

**Two-Year Functional Outcomes After Adolescent Clavicle Trauma:
A Multicenter Comparison of Operative Versus Non-operative Treatment**

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Purpose: We sought to investigate the 2-year functional outcomes and complications following operative versus nonoperative treatment of completely displaced midshaft clavicle fractures in adolescents.

Methods: Patients 10-18 years old treated for a midshaft clavicle fracture between August, 2013 and August, 2018 at 1 of 8 geographically diverse, high-volume, tertiary-care pediatric centers were enrolled, with treatment decisions determined by individual providers. Patients with completely displaced fractures were followed for >2 years. Clinical course, complications, validated patient-reported outcome measures (PROs), quality of life, and satisfaction scores were analyzed. The ceiling effect of PRO/satisfaction data following clavicle injuries prompted establishment of a priori threshold for 'suboptimal' scores (ASES [American Shoulder and Elbow Surgeons] <90, QuickDASH [an abbreviated version of the Disabilities of the Arm, Shoulder and Hand] >10, EQ-5D [EuroQol 5-Dimensions] <0.80, EQ-VAS [visual analog scale] <80). To create comparable cohorts, PRO analysis was performed between operative patients and those nonoperative patients with shortening greater than the mean cohort value. According to 'intention to treat' statistical principles, 1 postoperative complication (and subsequent secondary operation) was analyzed within the nonoperative cohort.

Results: Of the 909 patients enrolled, 431 (47%) demonstrated completely displaced fractures and maintained enrollment over the study period, 410 (95%) of whom attained 2-year follow-up, and 227 (55%) of whom provided adequate PRO data. Of these patients, 75 (33%) underwent operative treatment, while 153 (67%) were treated conservatively. Those treated surgically showed no difference in sex (82% males, $P = 0.17$), but were older (mean age 15.3 vs 13.6 years, $P < 0.001$). There was no difference in shortening in the subset compared for PROs. Complications were less common in nonsurgical patients ($P < 0.001$), but this difference did not reach significance when sensory deficits were excluded ($P = 0.17$). There was no difference in secondary surgeries ($P = 0.43$). Greater percentages of operative patients reported suboptimal PRO/satisfaction scores (ASES: 11% vs 5%, QuickDASH: 9% vs 6%, EQ-5D: 8% vs 5%, EQ-VAS: 8% vs 7%, satisfaction 5% vs 3%), but these differences did not reach significance ($P = 0.16, 0.40, 0.38, 0.38, \text{ and } 0.61$, respectively).

Conclusion: At 8 large pediatric centers with independent treatment decisions made by over 40 orthopaedic surgeons, nonoperative treatment of adolescent clavicle fractures demonstrated lower complication rates and similar satisfaction and functional outcomes than operative treatment. These data for adolescents, the subpopulation most affected by this common condition, demonstrate contrasting findings to those of several adult studies, which suggest superiority with operative treatment.

See the meeting app for complete listing of authors' disclosure information.