A TOOL TO ASSESS ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION BY QUANTITATIVE LOCALIZATION OF THE KNEE CENTRE OF ROTATION

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Introduction

The determination of some artrokynematics properties of the knee is not possible clinically and requires an objective method . [De Lange, 1999], such as the determination of the centre of rotation (COR) in videofluoroscopy image sequences [Baltzopoulos, 1995, Silveira L, 2005]. For Anterior Cruciate Ligament (ACL) Reconstruction evaluation, the follow up of COR helps to put in place the most appropriate rehabilitation strategy, as well as to give meaningful feedback to the surgeon [Mizner, 2003].This approach has been implemented in our Laboratory with original design of components, data processing and display. For the first time in our region, quantitative assessment of COR displacement is possible.

Methods

The COR, following Baltzopoulos, is determined as the point which is equidistant to the articular surfaces of the femur and the tibia. The video sequence comprises 30 images spanning 2 seconds untill full extension is reached. In each image the COR is marked with a cursor, using our image processing software, build using a math library.

Results

CINARTRO is our interactive software to process sequences of images and to produce graphs with COR coordinates. The output may be used as evidence for the patient´s clinical record during follow up (Figure2).

CINARTRO features the following:
>   Segmentation of articular surfaces
>   Interactive cursor to pick points
>   Correction capability to help the user
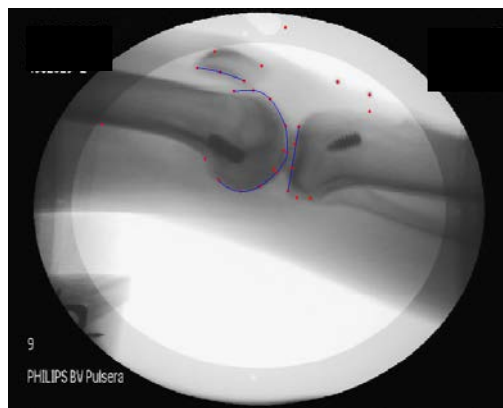>   Generation of a clinical report

*Figure 1: Video Fluoroscopy with ACL Injury (full extension frame 30) 6 months **after** reconstruction.*
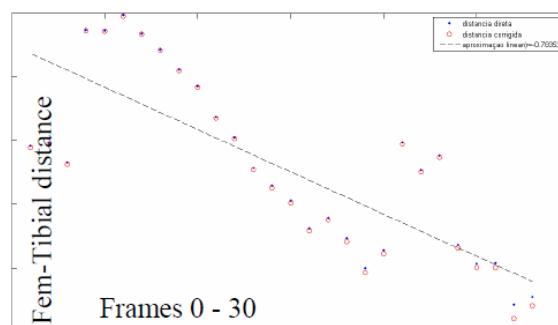

*Figure 2: Diagnostic output of **CINARTRO**. x-axis: frame number. Y-axis: distance from tibia to femoral surfaces. ACL Injury **after** reconstruction.*

Discussion

A new tool is now available for follow up of patients with ACL Injury. Considering the incidence of this problem in rehabilitation, the impact of **CINARTRO** will ease the burden of patient management, usually left to subjective upraisal.

References

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Mizner R et al Phys. Therapy 4:359-65, 2003
Baltzopoulos V. et al. Clinical Biomechanics 2:85-92, 1995
Silveira L et al Radiol. Brasil: 38 :427-30,2005