

ACL reconstruction. Pressure measuring film was inserted between tibia and femur, and subject to 1000N axial load using an uniaxial testing machine. The super-low film was used to assess the average and maximum tibiofemoral pressure, and the contact area at 0, 15, 30 and 45degrees. Three conditions were evaluated: 1) intact ACL(Int), 2)DB ACL reconstruction, and 3)SB ACL reconstruction. The pressure measuring films were scanned after the experiment and the images evaluated by specific software. Statistical analysis was performed using the Repeated Measures Anova. The level of significance was set a prior at  $p < .05$ .

**Results:** The average pressure in the lateral compartment of DB and SB groups at all flexion angles tested was not different from the intact ACL group. However, at 15 degrees SB had higher pressure than DB. The average pressure in the medial compartment at 15, 30, and 45 degrees showed no difference between groups. But, at 0 degrees DB had significant less pressure than SB. The maximum pressure in the lateral compartment at all flexion angles showed no difference between groups. The maximum pressure in the medial compartment showed no difference at 0, 30, and 45 degrees, but at 15 degrees DB restored close to normal the maximum pressure values while SB did not. Though no statistical differences were found in several circumstances regarding to average and maximum pressure, there was a trend to better restoration in the DB group compared to SB.

DB restored the contact area in the lateral compartment at 0, 15 degrees of flexion to values close to normal while SB did not. At 30 and 45 degrees neither DB nor SB restored the normal contact area in the lateral compartment. In the medial compartment at 0, 15, 30 degrees DB is significant better to SB and restore the contact area close to normal. At 45 degrees there was no difference between DB and SB compared to the normal.

**Conclusions:** We found that DB has superior restoration of the tibiofemoral pressure and contact area than SB reconstruction. It suggests in our experimental model that DB reconstruction may preserve better the cartilage after ACL reconstruction when compared to SB reconstruction. However, further clinical studies are needed to elucidate clinically this issue.

**Computer-Assisted Evaluation of the Kinematics of the AM and PL Bundle and the Value of Parameters According to the IKDC Knee Ligament Examination Form (SS-12).** Hanno Steckel, MD, Patricia Murtha, MD, Ryan Costic, MD, James Moody, MD, Branislav Jaramaz, MD, Freddie Fu, MD

**Summary:** The aim of this cadaveric study was to describe the kinematics in the ACL-Intact (ACL-I), PL bundle-Deficient (PL-D), and ACL-Deficient (ACL-D) knee by applying a protocol for computer-assisted evaluation of knee kinematics. Our study demonstrated a force distribution between the two bundles that changes with knee position. Current clinical knee laxity measurements may not be suited for detecting subtle changes (like PL deficiency) in the ACL anatomy, and therefore might fail to assess outcome differences in various ACL reconstruction techniques.

**Purpose:** The double bundle concept is an accepted model for describing both the anatomy and the tension patterns of the AM and PL bundles in the ACL. The aim of this cadaveric study was to describe the kinematics in the ACL-Intact (ACL-I), PL bundle-Deficient (PL-D), and ACL-Deficient (ACL-D) knee by applying a protocol for computer-assisted evaluation of knee kinematics.

**Methods:** An optical position measurement system was used to acquire knee joint motion ( $n=10$ ) during clinical evaluations by tracking markers rigidly attached to the bones. The protocol included acquisition of AP translations and IE rotations, and evaluation of the IKDC knee ligament examination form.

**Results:** Comparison of the AP translation between PL-D and ACL-D states demonstrated an increase at  $0^\circ$ ,  $15^\circ$  and  $30^\circ$ . Comparison of IE laxities did not show any significant change between ACL-I, PL-D and ACL-D. The instrumented and the manual Lachman test, the total AP translation at  $25^\circ$  and  $70^\circ$ , and the pivot shift test showed differences between the PL-D and ACL-D states.

**Conclusions:** Our study demonstrated a force distribution between the two bundles that changes with knee position. Current clinical knee laxity measurements may not be suited for detecting subtle changes (like PL deficiency) in the ACL anatomy, and therefore might fail to assess outcome differences in various ACL reconstruction techniques. An instrumented measurement of rotational laxity needs to be evaluated as a step towards a more precise kinematic test of knee stability not only in the native and torn ACL but also in the reconstructed knee.

**Mid-Term Results of ACL-Rupture Treatment with the “Healing Response” Procedure (SS-13).** Holger Grehn, MD, Martin Reese, MD

**Purpose:** Retrospective evaluation of the minimal invasive, “Healing response“ procedure in the treatment of a ACL-rupture in relatively young patients.

**Method:** We treated 22 patients with a mean age of 32,5 years (16-45 years) after a proximal ACL-rupture

arthroscopically with a rigorous standardized aftercare in a plaster cast and with physiotherapy. The mean follow-up period was 16 months (9-18 months). During the follow-up examinations, the orthopaedic knee score (OAK) of the Swiss Society of Orthopaedics (SGO) was assessed. To improve objectivity, one experienced investigator documented the a.-p. drawer with the "Kneelax3" machine in comparison to the uninjured contralateral side.

**Results:** 21 Patients injured their ACL during sport activities and 1 while at work. The mean time from injury to the operation was 15,5 days (5-37 days). We found additional meniscus injuries in 6 patients. The patients were hospitalized for a of mean 1,5 nights (1-3 nights). The average return-to-work time was 8,8 weeks (2-20). We had 2 patients lost to follow-up and 5 patients required revision (4 ACL reconstructions, 1 mobilisation after stiffness). Orthopaedic knee score showed a mean of 91,5 points out of 100 (78-98 points) and the a.-p. drawer difference compared to the uninjured side was a mean of 2,86 mm (0,99-5,90 mm).

**Conclusions:** The "Healing response" is an easy procedure to carry out without any additional iatrogenic trauma and is minimally invasive compared to reconstruction methods. However, our revision rate of 23% is relative high. Thus it has to be discussed if this procedure is the best treatment approach in for highly active young patients. In considering other investigations with elderly study groups and better results, it appears that the use of the "healing response" procedure is most appropriate for patients with an lower level of activity and higher age.

**Primary Repair with Healing Stimulation Technique for Partial Tears of the Anterior Cruciate Ligament (SS-14).** *Alberto Gobbi, MD, Ramces Francisco, MD, Ariel Sandoval, MD, Paolo Arrigoni, MD*

**Purpose:** We analyzed the functional outcome of acute treatment for partial ACL tears involving either the anteromedial (AM) or the posterolateral (PL) bundle using suture-repair combined with a bone marrow stimulation (BMS) technique (microperforation). We hypothesized that knee stability could be restored and good functional outcome could be obtained with a simple primary repair technique.

**Methods:** From January 2003 to December 2005, thirteen patients (mean age: 20 years) with partial ACL rupture underwent acute primary ACL repair of the torn ligament. The senior author performed all the surgeries within 2 weeks from injury and all the patients were required to complete a specific rehabilitation protocol. Parameters analysed included the standard knee scales

(IKDC, Noyes, Lysholm and Tegner), SANE Score, Computer Knee Laxity Analysis and Deep Flexion Tests. Seven (7) patients had second look arthroscopy after signing an informed consent. The rest conceded to have a post-operative MRI for the re-evaluation of the repaired ACL.

**Results:** Preliminary Results revealed an average Lysholm score of 84%, Tegner score of 7, Noyes Score of 85% and Subjective score of 76.25%. IKDC score demonstrated that 60% of the patients had normal knee functions while 40% were nearly normal. Pivot shift test was negative and 80% of the patients had less than 3mm anteroposterior laxity.

**Conclusions:** Based on the preliminary results, primary ACL repair with BMS can lead to favourable results. However, further evaluation is recommended at longer follow-up to validate these findings.

**Accuracy of Knee MRI to Evaluate Osteochondral Lesions (SS-15).** *Pablo Adelino Narbona, MD, Guillermo Allende, MD, Julio Masquijo, MD, Luis Vazquez, MD*

**Purpose:** Determine the MRI diagnostic precision for assessment of osteochondral knee defects, and the concordance between the grading of such lesions by arthroscopy with the Density Prototonic Fat Sat (DP Fat Sat) MRI.

**Type of study:** Transversal with prospective data.

**Material and methods:** Fifty knees of 49 patients (divided into 6 regions) were studied. Relationship between surface of the lesions in mm<sup>2</sup> using a coefficient of variation  $\pm 2\text{mm}^2$ , and the grading of the lesion according to Outerbridge modify system, using arthroscopy as a standard pattern. The Wilcoxon test was used for comparison between medians with the significance of 95% confidence. To evaluate grading concordance was used, the kappa coefficient.

**Results:** Osteochondral lesions were found in 48% of the cases (24/50). Comparing such data with the arthroscopic findings, we found: sensibility 79.4%, specificity 99.3% and accuracy of 97%. Concerning the lesion size, the 53% of the small ones (0-20mm<sup>2</sup>), 92% of the moderate (20-100mm<sup>2</sup>) and the 100% of the large lesion (>100mm<sup>2</sup>) were underestimated by MRI. The average of underestimation was 37,2% (p < 0,0004). Concordance of 70% with kappa coefficient (0.80) was obtained in relationship with grading of the lesions. Grade IV lesions presented the largest percentage of coincidence (77%).

**Conclusions:** The DP Fat Sat MRI possesses a sensibility and specificity similar to those reported with