

Should We Throw Away the External Fixator for Knee Dislocations?

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Purpose: Knee dislocations are limb-threatening injuries and may present as pure knee dislocations, fracture dislocations, or periarticular knee fractures. There are limited data to guide optimal management strategies for these dislocations. Many authors have reported improved outcomes with early surgical reconstruction of all ligamentous structures. Some advocate for the role of initial external fixation in the management of the dislocated knee, especially with neurovascular compromise. There are currently no articles in the literature that describe the patient reported outcomes of multiligamentous knee dislocations treated with nonarticulated external fixation. The purpose of this study is (1) to describe the demographic and injury characteristics of a series of patients with multiligamentous knee dislocations and (2) to report patient outcome data (SANE [Single Assessment Numeric Evaluation] and PROMIS [Patient-Reported Outcomes Measurement Information System] scores) following the use of nonarticulated external fixation.

Methods: Between 2008 and 2013, 41 patients with multiligamentous knee dislocations presented to our emergency department. All patients were treated with application of nonarticulated external fixation placed by orthopaedic trauma surgeons. Indications for spanning external fixation included gross instability on examination with failure to maintain joint reduction, open injuries, and those with neurovascular compromise. Their medical records were retrospectively reviewed for injury characteristics and patient demographics. All patients underwent MRI scan following application of external fixation. All patients underwent manipulation under anesthesia at time of removal of external fixation. Patient-reported outcome data was quantified using SANE and PROMIS scores.

Results: 33 patients were identified, with 22 males and 11 females. The mean age was 39 years (range, 17-70) and the mean body mass index was 32 kg/m² (range, 21-66). Three patients (9%) had isolated knee dislocations. The most common mechanism for injury was motor vehicle collision (42%), followed by a fall from height (30%), pedestrian versus auto (18%), and fall from standing (9%). MRI results revealed a torn anterior cruciate ligament in all patients (100%). The other most commonly injured structures were posterior cruciate ligament (91%), lateral collateral ligament (48%), medial collateral ligament (44%), medial meniscus (18%), lateral meniscus (15%), and posterolateral corner (12%). Thus, all were multiligamentous knee injuries. 82% of patients were treated definitively with external fixation, while 18% underwent ligamentous repair/reconstruction. The mean time to removal of external fixation was 48 days (range, 4-82). 86% of patients underwent formal physical therapy. The average follow-up was 44 months (range, 9-62). At time of follow-up, 26 patients (79%) maintained normal radiographic alignment of the knee, while 7 patients (21%) were in varus alignment. Four of these 7 patients underwent high tibial osteotomy. The mean range of motion of the knee was 101° (range, 55-138). The patient-reported outcomes were obtained using SANE and PROMIS scores, with a mean SANE score of 49 (range, 5-90) and mean PROMIS score of 38 (range, 32-46). SANE is a subjective measure of patient's perceived function and our results indicated decreased function. The PROMIS score indicates that the

patient's average level of physical function is higher than 38% percent of people in the general population. Additionally, not a single patient scored above 50% of their age-matched peers.

Conclusion: To our knowledge, this series represents the first dedicated patient-reported outcome data using SANE and PROMIS scores in patients sustaining multiligamentous knee injuries treated with nonarticulated external fixation. While use of this method might be thought of as leading to stiff knee, the patient's final range of motion in this study is higher than previous reports. Our protocol of manipulation under anesthesia at the time of external fixator removal and importance of outpatient physical therapy most likely contributed to these results. Over 20% of patients had a varus deformity at follow-up. Multiligamentous knee dislocations are serious injuries as the overall patient-reported outcomes indicated decreased function. However, the use of a nonarticulated external fixator is a viable treatment alternative for traumatic knee dislocations.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.