

ANGLIA POLYTECHNIC UNIVERSITY

ABSTRACT

SCHOOL OF APPLIED SCIENCES

MASTER OF SCIENCE

AN EVALUATION OF THE USE OF REFORMATTED CORONAL OBLIQUE PROTON DENSITY FAT  
SUPPRESSED FAST SPIN ECHO IMAGES IN ACL TEARS

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**Purpose:** The use of coronal oblique images (RCO), reformatted from an optimized proton density fat suppressed fast spin echo (PD-fs) and prescribed parallel to the ACL, was evaluated for ACL tears in comparison with conventional planes. The study also evaluated the image quality of the optimized sequence in the sagittal and coronal plane with two other sequences, the T2\* gradient echo (GRE) and Fast STIR.

**Methods:** Thirty patients with normal and abnormal ACLs underwent MRI of the knee using the above sequences. The signal-to-noise ratio (SNR) of bone, cartilage, synovium, meniscus and ligament, as well as contrast-to-noise ratio (CNR) and relative contrast (rel con) was measured using region of interest.

Images were subjectively assessed for image quality and demarcation of ligaments and menisci using a 4 point rating scale. Two independent readers evaluated the status of the ACL by the four sequences (protocol A), by including the RCO (protocol B) and the RCO on its own (protocol C). The confidence level for the presence or absence of the ACL tear and its severity were graded by a 5 point and 4 point rating scale respectively. Kappa weighted statistics was used to compare diagnostic accuracy of these protocols.

**Results:** PD-fs had significantly better SNR, CNR than T2\* GRE but not always better than STIR. Readers preferred the PD-fs over the T2\* and rated the PD-fs and STIR as equal for demarcation.

Confidence level was better for protocol B ( $\kappa_w=0.78$ ) than protocol A ( $\kappa_w=0.45$ ) and protocol C ( $\kappa_w=0.18$ ). Grading the severity of the ACL injury was very good for protocol B ( $\kappa_w=0.81$ ), good ( $\kappa_w=0.70$ ) protocol A and moderate ( $\kappa_w=0.50$ ) for protocol C.

**Conclusion:** The reformatted coronal oblique improved the accuracy in the diagnosis of ACL tears.