Thomas G, Whalley H, Modi C. Early mobilization of operatively fixed ankle fractures: a systematic review. Foot Ankle Int. 2009;30(7):666-74

Design: systematic review of clinical trials

Purpose of study: to review the evidence in favor of early motion after joint fixation in ankle fractures

PICOS:

- Patient population: patients with operatively treated ankle fractures using any type of internal fixation that allowed ankle joint motion
- Intervention/Comparisons: Immobilization for 6 to 8 weeks versus earlier mobilization
    - "Early motion" meant that the patients spent at least half of the initial 6 to 8 weeks free to dorsiflex and plantar flex the ankle joint
    - "Immobilization" meant that the patients spent the initial 6 to 8 weeks unable to dorsiflex or plantar flex due to a non-removable cast
- Outcomes:
    - Functional outcome measures such as the Olerud-Molander score
    - Range of motion
    - Return to work
    - Complications
- Study types: randomized or pseudo-randomized trials published in English
    - Trials involving conservatively treated fractures were excluded
    - Studies of fractures in children were excluded
    - Studies of other ankle injuries such as ligamentous injuries and pilon fractures were excluded

Study selection:

- Databases included MEDLINE, EMBASE, and the Cochrane Collaboration Library through 2008
- Two reviewers independently assessed articles for quality but did not formally score them
    - Criteria included details of recruitment and participant flow, baseline patient characteristics, intention to treat analysis, adverse event reporting, details of interventions given, good randomization and concealment, blinding of patients, and appropriate statistics

Results:

- 9 studies published between 1986 and 2007 met the inclusion criteria

- All studies were randomized but the quality of randomization varied
    - 5 studies did not give details 2 used a sealed envelope, and two were quasi-randomized by date of birth or alternation between groups
- In all studies the initial study phase was for 6 weeks, and rules for weight bearing differed
    - In 5 studies both groups were non-weight bearing for 6 weeks
    - In 3 studies both groups were allowed to bear weight for 6 weeks
    - In one study the groups were non-weight bearing for two weeks and then allowed to bear weight
- The immobilized patients in the studies had either fiberglass or Paris casts
- The mobilization patients varied in the device used; 3 studies used a weight bearing brace, 2 used a non-weight-bearing brace, and in 2 studies a cast was used for 3 days and then removed as the patients were treated without either a brace or cast but were told not to bear weight
- Outcome measure varied between studies
    - The most common outcome was the Olerud-Molander (O&M) score, which allocates 25 points for pain, 25 for stiffness, and 50 for activities, with 100 points as the best score and 0 the worst
    - Other studies used scoring systems similar to the O&M score, and the authors synthesized these scores with the O&M
    - Timing of outcome measures varied, but measures ad 9, 10, or 12 weeks were considered close enough to combine together, and values at 1 year were analyzed together
- O&M scores from 4 studies at 6 weeks showed statistically significant improved scores in the early motion group
- O&M scores at 1 year found no significant differences with early motion
- At 9 to 12 weeks, there was a greater range of motion in the early groups, but at 1 year, there was no significant difference
- Return to work was reported by 5 studies, one of which was done in the military and had return to full active duty as the outcome; the other 4 studies were done in civilian settings
    - Time to work was significantly shorter in 3 of the studies with a p value less than 0.00001
- Complications of infection occurred more frequently in the early motion groups but deep vein thrombosis (DVTs) had no significant differences in frequency
    - One study (Lehtonen 2003) reported 20 infections (16 superficial, 4 deep) in 50 early mobilization patients but only 4 superficial infections in the cast immobilization group
    - A different study (Egol 2000) reported no infections in either group, either the 27 braced patients or the 28 cast-immobilized patients

    - Both Lehtonen and Egol used an Aircast brace for the early mobilization groups
    - Lehtonen applied the brace immediately after surgery, but Egol applied the brace after the patients had spent 3 days in a plaster A-O splint
    - There was not a statistically significant difference in DVTs, which were rare (p=0.12), but all 4 DVTs in the combined studies occurred in patients immobilized with a cast

Authors' conclusions:

- There is good evidence to show that treatment with early mobilization as compared with cast immobilization is associated with a faster return to work on average, with improved range of motion at 9 to 12 weeks, but is associated with an increased risk of wound infection
- There is no evidence that early mobilization gives better joint specific functional outcomes or better range of motion at 1 year
- The decision regarding early mobilization of a surgically treated ankle fracture is a balance between early motion with improved short term function versus cast immobilization which may have fewer complications

Comments:

- Although the authors report having done a meta-analysis on several outcomes, there is no presentation of effect sizes, only of p values for the combined results
- Since pooling of effect sizes is the essence of meta-analysis, this analysis carries little information regarding the differences between rehabilitation approaches
- Early mobilization was also associated with more infections in Vioreanu 2007 (n=3/33) than with a cast (n=0/29); however, Lehtonen reported the highest rate of infection (n=20/50)
    - This could have been due to different criteria for diagnosing infection or it could have been related to the timing of the early mobilization
    - That is, Vioreanu immobilized all patients for 10 to 14 days in a dorsal Paris splint until primary wound healing had occurred, while Lehtonen used a removable brace immediately, before primary wound healing had been accomplished
- Lehtonen, who had the high rate of infection in the brace group, also found no difference in promptness of return to work, while Egol and Vioreanu, with low rates of infection, also found that return to work was faster with the brace
    - For early motion, Egol reported a mean of 53.8 days versus 106.5 days for the cast
    - For early motion, Vioreanu reported a mean of 67 days for early motion versus 94.9 days for the cast

- It is possible that awaiting mobilization until primary wound healing has occurred would confer many of the benefits of a removable lightweight device and prevent wound irritation from premature placement of a removable brace
- Most other differences between groups were transient; that is, range of motion and satisfactory O&M scores were equal at one year even though there may have been some early differences in these outcomes

Assessment: marginally adequate systematic review which is not sufficient to support a "good evidence" statement for any outcome, but which gives some evidence that immediate mobilization with a brace on the day of fracture surgery leads to a higher risk of wound infection than with an immobilizing cast, and some evidence that if mobilization is done with a removable brace after primary wound healing has taken place, range of motion happens earlier and return to work happens more quickly

References:

Egol KA, Dolan R, Koval KJ. Functional outcome of surgery for fractures of the ankle. A prospective, randomised comparison of management in a cast or a functional brace. JBJS Br. 2000; 82(2):246 – 9.

Lehtonen H Jarvinen TL, et al.: Use of a cast compared with a functional ankle brace after operative treatment of an ankle fracture: A prospective, randomised study. JBJS (Am) 2003; 85-A(2): 205 – 11.

Vioreanu M, Dudeney S, et al.: Early mobilization in a removable cast compared with immobilization in a cast after operative treatment of ankle fractures: a prospective randomized study. Foot Ankle Int. 28(1):13 – 9, 2007