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# **Displaced middle-third clavicle fracture management in sport--still a challenge in 2018. Should you call the surgeon to speed return to play?**

Greg A Robertson (1)

Alexander M Wood (2)

Christopher W Oliver (1), (3)

- 1) Edinburgh Orthopaedic Trauma Unit, Royal Infirmary of Edinburgh, 51 Little France Crescent, Edinburgh EH16 4SA
- 2) Orthopaedic Department, Leeds General Infirmary, Great George St, Leeds LS1 3EX, United Kingdom
- 3) Physical Activity for Health Research Centre, The University of Edinburgh St Leonard's Land, Edinburgh EH8 8AQ

Correspondence to Greg Robertson: [greg\\_robertson@live.co.uk](mailto:greg_robertson@live.co.uk)

Prof Chris Oliver is on Twitter @CyclingSurgeon

## **Introduction**

The management of clavicle fractures should be guided by fracture location (middle-third/lateral/medial) and fracture configuration (undisplaced/displaced/comminuted)[1-5]. Current management guidelines recommend surgical management for middle-third fractures, which are completely displaced, shortened by 2cm or comminuted, as this can facilitate an earlier return to sport and improve final shoulder function[2 3 5].

Our systematic review assessed all clavicle fracture studies that recorded return to sport, to determine the effect of different treatment methods on return rates and times to sport[6]. Twenty-three studies were included: eight were prospective cohort studies, fifteen were retrospective cohort studies[6].

Here we summarise the results from that systematic review, to determine the optimal management of middle-third clavicle fractures. Such information provides sport physicians and surgeons with an evidence-based treatment algorithm for these injuries, allowing optimisation of return rates and times to sport for affected athletes.

## **Review Methodology**

The systematic review was collated following a search of: CINAHAL, Cochrane, EMBASE, Google Scholar, Medline, PEDro, Scopus, SPORTDiscus, Web of Science[6]. Studies were considered for inclusion if they reported on patient cohorts who were active in sport pre-injury, had sustained a fractured clavicle, and attempted to return to sport post-injury[6]. Documentation of either return rate or time to sport post-treatment was necessary for inclusion[6].

Return rates and times to sport were the primary outcome measures. Return rates to pre-injury level of sport, rates of and times to fracture union, re-intervention and complication rates were the secondary outcome measures[6]. Return to sport was defined as the resumption of sporting activities; return to pre-injury level of sport was defined as resumption of pre-injury sporting activities[6].

### **Middle-Third Fractures**

Ten of the studies reported on middle-third fractures(n=304): three included conservatively-managed undisplaced fractures(n=22); five included conservatively-managed displaced fractures(n=85); nine included surgically-managed displaced fractures(n=197)[6].

Six studies were retrospective cohort studies; four were prospective cohort studies[6]. One study comprised Level 3 evidence; nine comprised Level 4 evidence[6].

No study provided a set definition for fracture displacement: fractures were arbitrary classified as 'displaced' or 'undisplaced' [6].

For the whole cohort, the mean return rate was 97%; the mean return time was 12 (2-16) weeks[6].

### **Undisplaced Middle-Third Fractures**

#### *Conservative Management*

For undisplaced middle-third clavicle fractures, conservative management was the sole treatment modality[6]. This comprised collar and cuff immobilisation for two to six weeks, with early mobilisation and strengthening exercises[6]. The mean return rate was 95%; the mean return time was 10.6 (10-13) weeks[6]. There were no reported complications[6].

### **Displaced Middle-Third Fractures**

#### *Surgical Management*

For displaced middle-third fractures, there were two main methods of surgical fixation – open reduction with plate fixation (ORIF) or intramedullary nailing (IM Nail)[6]. The choice of fixation was guided by fracture configuration: two-part fractures were treated with either technique; three-part and comminuted fractures were treated with ORIF, to ensure adequate reduction and stabilisation[6].

For surgically-managed displaced middle-third fractures, the mean return rate was 98%; the mean return time was 9.4 (2-24) weeks[6]. For fractures managed with ORIF (n=129), the mean return rate was 98%; the mean return times was 9.3 (6-24) weeks[6]. For fractures managed with IM Nail (n=68), the mean return rate was 99%; the mean return time was 9.9 (2-14) weeks[6]. For ORIF, the re-intervention rate ranged 0-18%, while for IM Nail, the re-intervention rate ranged 67-100%[6].

#### *Conservative Management*

Conservative management of displaced middle-third fractures comprised collar and cuff immobilisation for six to eight weeks, followed by progressive mobilisation and strengthening exercises, once clinical and radiological union had been achieved[6]. The mean return rate was 93%; the mean return time was 21.5 (12-78) weeks[6]. Refracture rates ranged 0-57% and delayed surgical intervention rates ranged 0-29%[6].

On meta-analysis comparison, of surgical versus conservative management, for displaced middle-third fractures, the results were:

Return Rates: OR 0.20: 95%CI 0.05–0.83,  $p < 0.027$ ;  $I^2 = 0\%$ ,  $p = 0.68$  (Figure 1)

Return Times: MD 12.1 weeks: 95%CI 5.58–18.62,  $p < 0.001$  (Figure 2)

Post-hoc power analysis confirmed the included sample size was sufficient to detect the observed differences, with Type 1 errors set at 0.05 and Type 2 errors at 0.20 (minimum cohort size: 57 per group).

## **Conclusions**

Clavicle fracture management should be guided by fracture location and configuration. For middle-third fractures, conservative management of undisplaced fractures provides good return rates and times to sport. For displaced middle-third fractures, surgical management can offer improved return times to sport over conservative management. The majority of evidence guiding this, however, is Level 4 quality. Future well-designed randomised controlled trials are required to confirm the optimal management techniques for these fractures.

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