STRENGTH OF FIXATION OF TIBIAL INLAY GRAFT, ONE VERSUS TWO SCREWS TECHNIQUE. A CADAVERIC STUDY

*Munjal, S; Mihalko, W; + Fineberg, M
++ State University of New York at Buffalo, Buffalo, NY

INTRODUCTION:
The inlay technique of posterior cruciate ligament replacement is gaining popularity (1-3). With the tibial inlay technique a small osseous recess is created in the posterior part of tibia at the anatomic insertion of posterior cruciate ligament. The bone block of the condylar-bone graft is fixed flush to the posterior tibial surface with a screw. The theoretical benefits of inlay graft are that it eliminates the acute turn associated with transibial techniques and it allows anatomic placement of the graft.

The aim of this study was to compare the pull out forces of two different techniques for fixing tibial inlay grafts to tibia.

METHODS:
We used five pair of human cadaver knees to compare the fixation strength of one versus two-screws fixation. One knee from each pair underwent one screw fixation while the other knee underwent two-screw fixation. Ten tendoachilles graft with a bone plug were harvested from 5 cadavers. To match the bone quality of the graft bone plug, the grafts harvested from the same cadaver were used to prepare inlay grafts for right and left side of the paired knee specimens.

The proximal part of tibia was cleaned and sectioned 15 cm from the joint line. A trough was made at the posterior margin of the tibia for the inlay graft. The bone plug was contoured into a 20mm × 11mm × 10mm bone block. The trough and bone block were adjusted to obtain an accurate fit in the osseous recess. The tendon was shaped into a 10 mm tube stitched with a running ethibond whipstitch. Five prepared grafts were fixed with one 6.5 AO cancellous screw and washer, while the contralateral side was fixed with two 4.0 AO cancellous screws with washer. The tibial specimen was mounted onto MTS model no. 858 Mini Bionix biaxial servo hydraulic load frame. The tendon with the suture was connected to a clamp. The angle of the construct was adjusted to provide the pull of graft at 35 to 40 degrees relative to the tibial plateau. Maximum tensile force to fracture or displace the bone plug from the trough was recorded.

Statistical analysis of the data was done with the non-parametric Wilcoxon signed ranks test using significance at a level of \( p = 0.05 \)

RESULTS:
The mode of failure was different in both groups. All five constructs with two 4.0 cancellous screws and washer fixation, failed with pull out of the screws and displacement of the graft. Four out of five constructs in the group with one 6.5 cancellous screw and washer fixation failed with the fracture of graft at the site of fixation, one construct failed with the pull out of the screw and graft construct. The mean pull out forces in two screw and one-screw groups were 385.2 +/- 132.2 N, and 358.8 +/- 148.13 N respectively. The pull out strength did not differ significantly between the two matched groups. A Wilcoxon Signed ranks analysis showed no significant difference between the two matched groups, \( p = 0.686 \).

DISCUSSION:
Tibial inlay graft for posterior cruciate ligament reconstruction is a relatively new procedure, techniques described in literature have suggested use of both one and two screw fixation methods. To our knowledge this is the first study to compare the fixation techniques of one versus two-screw fixation of tibial inlay graft. The study design deserves a special mention as we matched the pairs for the same quality of bone graft and the recipient bone. Our results show no statistical difference in the fixation strength of one 6.5 cancellous screw versus two 4.0 cancellous screws fixation. The mode of failure was different in both the groups with grafts with one 6.5 screw fixation predominantly failing at the fixation point with the fracture of the bone plug. This is important clinically, and we suggest that wider and thicker bone plug must be used rather than the dimensions described in literature, if one 6.5 cancellous screw is used to fix the tibial inlay graft.

REFERENCES: