



# Acute severe valgus instability without elbow dislocation



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**Background:** The purpose of this study was to investigate the pathoanatomy of acute valgus instability without elbow dislocation and to evaluate clinical outcomes after operative treatment.

**Methods:** Seven patients presented with acute severe valgus instability without elbow dislocation or fracture after a single traumatic episode. Five patients had primary repair of the medial collateral ligament (MCL) and flexor-pronator tendon (FPT) with suture anchor. Two patients with highly unstable elbow had primary repair of both the medial and lateral structures. On the basis of magnetic resonance imaging and intraoperative findings, the injury patterns of the ligament, capsule, tendon, and bone structures were evaluated. Clinical outcomes were assessed with the Mayo Elbow Performance Score and the shortened Disabilities of the Arm, Shoulder, and Hand score.

**Results:** A complete tear of the MCL from its humeral origin and FPT was found in all patients. The anterior capsule was also damaged. A stripping-type complete tear of the lateral collateral ligament complex with significant instability was observed in 2 patients. Bone contusion at the capitellum or radial head was found in 6 patients. The mean Mayo Elbow Performance Score and shortened Disabilities of the Arm, Shoulder, and Hand score at final follow-up were 95.7 and 12.0. All patients returned to previous work levels within 4 months after operation.

**Conclusion:** These results indicate that complete tears of both the MCL and FPT occur with severe valgus instability. Primary repair of medial structures with suture anchor in acute severe valgus instability can restore stability.

**Level of evidence:** Level IV, Case Series, Treatment Study.

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**Keywords:** Elbow; medial collateral ligament; flexor-pronator tendon; valgus; instability

Numerous studies have demonstrated that the medial collateral ligament (MCL) complex of the elbow joint is a primary static restraint and the radiocapitellar joint is a

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secondary static restraint to valgus stress.<sup>1,10</sup> The flexor-pronator tendon (FPT) complex also serves as a dynamic restraint to valgus stress. Recently, the importance of the FPT complex in valgus stability of the elbow has been emphasized.<sup>3,7,9,13,14</sup>

The diagnosis and treatment of ligamentous injuries in elbow dislocation have been well documented.<sup>4,7,12</sup> However, few studies have documented the acute disruption of medial structures causing valgus instability with no

**Table I** Patients' clinical data

Case no.	Age (years)	Sex	Injury mechanism	Side	Interval from injury to operation (days)	Difference in gap (VSR, mm)	Operation	Final MEPS	Final Quick DASH	Final ROM	Follow-up period (months)	Complications
1	56	M	Fall down	ND	10	11.7	MCL + FPT + LCL + CET	85	13	5°-125°	48	HO
2	15	M	Judo	D	6	10.5	MCL + FPT	100	11	0°-140°	33	
3	49	M	Physical fight	D	7	12.4	MCL + PFT + LCL + CET	100	12	0°-135°	20	UN Sx
4	53	M	Slip down	ND	7	10.3	MCL + FPT	85	13	0°-140°	49	
5	70	F	Slip down	ND	3	13.7	MCL + FPT	100	12	0°-130°	28	
6	27	M	Slip down	ND	7	10.7	MCL + FPT	100	11	0°-140°	17	UN Sx
7	43	F	Horse riding	ND	5	8.1	MCL + FPT	100	12	5°-135°	12	HO

*CET*, common extensor tendon; *D*, dominant; *F*, female; *FPT*, flexor-pronator tendon; *HO*, heterotopic ossification; *LCL*, lateral collateral ligament; *M*, male; *MCL*, medial collateral ligament; *MEPS*, Mayo Elbow Performance Score; *ND*, nondominant; *QuickDASH*, shortened Disabilities of the Arm, Shoulder, and Hand score; *ROM*, range of motion; *UN Sx*, ulnar nerve symptoms; *VSR*, valgus stress radiograph.

history of elbow dislocation. Kenter et al<sup>8</sup> reported that 5 acute MCL injuries in football players occurred when a hand was planted on the playing surface while a valgus or hyperextension force was applied to the elbow. All patients were diagnosed on physical examination only and were able to return to previous activity levels without instability after nonoperative treatment. Norwood et al<sup>11</sup> reported that 4 patients with acute medial elbow ruptures including the MCL, FPT, and anterior capsule had primary repair of medial structures and had excellent final clinical outcomes. Richard et al<sup>16</sup> reported that 11 athletes with acute traumatic valgus instability had valgus stability restored after direct repair of the MCL and FPT. Even though several studies have documented the acute disruption of the MCL complex without elbow dislocation, the injury mechanism and pathoanatomy of acute valgus instability are not well understood. The rarity of this injury has made it difficult to standardize diagnosis and treatment of valgus instability.

The purpose of this study was to investigate the pathoanatomy of acute valgus instability without elbow dislocation based on physical examination, magnetic resonance imaging (MRI), and intraoperative findings and to evaluate clinical outcomes after operative treatment.

## Materials and methods

This is a retrospective case series study conducted in a single tertiary care hospital. Between 2006 and 2013, 7 patients presented with acute severe valgus instability and no history of elbow dislocation after a single traumatic episode. Patients with chronic instability during 4 weeks after the initial trauma, a previous history of elbow trauma, or associated fractures, including coronoid, olecranon, or radial head fractures, were excluded from review. There were 5 men and 2 women with an average age of 44.7 years (range, 15-70 years). The injury involved the dominant arm in 2 patients and the nondominant arm in 5 patients. The mechanism of injury was a fall



**Figure 1** Clinical photograph shows extensive ecchymosis with swelling on the medial side of the elbow.

on an outstretched hand for 6 patients (tripped, 3; sport activity, 2; and fall, 1). One patient was injured in a physical fight, but he could not remember the exact position at the time of injury. The average follow-up period was 29.6 months (range, 12-49 months) (Table I).

All patients complained of pain and swelling on the medial side of the elbow. Physical examination revealed extensive ecchymosis on the medial side of the elbow and a palpable defect between the medial epicondyle and the flexor-pronator mass (Fig. 1). A tingling sensation in the little finger as an ulnar nerve symptom was observed in 2 patients. All elbows had gross valgus instability without a firm end point.

Imaging studies included stress radiography and MRI. All elbows were evaluated with valgus and varus stress radiographs, which were compared with the unaffected elbow. The average difference in the medial opening of the medial joint space was 11.1 mm (range, 8.1-13.7 mm) (Fig. 2). Varus instability was also observed in cases 1 and 3, in which the difference in the lateral opening of the lateral joint space was 7.2 mm and 9.0 mm. An experienced musculoskeletal radiologist assessed blinded magnetic resonance images to analyze injury patterns of the ligament, tendon, capsule, and bone structures.

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