REVIEW: MANAGEMENT OF MIDSHAFT CLAVICLE FRACTURES IN ADOLESCENTS

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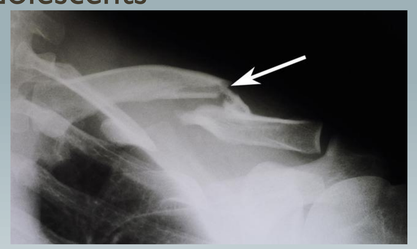
Background

- Majority of clavicle fractures occur in the midshaft of the clavicle (70-80%)
- Clavicle ossifies by intramembranous ossification as opposed to endochondral ossification meaning that vascular invasion comes from the periosteal layers of the mesenchymal tissue
- **Adults** = have difficulty healing clavicle fractures because of a blood supply that relies exclusively on periosteal nutrition only present on the superior and anterior surface of the bone
- **Children** = have excellent healing and remodeling potential due to an active adjacent physis and increased blood supply within their periosteum
  - Their thickened periosteum also limits the extent of displacement of the injured clavicle
- **Adolescents =** in a gray area given their level of skeletal maturity lacks the remarkable growth potential seen in children yet surpasses that seen in adults

Purpose of Study

The rate of surgical fixation in adolescents currently sits around 25% compared to 2% before the turn of the century.

- This trend was likely extrapolated from adult-derived practice guidelines as limited prospective data exists for adolescents



https://orthoinfo.aaos.org/en/diseases--conditions/clavicle-fracture-broken-collarbone/

Surgical Management

Intramedullary Fixation (IMF)

- Smaller scar, shorter operation time, fewer infections
- May be preferred operative treatment for simple fractures

Plate Fixation (PF)

- Most reliable, well-tested, and popular procedure among orthopaedic surgeons
- May be preferred operative treatment for comminuted fractures

Dual Small Plate Fixation (DSPF)

- Novel technique that creates a lower profile construct to avoid a more prominent plate-screw model
- Has shown no significant differences in stiffness or in bending load to failure
- Non-union rates between 1-2% in adults following surgery
- Implant irritation is the leading indication for a secondary surgery (26%)

Conservative Management

Figure-of-Eight Bracing

- 6 weeks of bracing with initiation of passive ROM when pain subsides

https://www.amazon.com/BraceAbility-Corrector-Collarbone-Fractures-Straightening/dp/B00HGECOCA

- Avoid contact sports for 4 months
- Radiologic f/u at 2 and 6 weeks to look for secondary displacement
- Non-union rates between 10-20% in adults

Conflicting Information

- Heterogeneity between studies is present throughout literature making it challenging for physicians to confidently approach treatment for midclavicular fractures

Conclusions

Adults

- Patients who choose to have surgery should be warned of complications and the approximately 25% chance of undergoing a second procedure for hardware removal within two years due to implant complications, infection, or non-union
- Those who opt out of surgery should be informed that non-union occurs in slightly more than 10% of patients, and these can be more difficult to manage than acute fractures

Children

- Children with clavicle fractures should not be strongly considered for surgical intervention because of their great capacity for healing

Adolescents

- Rate of surgical treatment of diaphyseal clavicular fractures has increased 7-fold with the greatest increase in younger age groups, particularly young athletes between age 15-19
- Inconsistent treatment of adolescents
  - Those treated in adult hospitals 5 times more likely to undergo surgical treatment than those treated in pediatric hospitals
- Fractures most commonly occurring in males who suffer direct blows to the non-dominant shoulder while playing sports
- Non-union rare following non-operative management in this group
  - Majority of non-unions occurring in males who sustained a previous injury to the same clavicle
- More studies are required to determine the necessary treatment for adolescents, but recent studies suggest that the trend toward surgical treatment of diaphyseal clavicle fractures may be unwarranted

https://sph.umich.edu/podcast/season2/adolescent-health.html