Low Complication Rates Associated With Both Operative and Nonoperative Treatment of Adolescent Clavicle Fractures

Written by Nicola Parry

Benton E. Heyworth, MD, Boston Children's Hospital, Boston, Massachusetts, USA, presented data from a study conducted to review the demographic characteristics, treatment approaches, and complications in a large series of adolescent clavicle fractures receiving operative or nonoperative treatment. The results showed an increase in the incidence of clavicle fractures in recent years, with approximately two-thirds of cases occurring during sports, and an increasing trend toward operative treatment. Overall complication rates were more common following operative treatment.

Clavicle fractures are common, mostly arising in the diaphysis and comprising up to 5% of all fractures in adults and up to 15% in children [van der Meijden OA et al. *J Shoulder Elbow Surg* 2011]. However, the optimal treatment for these displaced fractures, in terms of operative and nonoperative techniques, remains controversial. With this in mind, Dr. Heyworth and colleagues conducted a retrospective study to evaluate a large, consecutive series of adolescent mid-diaphyseal clavicle fractures that were predominantly managed at a single, tertiary-care pediatric center between 2003 and 2012.

The study included adolescents (n = 641; 79% male; mean age, 14.6 years; age range, 10 to 18 years) with any clavicle fracture pattern who had undergone any operative (n = 117) or nonoperative (n = 524) treatment method. Exclusion criteria included patients with underlying neurological and metabolic bone disorders. Demographic data, radiographic features (such as fracture pattern), operative details when applicable, and posttreatment clinical course were analyzed, including the reported time to healing and any known complications.

The mean age was higher in the operative group than in the nonoperative group (15.8 vs 14.3 years; $p < .001$). Of all fractures reviewed, the most common type of injury was an athletic injury (64%), mostly associated with participation in contact sports such as football (25%) and hockey (18%), as well as snowboarding (12%) and skiing (9%). Other common mechanisms of injury were falls occurring during nonathletic activity (19%) and motor vehicle accidents (5%). Similar rates of associated injuries were seen within the operative (5%) and nonoperative (6%) treatment groups.

Between 2003 and 2012, there was an increase in the number of clavicle fractures and an increasing trend towards operative treatment: the majority of patients (82%) were treated nonoperatively, whereas 18% were treated surgically, with an increasing percentage of patients undergoing surgery over this time frame.

Overall, complications were rare following both approaches to management. Fifty-eight complications were documented in 46 patients (7%); these occurred more frequently in the operative group than the nonoperative group (16% vs 5%; $p < .001$), and were more common in older patients ($p < .001$). Delayed union (2% vs 0%; $p = .54$) and nonunion (1% vs 0%; $p = .56$) were uncommon. Whereas re-fracture was more common following nonoperative treatment (2% operative vs 3% nonoperative; $p = .03$), complications occurred more frequently in association with operative management, the most common of which was from symptomatic implants (13% vs 0%; $p < .001$).

Dr. Heyworth concluded that complications are rare following both approaches, but may be more common in patients whose treatment is delayed. However, he stressed that although these data and the rates of complications with both types of treatment may be helpful for orthopedic surgeons and families of patients with clavicle fractures, the two populations are not directly comparable, given that the operative group was older and more likely to have more complex fractures. There is a growing need for improved prospective, comparative research to more directly investigate which treatment option may be optimal for which adolescent patients.

Good Success Rate at 6 Years Following Meniscal Repair With ACLR

Written by Maria Vinall

Combined injury to the anterior cruciate ligament (ACL) and meniscus is a common sports-related injury. A frequent outcome of this injury is posttraumatic osteoarthritis (PTOA), a devastating condition for young patients [Smith JP III et al. *Am J Sports Med* 2001]. Over the past 3 decades, treatment of this type of injury has focused on meniscus preservation to improve outcomes and possibly prevent PTOA [Stein T et al. *Am J Sports Med* 2010].

Robert W. Westermann, MD, University of Iowa, Iowa City, Iowa, USA, reported an 86% success rate at 6 years

among patients receiving concurrent ACL reconstruction (ACLR) and meniscus repair [Westermann RW et al. *Am J Sports Med* 2014]. The study was based on data from the Multicenter Orthopedic Outcomes Network (MOON) database. Surgeon and patient questionnaires for the years 2002 to 2004, as well as operative reports for subsequent knee surgery, were analyzed with Microsoft Excel and SPSS software at entry and again at 2 and 6 years. Meniscus repair failure was defined as a need for subsequent meniscus surgery by debridement, excision/meniscectomy, or revision repair.

Primary ACLR was performed in 1440 patients, 286 of whom underwent concurrent meniscus repair. Most patients (n = 235 of 286; 82.2%) were available for follow-up at 6 years (n = 154, medial; n = 72, lateral; n = 9, both medial and lateral). There were no differences between successful and failed repairs regarding tear pattern (84% longitudinal), location (10% displaced bucket handle), or size (mean, 16.5 ± 5.8 mm). Of the 154 medial meniscus repairs, 21 (13.6%) were failures. There were 10 failures among patients with lateral repairs (n = 10 of 72; 13.9%). The failure rate for both medial and lateral repair was 22.2% (n = 2 of 9). Mean time to failure of medial repairs was 2.1 years, compared with 3.7 years for lateral repairs (p = .01; Figure 1).

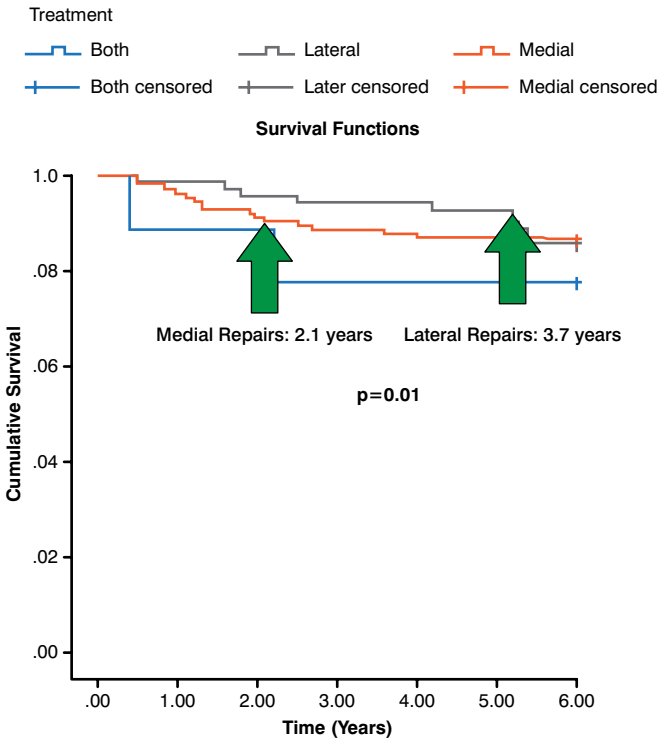
At 6 years, lower failure rates were noted with inside-out procedures (n = 19 patients), compared with the all-inside technique (n = 208 patients): 5.3% (n = 1) versus 14.9% (n = 31), respectively. Patient numbers were too low to detect a significant difference, however.

Patient-reported outcomes were assessed with the Knee injury and Osteoarthritis Outcome Score. Patients receiving medial and lateral repairs had similar improvements, which were significant at 2 years and maintained out to 6 years (p value not shown). A single subscore (knee-related quality of life) identified patients who received bilateral repairs and those who had failed lateral meniscus repair as being worse at their 6-year follow-up. About 40% of these repair failures were associated with a primary ACLR failure.

Activity level, as defined by the Marx Activity Scale, decreased over time (Figure 2). There were no differences in number or type of sutures or repair device between repair failures and successes. An increase in subsequent knee surgery was noted among patients receiving meniscus repair compared with those with uninjured meniscus.

Several factors influence patient outcomes after ACLR. MOON data reported by Cox and colleagues [*Am J Sports Med* 2014] indicate that ACL revision, meniscus or chondral injury, and medial meniscus repair are predictors of poor outcomes. In this large study of patients with ACLR plus meniscus repair, medial and lateral repairs had similar failure rates and similar patient outcomes, which were significant at 2 years and well maintained out to 6 years.

Figure 1. Time to Medial and Lateral Repair Failure



Note that medial repairs appeared to fail early (2.1 years), while lateral repair failures more commonly occurred late (3.7 years).

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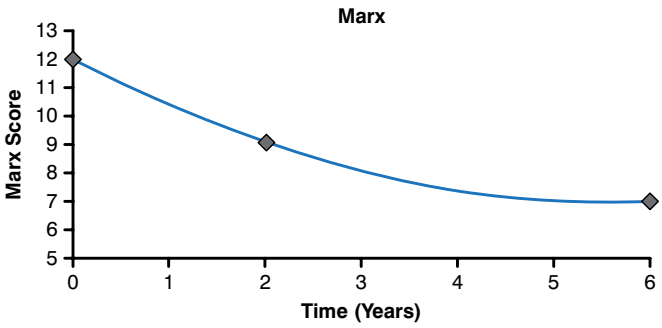
Figure 2. Marx Activity Scores Decreases Over Time



Marx score correlates with activity level and returning to pivoting sports.

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