



NOVEL BRACE FOR THE TREATMENT OF PCL INJURY

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INTRODUCTION

The Jack’s PCL brace is used to treat injuries to the PCL ligament. This brace imparts a constant anteriorly directed load to the tibia. However as noted in by Janssen 2012, the tension in the PCL increases as the knee flexes (figure 1). A brace has recently been designed to apply a variable anteriorly directed load, via a dynamic tensioning system (DTS), to the tibia to mimic the tension in the PCL (figure 2). The purpose of this biomechanical study is to demonstrate that this new design of brace imparts a dynamic anteriorly directed force to the tibia that is similar to the varying tension in the PCL during knee flexion.

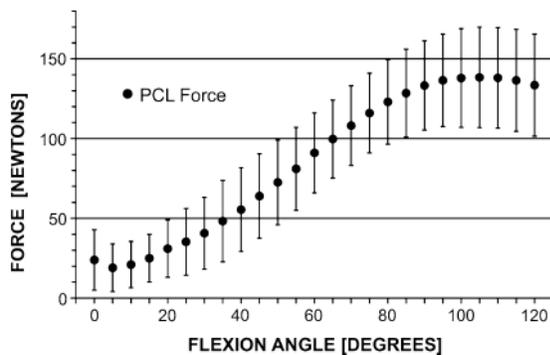


Figure 1 - Tension in the PCL throughout flexion

METHOD

Five healthy subjects were fit with an custom sized brace. A force transducer was placed beneath the DTS to measure force exerted against the posterior calf (figure 2). Subjects were instructed to stand shoulder width apart with straight legs. The force data were then logged as the subjects performed six squats, one squat being 0° to 90° to 0° knee flexion (judged visually). The force cuves were normalised over 100% and averaged across individuals and users.

RESULTS

The average force curve over all subjects can be seen in Figure 3.

DISCUSSION

The force exerted against the posterior calf was seen to increase and decrease during knee flexion in a linear fashion. This is closer to the tension seen in the PCL during knee flexion as

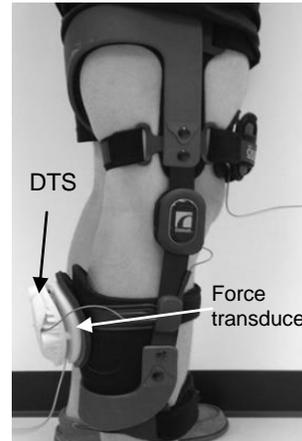


Figure 2 – Brace, DTS and force transducer

described by Janssen 2012. Due to the variable nature of tension in the PCL during flexion a brace that exerts a constant force is either applying too much or too little force for most knee angles. The DTS allows the amount of force applied to vary in a similar fashion to PCL tension promoting

a better position of the femur on the tibia throughout knee flexion. The reduced force in extension may also reduce discomfort.

CONCLUSION

The new brace applies an anteriorly directed force that increases linearly with knee flexion in the same manor that PCL tension increases with knee flexion.

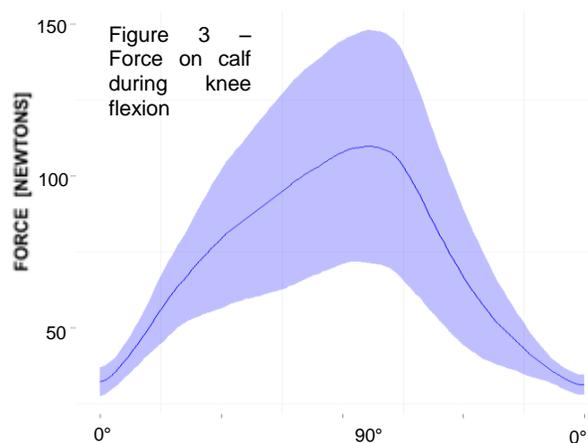


Figure 3 – Force on calf during knee flexion

CLINICAL APPLICATIONS

This new device may be beneficial for rehabilitation following both surgical or non-surgical treatment of the injured PCL.

REFERENCES

Janssen,K,S. KSSTA, 21, 1064-1070, 2013.

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