

CORRELATION OF IMAGING PHYSICAL EXAMINATION IN SPORTS INJURIES

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Introduction

Our knowledge on Anterior Cruciate Ligament (ACL) pathomechanics has increased. The diagnosis of partial ACL tears must be accurate in order to adjust the operative planning to anatomic status and injury severity. Instrumented measurement of knee laxity is a useful preoperative tool to quantify anterior tibial translation and several laximetry tests are available. Yet, their accuracy remains to be established. To evaluate the question of whether different arthroscopically confirmed ACL injury patterns have distinctive preoperative findings on clinical examination, instrumented laxity, and Magnetic Resonance Imaging (MRI).

Methods

Three hundred consecutive ACL-deficient patients with isolated ACL tears were evaluated with the Lachman Test (LT), the Pivot-Shift Test (PST), stress radiographs using the Telos Stress Device (Metax, Hungen, Germany), and MRI.

After arthroscopic confirmation of the ACL injury, we grouped patients into four different ACL tear types (1. complete, 2. partial anteromedial [AM] bundle intact, 3. posterolateral [PL] bundle intact, and 4. posterior cruciate ligament [PCL] healing), and partial tears were further evaluated for mechanical integrity and functionality of the remaining fibers.

Results

PST grades of p2 and p3 were consistent with complete ACL tears (86%; $P < 0.00001$), whereas PST grades of 0 or p1 were strongly related to partial tears (76%; $P < 0.00001$).

Instrumented laxity results showed a significant difference in Side-to-Side Difference (SSD) of anterior tibial translation in complete tears (9.1 vs 3.4 mm) versus partial tears (5.2 vs 2.9 mm; $P < 0.0001$). Most PL-intact cases were "functional" (67%), with lower instrumented laxity values (SSD, 4.3 vs 2.3 mm) than the "nonfunctional" cases (SSD, 6.7 vs 2.9 mm; $P < 0.001$).

The contrary was not observed for AM-intact cases (17% functional).

Partial ACL tears with functional remaining fibers had PST grades of 0 or p1 and less than a 4 mm SSD in stress radiographs (sensitivity, 0.76; specificity, 0.90).

Partial ACL tears with nonfunctional fibers had positive PST results and an SSD of anterior tibial displacement from 4 to 9 mm (sensitivity, 0.56; specificity, 0.92).

Positive PST results and an SSD greater than 9 mm was recorded in complete ACL tears (sensitivity, 0.88; specificity, 0.96). MRI analysis revealed overlapping results between complete and partial tears.

Conclusions

Preoperative evaluation of different ACL tear types showed differences between complete and partial ACL tears with functional fibers in clinical examination and instrumented laxity tests. The combination of clinical tests and stress radiographs produced threshold values that distinguished complete from partial ACL tears, which may help the surgeon in the early identification of the presence of remaining functional fibers. Applying additional diagnostic tools can help the surgeon to preoperatively diagnose partial or complete ACL ruptures and propose an injury-specific surgical treatment.