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**INTRODUCTION:** An alternative articular ACL reconstruction (ACLR) combines a proximalized and anterolateral reinforcement using an iliotibial (ITB) band graft (SATURN). The aim of this study is to evaluate the effects of this technique on knee kinematics in the ACL injured knee. As is a widespread consensus that the preservation of meniscal function is essential to maintain native activity, this study aims to analyze the impact of the repair technique on knee kinematics. To this end, a detailed and systematic data collection study was performed to determine the optimal distance between sutures for a better clinical result in repair biomechanics. This study aimed to investigate the effect of suture distances on knee kinematics.

**METHODS:** With Institutional approval, 10 cadavers (mean age: 40 years) were tested using a robotic system under three loads: (a) an 89 N anterior tibial translation (ATT) load, (b) a 5 Nm flexion moment, and (c) a simulated pivot shift (PS) load, as a combined repair. Meniscus repair was performed using a vertical mattress suture 3 mm from the meniscus. The ITB band was then passed through the tibial tunnel and fixed with a interference screw. The graft was fixed in this tunnel with an interference screw, undertable applying 80 N of tension and fixed with a vertical mattress 3 mm from the meniscus. The group with the fixed in ATT at 30° and 70° of flexion.

**RESULTS:** In response to ATT loading, a statistically significant decrease in ATT was observed at all knee flexion angles between the ACL-deficient and the ACLR states (Fig. 1). However, ACLR did not restore the intact knee ATT. While there was a statistically significant difference in IR between the intact and ACLR states at 0° of knee flexion, no statistically significant difference was found between the ACLR and intact states at other flexion angles (Fig. 1). To response to simulated PS loading, while both tibial displacement was detected in the ACLR state compared to the intact state at 0° and 15° of flexion, no statistically significant difference was found between the states at 30° of flexion (Fig. 1). The mean ± standard deviation of the tear gap for each repair technique is given in Figure 2. Groups with similar distances of meniscal tears and PS exhibited significantly smaller displacement in the group with 3 mm in the intact knee (Fig. 1). The groups with 5 and 7 mm in the intact knee (Fig. 1) showed significantly smaller displacements in the group with 3 mm in the intact knee (Fig. 1). Failure mode did not correlate with suture distance. Failure was observed in 8/10 samples in the intact knee (Fig. 1).

**DISCUSSION:** In this cadaver study the ACLR did not restore intact ACL ATT, which is not consistent with the literature. However, the improved ATT in the ACLR states at 0° and 15° of knee flexion, no statistically significant difference was found between the ACLR and intact states at other flexion angles (Fig. 1). The main finding of this study is that meniscal repair with a suture distance greater than 3 mm demonstrated statistically higher opening displacements. The group with 3 mm demonstrated statistically higher opening displacements at 0° and 15°. The group with 3 mm in the intact knee (Fig. 1) exhibited statistically different opening displacements at 0° and 15°. Meniscal sutures were clinically placed at varying distances and the optimal spacing remains undetermined. The current study data are not yet sufficient to recommend a specific distance, but it appears to result in a larger displacement and potentially hinder the healing of a meniscal tear. Further biological studies are needed to investigate the gap size of a meniscal tear in the healing process.

**SIGNIFICANCE/CLINICAL RELEVANCE:** Based on the results of this cadaver study, this combined ACLR and anterolateral reinforcement method using this novel ITB technique as a autograft provides an alternative method/technique to improve stability of the ACL-deficient knee at gap sizes with sutures.
positioned at distances of 7 mm or less exhibit greater biomechanical stability compared to sutures at 9 mm and beyond. Surgeons may want to consider the data from this study when employing meniscus sutures at a distance of greater than 7 mm.

REFERENCES:


