

purpose of this study was to prospectively evaluate outcomes following lateral unicompartmental knee arthroplasty.

**Methods:** Patients that underwent unicompartmental arthroplasty by one surgeon from 2000-2005 were prospectively studied. Nineteen patients underwent lateral unicompartmental knee replacements. The average age for the lateral unicompartmental group was 68 (range, 50-80). Assessment included preoperative and postoperative range of motion, subjective testing, KT-1000, radiographic evaluation consisting of a full plain radiograph knee series including 3-foot alignment films. An MRI was completed in all patients but one who had a pacemaker. All patients had the same implant utilized.

**Results:** All patients reported severe knee pain preoperatively involving the lateral compartment. No patients were lost to follow-up. One patient was converted to a total knee arthroplasty. Average follow-up was 33 months (range: 24-56 months). The average post-surgical Lysholm score was 91 (range, 67-100) points with a pre-operative Lysholm score of 64 ( $P=0.001$ ). The pre-operative Tegner was 4 (range, 1-7) with a postoperative Tegner of 5 (range, 1-8) ( $p=0.001$ ). The preoperative HSS score was 67 (range, 45-87) with a postoperative score of 92 (range, 82-100) ( $p=0.001$ ). Physical examination and subjective questioning along with MRI correlation helped predict successful outcomes. The average medial compartment Outerbridge grade was 2.2 for the medial femoral condyle and 2.3 for the medial tibial plateau. The average trochlear groove Outerbridge grade was 2.3 and for the patella was 2.2. Overall, patients reported a return to skiing in 5 months, tennis in 4 months, and 1-2 months for walking and jogging.

**Conclusion:** Determining specific patient selection criteria improves patient outcomes and helps with patient education. This study will give the guidelines necessary to offer an alternative to repeat arthroscopic intervention or total knee arthroplasty and allow patients the ability to return to their activities of daily living and sport. Long term results need to be carefully followed. We are not aware of any previous study attempting to report success with lateral unicompartmental knee arthroplasty in a population having returned to sport.

#### **Effects of HYLAN G-F 20 (Synvisc) Supplementation on Cartilage Preservation in Osteoarthritis of the Knee: A Two-Year, Single-blind Clinical Trial (SS-A)**

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**Introduction:** To assess the effect of viscosupplementation with Hylan G-F 20 on the progression of cartilage loss over two years in patients with knee osteoarthritis (OA).

**Methods:** A single-blind, parallel control group pilot clinical trial was performed in 78 eligible patients with symptomatic knee OA (Kellgren Lawrence grade II and III). Patients were assigned to either an intervention group ( $n=39$ , receiving four courses ( $3 \times 2.0\text{cc}$ ) of intra-articular HYLAN-G-F 20 injections at six months intervals or a control group ( $n=39$ , without injections but receiving usual care for OA). Magnetic resonance imaging the target knee was performed at baseline, 6, 12, and 24 months and images were analyzed blinded both to patient group and sequence. Tibial cartilage volume, tibiofemoral cartilage defects and bone marrow lesions were assessed at baseline and follow up.

**Results:** 55 subjects (71%) completed 2-year follow up. There was no significant difference in age, gender, BMI, baseline cartilage volume, bone marrow lesions and bone area in those who completed and those who did not (all  $P>0.13$ ). Analysis of completers demonstrated a significantly reduced annual percentage rate of medial, lateral and total tibial cartilage loss in the intervention group (mean  $\pm$  SD,  $-0.3 \pm 2.7\%$ ,  $-1.4 \pm 4.3\%$  and  $-0.5 \pm 2.3\%$ ) compared with the control group ( $2.3 \pm 2.6\%$ ,  $1.4 \pm 2.6\%$ ,  $1.6 \pm 1.8\%$ ,  $P=0.001$ ,  $0.005$  and  $0.001$  for difference, respectively). The intervention group also showed a significant reduction in the increase of cartilage defect score in the medial and total tibiofemoral compartments ( $0.1 \pm 1.3$  and  $0.5 \pm 2.0$ ) compared with the control group ( $0.8 \pm 1.5$  and  $1.6 \pm 2.0$ , all  $P=0.05$ ). There was no significant difference of change in bone marrow lesions between the intervention and control groups.

**Conclusion:** 6 monthly intra-articular injections of HYLAN-G-F 20 administered without regard to symptoms have a beneficial effect on knee cartilage preservation as measured by both cartilage volume and cartilage defect score. Over two years, the control group continues to lose cartilage while there is no significant loss of cartilage in the HYLAN G-F treated group. HYLAN G-F 20 could be further evaluated in larger trials as a possible disease-modifying agent in patients with knee OA.

#### **A Prospective Randomized Study of 4-strand Hamstring Tendon Anterior Cruciate Ligament Reconstruction Comparing Single-Bundle and Double-Bundle Techniques (SS-39)** *Sang Eun Park, M.D., Ph.D.*

**Introduction:** A randomized clinical study was conducted to compare the outcome between double-bundle and single-bundle anterior cruciate ligament (ACL) re-

constructions with 4-strand hamstring tendons (semitendinosus and gracilis).

**Methods:** 56 patients with ACL injury in one knee were recruited with 27 allocated to the double bundle ACL reconstruction group and 29 to the single bundle ACL reconstruction group and were analyzed including Lysholm knee scores, Tegner activity scores, Lachman and pivot shift test results, and radiographic stabilities were also compared between the two groups after a minimum of 3 year follow-up.

**Results:** Clinical outcomes were similar in the two groups at 3 year follow-up ( $p > 0.5$ ). Furthermore, stability results of Lachman test, pivot shift test, and radiological findings at 3 year follow-up failed to reveal any significant inter-group differences ( $p > 0.05$ ). Notchplasty rate was different between two groups: double bundle (25.9%) and single bundle group (58.6%) ( $p < 0.05$ ). In double bundle ACL reconstruction group, there was no extension deficit showing PL bundle rupture but 3 cases (11.1%) of medial joint tightness implying PL bundle tightness.

**Conclusion:** Double bundle ACL reconstruction does not produce better in clinical outcomes and postoperative stabilities after a minimum of 3 year follow-up. This suggests that only AML fiber reconstruction in ACL injury patients can produce a stable and reliable clinical result. Notchplasty rather than methods of ACL reconstruction may play an more important role in early postoperative rotational stability in double bundle ACL reconstruction.

**The Evaluation of Revascularization Following Arthroscopic Anterior Cruciate Ligament Reconstruction Using Vascular Angiography Imaging and Serum Vascular Markers (SS-40)** Aldo Izaquirre, M.D., Luis Sierra, M.D., Yulia Savitskaya, Ph.D., Enrique Villalobos, M.D., Arturo Almazan, M.D., Clemente Ibarra, M.D.

**Introduction:** To investigate the relationship between the vascular markers expression, the variables of vascularity at the tendon-bone interface and the functional outcome in the early phase after the arthroscopic anterior cruciate ligament reconstruction (ACLR): the temporal changes of angiogenesis status.

**Methods:** Between July 2007 and October 2008 25 patients with arthroscopic ACLR were chosen from those admitted at the Department of Sports Medicine & Arthroscopy. Mean follow-up was 12 months. Control data was collected from 25 subjects by Blood Bank. The ANG were measured by ELISA kit from R&D Systems. Express ELISA techniques have been developed to quan-

tify immune marker of angiogenesis (anti-ANG IgG) in INR. Digital angiography imaging was used to evaluate the revascularization following arthroscopic ACLR. Functional outcome was evaluated using the International Knee Documentation Committee (IKDC) scoring. Before surgery, and at 1, 2, 3, 4, 5, 8, and 12 weeks after it, a control IKDC assessment, serological vascular markers, and vascular imaging measurements were completed.

**Results:** Neovascularization was confirmed by the angiogenic markers including ANG and anti-ANG IgG. Mean serum ANG levels in patients after ACLR were significantly higher at all time points, except on day 17 ( $m \pm SD$ , ng/mL:  $334.9 \pm 93.9$  versus  $443.6 \pm 91.1$ ;  $P \leq 0.005$ ). Levels were found equal after day 17 in both donors and ACLR patients. Digital angiography imaging research of ACLR blood supply and blood vessel indicated a significant difference between the revascularization of the normal and the pathological ACLR ( $P \leq 0.0089$ ). The vascularity at the tendon-bone interface was present as early as 3 weeks after surgery and increased over next 5 weeks. For patients with ACLR ANG expression was directly associated with levels of secretory anti-ANG IgG of this patients ( $r = 0.93$ ;  $P \leq 0.0001$ ). Serum anti-ANG IgG levels in ACLR patients were significantly correlated with the vascular state, i.e., patients after surgery with higher serum anti-ANG IgG levels ( $m \pm SD$ , ODx1000:  $499 \pm 163$  versus  $625 \pm 118$ ;  $P \leq 0.005$ ) had hypervascularity. Postoperative IKDC score was positively correlated with expression of ANG and anti-ANG IgG. Additionally, a significant association was seen between intensity of revascularization and functional outcome: IKDC score ( $r = 0.93$ ;  $P \leq 0.0001$ ).

**Conclusion:** A significant relationship was found between the examined variables of vascularity at the tendon-bone interface, IKDC score, and the dynamic change of serum levels of vascular markers after ACLR. ANG and anti-ANG IgG concentrations are elevated in the sera of patients after ACLR and correlate with individual and composite measures of the revascularization activity. Sensitive methods for visualizing revascularization following ACLR, such as digital angiography, are emerging as clinically important tools in the assessment of revascularization activity. Imaging technologies capable of evaluating vascularity at the tendon-bone will have a practical value in assessment of functional outcome following ACLR. Measurement of serologic vascular markers and angiography vascular imaging can be used to identify early revascularization following ACLR and show promise for functional outcome. Serological vascular markers and vascular imaging after ACLR will become useful tools in the assessment of revasculariza-