Comparison of Clinical Outcomes of Multi-ligament Reconstruction Patients stabilized with External Fixation versus Hinged Knee Bracing Prior to Definitive Surgery

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INTRODUCTION: Multi-ligament knee injuries (MLKIs) are rare, severe injuries that with long, difficult recoveries. While external fixation (Ex-Fix) and hinged knee bracing (HKB) are both used pre-operatively, they serve different indications. Currently, it remains unclear which form of temporary stabilization leads to better outcomes in this injury. This study compares clinical outcomes between patients who sustained an MLKI and were treated with Ex-Fix and those treated with HKB prior to definitive multi-ligament reconstruction.

METHODS: This retrospective case-control study was conducted at a single level 1 academic trauma center. Thirty-three consecutive patients who underwent MLKI reconstruction by a single sports medicine fellowship-trained orthopaedic surgeon since 2019 were included, identified via CPT codes. Patients were excluded if they had a proximal tibia fracture or if surgery occurred more than 6 months post-injury. The experimental group included those treated with Ex-Fix; the control group received only HKB. Data was collected on comorbidities, injury characteristics, perioperative details, clinical outcomes, and patient-reported outcomes. Categorical data were analyzed with chi-square, and continuous variables with t-tests.

RESULTS: Fourteen patients were treated with external fixation and 19 with a hinged knee brace. There was no significant difference in Schenck classification (p=0.126). The rates of nerve injuries (p=0.493) and vascular injuries (p=0.124) were similar between the two groups. There were 8 patients who sustained vascular injuries at the time of the MLKI, 6 of which required a vascular bypass surgery. There was no difference in the rate of vascular bypass surgery between groups (p=0.065). At 12 months post-op, there were no significant differences in pain (4.2 vs 3.8; p=0.94), International Knee Documentation Committee (IKDC) scores (60 vs 62.75; p=0.64), and Lysholm score (67 vs 74; p=0.85) between groups between Ex-Fix and HKB groups, respectively. Knee flexion compared was also similar between the HKB and Ex-Fix groups (109.8 vs 107.3, respectively) (p=0.453). Rates of DVT (p=0.894) and other complications (p=0.611) were similar.

DISCUSSION AND CONCLUSION: One year after surgery, patients managed pre-operatively with HKB had similar outcome scores compared to those treated with External Fixation. The use of Ex-Fix over HKB did not appear to be associated with Schenck classification, or the presence of neurovascular injuries. Clinical and patient-reported outcomes were also similar. Hinged knee brace stabilization prior to definitive surgery for multi-ligament reconstruction is a less invasive treatment option for patients with MLKI. External fixation should still be considered for knees that are unable to remain reduced in a brace.

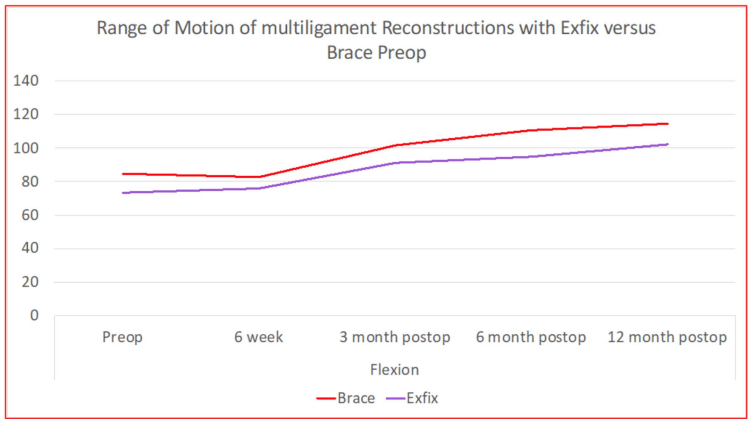

Figure 1: Flexion range of motion between groups over 12 months of post-operative follow-up.
Both groups had similar knee flexion by 12-months of follow-up. (p=0.453)