

Journal Club Synopsis

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"To Immobilize, or not to immobilize—that is the question"

Clinical Scenario:

It is a Friday night in March and you are working a shift in the ED. You pick up a 17 year-old male with a chief complaint of "knee injury". The young man is the starting point guard for a local high school basketball team. He states that he was playing in his high school game earlier in the evening when he injured his knee. He states the mechanism of injury was twisting in nature after he "came down on it wrong". He had immediate pain and now his knee is swollen. The patient is very concerned about getting back on the court as soon as possible. On exam, the patient has midline joint tenderness, a moderate sized effusion but an otherwise benign exam. Plain films of the injured knee are obtained and are negative for fracture or dislocation.

As you fill out his discharge paperwork you give him instructions to follow up with the sports medicine clinic. You put in an order for a knee immobilizer and crutches, as it is your standard of practice, but your staff attending questions the need for the knee immobilizer.

What evidence is there to support knee immobilization in the non-fractured knee injury? What morbidity is associated with knee immobilization and how might that impact your patient's return to sport?

Introduction:

Immobilization of the non-fractured knee injury is a debate that continues in clinical emergency medicine. Classically, many emergency physicians choose to immobilize these patients based on a theoretic benefit of protecting the joint and pain control for the patient. This theoretic benefit of protection is based on the acute phase of healing in which inflammation places the joint at increased risk for further soft tissues injury. Given the fact that immobilization itself places the patient at risk for increased morbidity (decreased mobility, injury associated with gait changes associated with immobilization) our goal was to investigate what clinical literature exists looking at the benefits and risks of immobilization in the special patient population.

Article 1:

Functional and morphological adaptations following four weeks of knee immobilization, JW Veldhuizen; FTJ Verstappen; JPAM Vroemen; H Kuipers; JM Greep; Orthopedics and Clinical Science 1993;14: 283-287.

The first article was a prospective observational study that took 8 healthy subjects without history of knee injury and placed them in a unilateral long leg cast for four weeks. The subjects were made non-weight bearing on that extremity for the study period. Leg performance and muscle atrophy were studied before and after immobilization. Immobilization was found to cause a significant decreased in quadriceps cross section area, isokinetic strength of knee extensors and flexors, quadriceps endurance. However, despite functional decline subjects had only minor functional complaints and they regained full range of motion of the joint within three days regaining normal gait.

Article 2:

Changes in muscle function in response to 10 days of lower limb unloading in humans, HE Berg; PA Tesch; Act Physiol Scand 1996;157: 63-70.

Article two was another prospective observation study that looked at 10 healthy subjects without a history of knee problems. These individuals were randomized to 10 days of lower limb unloading using either a unilateral unloading harness or by wearing an elevation shoe on the contralateral extremity. Strength and EMG activity of the immobilized limb was tested before and after unloading. Two study subjects were not included in data analysis secondary to development of calf venous thrombosis. Torque of the quadriceps muscle was found to decrease after 10 days of unloading while submaximal EMG activity increased. Both torque and EMG activity returned to baseline within 4 days of resumed weight bearing.

Article 3:

Cylinder or mobile cast brace after knee ligament surgery, T Haggmark; E Eriksson; The American Journal of Sports Medicine 1979;7(1): 48-56.

A prospective randomized trial, article three looked at patient's status post anterior cruciate ligament (ACL) reconstruction. One week post operatively, sixteen patients were randomized to either standard cylinder cast or mobile cast brace for four weeks. Muscle biopsies were taken before and after the four week immobilization period investigating muscle fiber type changes and muscle size. Cylinder cast patients were found to have a significant decreased in Type I muscle fibers in the vastus lateralis compared to the mobile cast group. Cylinder cast patients took twice as long to return to sport compared to their mobile cast brace counterparts. One-year follow-up demonstrated no clinical differences between the study groups.

Overall Discussion:

My literature review performed to prepare for this journal club demonstrated a paucity of literature looking at the benefits and risks of immobilization in the non-bony injured knee. The majority of articles dealing with the intended clinical question were animal studies that I felt had little clinical application

and were, therefore, not selected. The first study was selected as I felt it to be well designed. The second study was selected as it was the only study investigating a very short time of immobilization and, therefore, is likely the most similar to our emergency patient population. Article three was selected in an attempt to investigate the effects of immobilization on the injured knee as the first two studies looked only at uninjured patients.

As the group discussed each article separately, similar themes regarding study limitations were repeatedly voiced. Small study size was an issue with all three articles. The first two articles were thought to have a somewhat limited clinical correlation given the fact that the study individuals were healthy and uninjured and not similar to our emergency room patients. Study three looked at surgical patients which again were thought to be different from our clinical population.

When specifically looking at study results, we did find it interesting how quickly immobilization causes strength effects as highlighted in article two. This short term immobilization is likely most similar to our ED patients. Additional morbidity associated with immobilization was highlighted in this article with regard to the two patients who developed DVTs. Overall, article two highlighted the possible morbidity associated with immobilization of the non-fractured knee. However, this morbidity seemed to be quickly resolved in this and the other articles as the patients regained full mobility and strength in the extremity.

Although article three looked at surgical patients, we did find some good clinical application in the study results. Patients placed in hinged knee braces were able to return to sport in half the time of their cylinder cast counter parts. Although both patient groups had similar one year outcomes, early return to sport obtained with the hinged knee brace would certainly be of personal significance to the individual patient. This led us to discuss how our use of immobilization might change based on the patient population or specific patient we are caring for.

Bottom Line:

Overall, we were quite surprised at the paucity of literature found regarding the use of immobilization in the non-fractured knee injury. There certainly is no good literature to give a universal answer to our clinical question. Use of immobilization can be considered when the patient might receive benefit from added pain relief. However, a focus should be placed on early mobilization and prompt outpatient follow-up with appropriate specialists to minimize morbidity associated with immobilization.