

## Manipulation Under Anesthesia: A Safe and Effective Treatment for Posttraumatic Arthrofibrosis of the Knee

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**Purpose:** Manipulation under anesthesia (MUA) has been shown to improve range of motion (ROM) following elective total knee arthroplasty; however, there is a paucity of data regarding its role in a posttraumatic setting. This study seeks to investigate the results of a consecutive series of closed knee manipulations performed under anesthesia after high-energy trauma to evaluate if this treatment modality is an effective means to treat posttraumatic arthrofibrosis.

**Methods:** Patients undergoing a closed knee MUA for the treatment of arthrofibrosis, which developed subsequent to surgical treatment after high-energy periarticular knee injury, were retrospectively reviewed. Knee ROM was determined prior to MUA and the ROM at the most recent follow-up was recorded. Patient and injury characteristics including patient age, body mass index, tobacco use, medical comorbidities, injury type, and location were assessed and correlated with manipulation success using a 2-sample *t*-test. A delay in manipulation of 90 days or greater was also evaluated in this fashion with regard to its role in predicting the benefit of MUA.

**Results:** 22 patients with a mean age of 40 years (range, 21-78), consisting of 11 women and 11 men, were included. Injuries included distal femur fracture (7), tibial plateau fracture (5), patellar fracture (3), multiligamentous knee injury (2), femoral shaft fracture (1), traumatic arthrotomy (1), combined distal femur and patella fracture (1), combined tibial plateau and patella fracture (1), and combined femoral shaft and patella fracture (1). Nine fractures were open and 13 injuries presented in the setting of polytrauma. The mean time from definitive treatment to manipulation was 90 days (range, 42-188 days). Mean follow-up after manipulation was 7 months. The mean premanipulation ROM arc was 59° (range, 10°-110°). The mean intraoperative arc of motion, achieved at the time of the manipulation, was 123° (range, 90°-145°). The average intraoperative improvement was 67° (range, 25°-120°). No complications occurred during the MUA procedure. At the most recent follow-up, the mean ROM arc was 108° (range, 75°-145°). The average improvement from premanipulation to the most recent follow-up was 49° (range, 5°-115°). An average of 18° was lost between intraoperative ROM and that at most recent follow-up (range, loss of 50° to gain of 30°). Interestingly, manipulations performed 90 days or more following initial surgical treatment provided a benefit equaling those performed more acutely ( $P = 0.12$ ).

**Conclusion:** Manipulation under anesthesia is a safe and effective method to improve postoperative knee ROM in the setting of trauma-induced arthrofibrosis. Improvement in ROM was noted following manipulation in every patient in our series. Surgeons should anticipate that while some patients may show improvement beyond intraoperative achievements, the majority of patients fall short of reproducing this range at final follow-up. A 90-day window between fracture fixation and manipulation did not negatively impact ROM at final follow-up and may prevent fracture displacement during the MUA.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.