

SIZE OF ANTERIOR CRUCIATE LIGAMENT AND ITS RELATION TO ANTHROPOMETRIC PARAMETERS - A CADAVAR STUDY

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INTRODUCTION

Optimal graft size for anterior cruciate ligament (ACL) reconstruction is a key factor for successful surgery. Studies showed that small graft size (<8mm) increased risk of failure¹ while large graft size caused impingement to intercondylar roof, posterior cruciate ligament² and harmed the root area of lateral meniscus³. Hence, graft size need to be customized for optimal result rather than 1 size fit all. The purposes of this study are to evaluate diameter of ACL at mid-portion (figure1), length & width of femoral insertion (figure2), length & width of tibial insertion (figure3) of ACL and their correlation with anthropometric parameters that allow us to estimate native ACL size prior customizing the graft size for each individual.

MATERIALS & METHODS:

A total of 24 cadaveric knees were included. Demographic and anthropometric data including age, gender, height, thigh length and leg length were collected before dissection. Dissection of knee was done for anatomical measurement including diameter of ACL at mid-portion, length & width of femoral and tibial insertions of ACL, antero-posterior (AP) & mediolateral (ML) diameter of tibia plateau, femoral interepicondylar distance, femoral intercondylar notch distance, AP diameter of medial & lateral femoral condyle. Spearman correlation test was used to analysis association between variables.

RESULTS & DISCUSSIONS:

Diameter of ACL at mid-portion was 7.4mm±1.2 (5.8-10.5mm). Length and width of tibial insertion of ACL were 17.7mm±2.6 (11.3-22.3mm) and 12.0mm±2.1 (7.3-15.8mm) respectively. Length and width of femoral insertion of ACL were 17.0mm±3.3 (9.2-26.5mm) and 10.8mm±1.9 (7.3-15.4mm) respectively. The diameter of ACL at mid-portion had strongest association with thigh length (r:0.566, p:0.004). Length and width of tibial insertion of ACL had strongest association with leg length (r:0.753, p<0.001; r:0.714,

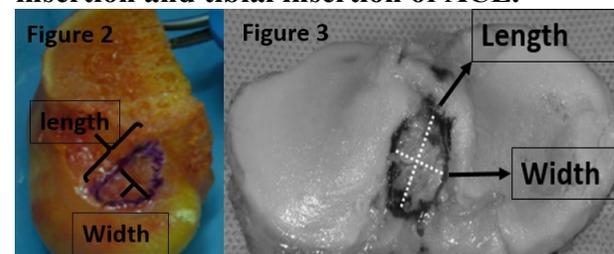
p<0.001). Length of femoral insertion of ACL had strongest association with ML diameter tibia plateau (r:0.664, p<0.001). There were no significant association between width of femoral insertion of ACL and studied parameters. Based on these associations, following linear regression formulas were developed:

1. Diameter of ACL at mid-portion(mm) = -4.22 + 0.24 (thigh length(cm))
2. Length of tibial insertion site of ACL(mm) = -12.71 + 0.79 (leg length(cm))
3. Width of tibial insertion of ACL(mm) = -11.17 + 0.60 (leg length(cm))
4. Length of femoral insertion of ACL(mm) = 1.19 + 0.19 (ML diameter tibia plateau(mm))

Figure 1: Diameter of ACL at mid-portion



Figure 2&3: Length & width of femoral insertion and tibial insertion of ACL.



CONCLUSION:

There are significant association between size of ACL with anthropometric parameters and the developed formulas are useful to predict native size of ACL prior to reconstruction surgery.

REFERENCES:

1. Magnussen, R.A et. Al. Arthroscopy 2012;28(4),526-531
2. Iriuchishima T et. Al. Knee Surg Sports Traumatol Arthrosc 2014;22(1),207-213
3. Park, Y. B. et. Al. Knee Surg Sports Traumatol Arthrosc 2017;25(5),1638-1645.