgery*. 2018. DOI: 10.1016/j.jse.2018.02.045 [33] Intra-articular findings in symptomatic minor instability of the lateral elbow (SMILE). *Knee Surgery, Sports Traumatology, Arthroscopy*. 2017. DOI: 10.1007/s00167-017-4530-x [34] Effect of coronal shear fractures of the distal humerus on elbow kinematics and stability. *Journal of Shoulder and Elbow Surgery*. 2010. DOI: 10.1016/j.jse.2010.02.002 [35] Testing of a Novel Method for Securing Ligaments Against Bone During Simultaneous Medial and Lateral Elbow Ligament Reconstruction. *The Journal of Hand Surgery*. 2024. DOI: 10.1016/j.jhsa.2023.02.008 [36] Kinematics of the ligamentous unstable elbow joint after application of a hinged external fixation device: A cadaveric study. *Journal of Shoulder and Elbow Surgery*. 2007. DOI: 10.1016/j.jse.2006.07.012 [37] Biomechanical Evaluation of the TightRope Versus Traditional Docking Ulnar Collateral Ligament Reconstruction Technique. *The American Journal of Sports Medicine*. 2013. DOI: 10.1177/0363546513482567 [38] Fixation Versus Replacement of Radial Head in Terrible Triad: Is There a Difference in Elbow Stability and Prognosis?. *Clinical Orthopaedics & Related Research*. 2014. DOI: 10.1007/s11999-013-3331-x [39] Stability of severely stiff elbows after complete open release: treatment by ligament repair with suture anchors and hinged external fixator. *Journal of Shoulder and Elbow Surgery*. 2014. DOI: 10.1016/j.jse.2014.03.013 [40] Valgus Laxity of the Ulnar Collateral Ligament of the Elbow in Collegiate Athletes. *The American Journal of Sports Medicine*. 2001. DOI: 10.1177/03635465010290050601 [41] Are bone bruises a possible cause of osteochondritis dissecans of the capitellum? a case report and review of the literature. *Archives of Orthopaedic*

*and Trauma Surgery*. 2005. DOI: 10.1007/s00402-005-0018-0 [42] Direct Repair for Managing Acute and Chronic Lateral Ulnar Collateral Ligament Disruptions. *The Journal of Hand Surgery*. 2014. DOI: 10.1016/j.jhsa.2014.02.011