

Biomechanical Study of Novel Modified UKM Internal Bracing in ACL Graft

¹ Akmal Hisham Md. Yusoff, Badrul; ²Razzan Rameez, M; ³Farihan Mohd, A; ⁴Norlelawati M, ⁵Muhammad Ilyas M, ⁶Muhammad Karbela R; ⁷Zainuddin S;

¹⁻⁶Department of Orthopedic and Traumatology, University Kebangsaan Malaysia, Malaysia, ⁷Department of Mechanical & Manufacturing Engineering, Institute, University Kebangsaan Malaysia, Malaysia

INTRODUCTION:

Anterior cruciate ligament reconstruction surgery is one of the commonest sports trauma procedures. ACL reconstruction has undergone an evolution throughout the years. The techniques, the jigs, as well as the grafts and the fixation methods have evolved too in the quest of getting the most favourable outcome for the patient. All- inside technique is one of the latest that rely on the sockets rather than a tunnel and an enhancement diameter of the graft to reduce the risks of retear. The all-inside graft preparation is a special technique that will result in a stronger and with larger diameter compared to quadrupled hamstring grafts. Orthosports Universiti Kebangsaan Malaysia (UKM) has devised a patented method to further enhanced the all-inside grafts using “semitendinosus, gracilis or peroneus Longus tendons” that is much stronger and prevents elongation and will shorten the time for return to sports. The purpose of this study was to compare the dynamic elongation and load to failure of anterior cruciate ligament repair with Modified UKM internal bracing in ACL graft (MUIB).

MATERIALS & METHODS:

Sawbones knees were used with all inside ACL reconstruction to compare the Dynamic Elongation and Load to Failure of the prepared ACL graft and MUIB ACL graft. Further comparison of an end-to-end vs trifold internal bracing was tested for the load to failure.

RESULTS:

The **Dynamic Elongation** was lower for the MUIB ACL graft group than the ACL graft group: 1.38mm versus 4.28mm, $P = .0004$ respectively. The average **Load to Failure** for the MUIB ACL graft group was higher than the ACL graft group: 1501 N (SD 324) versus 760 N (SD 74), $P = .0003$. End-to-end internal bracing

preparation had a load to failure 70% less than the trifold internal brace preparation.

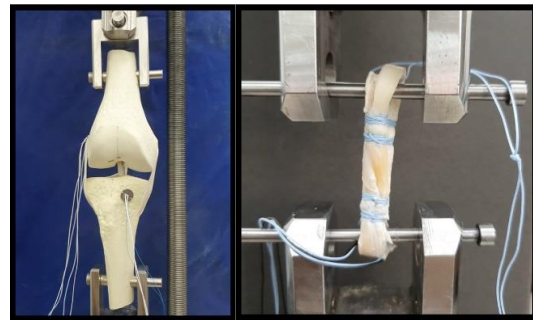


Figure 1: (Right) Graft fixed to the knee model and tested for Dynamic elongation using the machine. (Left) Graft fixed to the UTM-5/14P machine, using 5mm pin to test load to failure.

DISCUSSIONS:

There was lower dynamic elongation and higher load to failure MUIB ACL graft group compared to the ACL graft group. The trifold technique for internal bracing gives a superior load to failure compared with the end-to-end technique.

CONCLUSION:

Clinical significance: ACL reconstruction using MUIB ACL graft significantly increases the biomechanical properties of the graft. It may be useful to protect the anterior cruciate ligament reconstruction from failure during the early stages of healing and can allow accelerated rehabilitation in athletes.

REFERENCES:

1. Bachmaier, S, et al. Independent Suture Tape Reinforcement of Small and Standard Diameter Grafts for Anterior Cruciate Ligament Reconstruction: The Journal of Arthroscopic & Related Surgery, 34(2), pp.490-499