

## **EBJIS guideline Workgroup 5: Joint Mobilization**

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### **Background and aim**

Joint function after treatment of septic arthritis is impaired in up to 30% of patients [1]. Multiple variables can influence the final functional outcome. In this document, the effect, optimal starting time, and modalities of joint mobilization are evaluated.

Patients with septic arthritis are usually managed in the inpatient hospital setting to begin with and require an interprofessional team of caregivers. Joint mobilization starts when the infection is clinically under control.

The choice of rest versus motion has always presented a dilemma in the management of musculoskeletal injury and disease [2]. Treatment of injured joints has included immobilization because of the intuition that injury demands a period of rest for healing to occur and the commonsense reasoning that moving a painful part would produce more pain. The forefathers of orthopedics also strongly advocated treatment with enforced, uninterrupted, and prolonged rest. The end results were often atrophy, stiffness, and contractions. Prolonged immobilization following surgical intervention is a common cause of knee motion limitation [3]. Paulos et al. [3] reported that infrapatellar contracture syndrome is a recognized cause of posttraumatic knee morbidity.

Encouraging results with early motion led to studies of the biology of repair under the influence of motion [4-7]. However, these were mostly experimental animal and basic studies. Salter et al. [2, 6, 7] and O'Driscoll et al. [4] have demonstrated the beneficial effects of continuous passive motion not only on healing of articular cartilage defects, but also on fluid exchange; they have also justified its use for septic arthritis. These studies showed that early active or passive non-weight-bearing mobilization improves the nutrition of synovial cartilage and resists the weakening of surrounding muscles [8].

### **What are the strategies of joint mobilization?**

The goal is to reduce pain and restore and maintain physiological joint function. After reviewing the literature and involving a multidisciplinary expert panel, Chabaud et al. [9] proposed a consensus protocol after septic knee arthritis. The authors suggested the following three phases:

- early mobilization to recover range of motion
- muscular strengthening first unloaded without any resistance
- gradual reloading with a walking stick and finishing with functional work

Naylor et al. [10] categorized the rehabilitation periods after septic arthritis into three time periods, namely:

- the early rehabilitation phase (0 to 6 weeks)
- the middle rehabilitation phase (6 to 14 weeks)
- the late rehabilitation phase (15 to 30 weeks)

Each of these phases has goals with respect to body function and structure, activity of the physiotherapist, and participation of the patient. These phases should be adapted according to the anatomic site of infection and the patient's perspective for rehabilitation (e.g., daily practice activity, professional sport activity).

## **Summary of recommendations and level of evidence**

### **When should joint mobilization be started?**

After an infection is under control, motion should begin slowly but deliberately. Motion should not begin before the drains have been removed and the drain holes closed. This approach may decrease the incidence of chronic drainage or fistula formation [11, 12]. In line with the individual's healing dynamic after an infection, there is no uniform and precisely defined time point for starting mobilization. Reported starting time points after active symptoms subside have ranged from 24 to 48 hours [13] up to 5 days [13, 14]. Katz et al. [15] started passive motion of the involved joint in 14 children (mean 3 years [2 weeks to 9 years]) on the first day after drainage.

### **How many mobilization cycles/day should there be and when should weight bearing be started?**

There is no evidence on the number of mobilization cycles per day. The daily implementation of joint mobilization depends on numerous factors, including the patient's physical strength and ambition, pain management, institutional possibilities (e.g., mechanical devices for continuous passive motion, physiotherapist schedule, number of qualified caregivers), and costs.

Katz et al. [15] gradually increased motion as much as the patient could tolerate in their study with children. Passive motion was continued until the child resumed active motion spontaneously. Older children, in addition, were encouraged to move their affected limb actively as much as they could. Weight bearing was encouraged as soon as possible.

Sreenivas et al. [16] reported knee mobilization after 2 weeks and weight bearing at 6 weeks in their series of 26 cases of acute hematogenous septic arthritis in adults. Diefenbeck et al. [17] recommend light weight bearing (i.e. 10 kg) of the lower extremities within the first 3 weeks and a gradual weight increase over next 3 weeks.

### **How should the joint be rested between mobilization cycles?**

No studies are available on joint rest between mobilization cycles. Recommendations include allowing the joint to be in its functional position and positioning the joint to allow passive range of motion activities (e.g., continuous passive motion). Cooling, analgesics, and anti-inflammatory therapy contribute to pain relief and detumescence and may be beneficial during rest periods. In addition, they may allow early and continuous mobilization and alleviate synovitis [17]. However, these treatment practices have not yet been systematically evaluated.

### **Does regional anesthesia for pain relief during mobilization have any drawbacks?**

In patients with native joint septic arthritis, this question has not been systematically evaluated or investigated within a study setting. The majority of data stem from a setting other than septic arthritis, namely, from an optimal postoperative analgesic regimen following total knee replacement. Randomized trials and systematic reviews have concluded that local infiltration of anesthetics can provide improved postoperative pain relief [18-20]. Thus, when joint resistance to mobilization is met, manipulation techniques may also be used under anesthesia followed by the resumption of the activity initiated up to that point, with an emphasis on increasing the joint's amplitude of motion. Drawbacks of regional anesthesia for pain relief are not specific to septic arthritis and include adverse effects and allergies, similar to all drugs.

Bagry et al. [21] investigated the effect of a continuous peripheral nerve block on the inflammatory response in knee arthroplasty in 12 patients. After receiving spinal anesthesia, they were randomly allocated to either patient-controlled analgesia with morphine (n = 6) or a combination of continuous lumbar plexus and sciatic nerve blocks with ropivacaine 0.2% for 48 hours. Interestingly, continuous lumbar plexus and sciatic nerve blocks with ropivacaine contributed to the attenuation of the postoperative inflammatory response. It is unclear whether or not this should be taken into consideration in early relapse cases or in infections that are not yet controlled.

### **Conclusions**

In septic arthritis of the native joint, there is not enough evidence to recommend one mobilization strategy over another. Previous uncontrolled observational studies have shown that prolonged immobilization following surgical intervention leads to limitation of knee motion, atrophy, stiffness, and contractions. Conversely, animal and basic studies have demonstrated the beneficial effects of continuous passive motion. These results have been implemented in clinical practice [22].

Mobilization is recommended to be started *after* drains have been removed and surgical wounds closed. Most experts recommend mobilization when infection is controlled (i.e., within 24 to 48 hours up to the first 5 days) and then gradually increasing weight bearing within the first 6 weeks.

Further recommendations on joint mobilization cycles per day, joint rest between cycles, starting weight bearing, amount of weight when bearing, and pain management in septic arthritis derive from institutional and personal experience, as well textbooks, and hence, differ between centers. In addition, the patient's joint function prior to infection and her or his perspective regarding joint use must be considered. Studies are needed to evaluate and validate joint mobilization concepts and to ensure results are comparable between institutions. These studies are feasible, in particular when considering the number of assessment scores available to measure joint function [10, 15, 16, 23].

## **Literature review**

### **Material and methods**

Literature search strategy: We used the electronic database MEDLINE (Medical Literature Analysis and Retrieval System Online) through the PubMed interface and the Google Books search engine. Keywords and Medical Subject Heading (MeSH) terms used were as follows: septic arthritis, native joint arthritis, infectious arthritis, rehabilitation, physical therapy, joint mobilization, recovery.

### **Literature review with evidence grading and highlight on bias**

Level IV evidence

### **Disclosures**

Parham Sendi: none

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