

Bacterial Deoxyribonucleic Acid (DNA) is Often Present in Ruptured Graft Tissue at Time of Revision Anterior Cruciate Ligament (ACL) Reconstruction

SS-17

May 18, 2017, 1:50 PM

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Introduction: Graft failure after primary anterior cruciate ligament reconstruction (ACLR) has been attributed to multiple risk factors. Colonization of graft tissue with low virulence bacteria could cause graft attenuation and predispose patients to ACL graft failure. Polymerase chain reaction (PCR) is highly sensitive and can detect bacteria in low concentrations, including strains that cannot be cultured. We hypothesize that bacterial DNA will be detectable via PCR in torn graft tissue at time of revision ACLR at higher rates than in primary ACLR graft tissue.

Methods: Thirty-one consecutive first time revision ACLR cases (mean age 28 ± 5.1 years) and 5 primary ACLR controls (all hamstring autograft; mean age 27 ± 4.6 years) from one center were included. No patients had clinical signs of infection. Among revisions, autograft was used in 22/31 (71%) and allograft in 9/31 (29%) at time of primary ACLR. Mean time to failure was 15.8 months (range 6 months-7 years). Samples were obtained with a previously unused set of instruments from the tibial tunnel in revision cases and from excess tibial sided graft after passage and fixation in primary cases. PCR analysis was performed with a universal bacterial probe.

Results: Bacterial DNA was detectable in torn graft tissue in most revision cases 27/31 (87.0%) and less commonly 1/5 (20%) in primary ACLR controls ($p=0.002$). Median DNA concentration in torn grafts during revision ACLR was low at 17.5 ng/ml (range 0-101) with no difference found between revision patients with allograft (median 18.6 ng/ml range 0-45) vs. autograft tissue (median 17.1 ng/ml range 0-105; $p=0.56$).

Conclusion: Bacteria is often present in torn graft tissue at time of revision ACLR and at much higher rates than seen from similar graft tissue samples from primary ACLR. These findings suggest likely bacterial colonization of many failed ACL grafts though the causal relationship between graft colonization and failure remains unclear.

Timing of Anterior Cruciate Ligament Reconstruction and Implications for Meniscus Pathology and Treatment: Results from a Prospective Cohort

SS-18

May 18, 2017, 1:55 PM

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Introduction: Optimal timing of ACL reconstruction after injury continues to be debated, particularly when concomitant intra-articular pathology is present. The purpose of the present study was to report patient reported outcomes and the incidence of concomitant intra-articular pathology for patients undergoing early or delayed ACL reconstruction.

Methods: Patients undergoing ACL reconstruction at a single institution between January 2012 and December 2014 were prospectively enrolled. Variables of interest included patient demographic characteristics, concomitant pathology, and patient reported outcomes. Patient reported outcome measures, KOOS and WOMAC, were collected at the time of surgery and at 6 months. Univariate analysis was performed to assess short-term outcomes following ACLR, meniscus pathology and treatment as function of timing from injury to surgery.

Results: Injury and operative data was available for 255 patients, while 6-month patient reported outcomes were available for 161/255 (63%) patients. Patients treated with delayed reconstruction were older (28.7 years vs 23.1 years, $p=0.01$) and had a higher incidence of cartilage injury (16.5% vs. 7.8%, $p=0.03$). There were no clinical differences between groups at 6-month follow-up in terms of both KOOS and WOMAC scores. There were more medial meniscectomies in delayed reconstructions (medial- 40.5% vs 20.5%, $p=0.01$; lateral- 48.1% vs 31.7%, $p=0.06$). Conversely, the medial meniscus was more often repairable in early reconstruction (medial- 61.5% vs 20.9%, $p=0.0003$; lateral- 30% vs 21.2%, $p=0.28$).

Conclusion: Data from our prospective cohort suggest with increasing time from ACL injury to reconstruction, the reparability of the medial meniscus may decline. When certain tears to the meniscus are identified after injury, consideration should be given to early treatment in order to prevent propagation of intra-articular pathologies including both meniscus and articular cartilage injury.

Revision Multi-ligament Knee Reconstruction: Treatment Algorithm and Outcomes

SS-19

May 18, 2017, 2:00 PM

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Introduction: The treatment of knee dislocations remains challenging, and there is limited evidence available to guide treatment after failed multi-ligament reconstruction. The purpose of this study is to (1) present an algorithm describing surgical decision-making in the setting of

revision multi-ligament reconstruction, and (2) assess clinical outcomes of this algorithm at a minimum of two years after surgery.

Methods: We identified patients from our prospective multi-ligament database that underwent revision of multi-ligament reconstruction between 1992-2013 for persistent instability after failed primary reconstruction and/or repair. Patient demographic information (age, gender, BMI), injury description (mechanism of injury, neurovascular status, specific ligaments injured, associated chondral or meniscal injury), surgical technique (repair vs. reconstruction, staged vs. non-staged, concomitant procedures), mechanism of failure, as well as IKDC and Lysholm scores were obtained.

Results: The cohort consisted of 19 patients (6 female, 13 male), with an average age of 31 ± 12 years (range 17-59 years) who underwent revision of multi-ligament knee reconstruction with a mean follow-up of 47 ± 27 months. Thirteen (70%) patients underwent at least one additional procedure (mean 1.2, range 0-4) to correct other underlying pathology in preparation for revision reconstruction. Five (26%) patients underwent staged revisions with bone grafting of the tibial/femoral tunnels. Two (11%) patients underwent staged osteotomies, one distal femoral and one proximal tibial. One (5%) patient underwent concomitant meniscal transplant at time of revision. For revision surgeries, 17 (89%) underwent reconstruction only, and 2 (11%) underwent combined repair/reconstruction. Average IKDC and Lysholm scores were 66 ± 26 and 71 ± 23 respectively. High-energy mechanism of injury ($p=0.04$) and increased age at primary surgery ($p=0.03$) are associated with lower Lysholm scores.

Conclusion: This algorithm offers a systematic approach for treatment of failed multi-ligament knee reconstruction. Revision multi-ligament surgery can achieve modest outcomes in selected patients. Non-modifiable risk factors associated with worse outcome include increased patient age and a high-energy injury.

Preoperative Pain Perceptions Are Predictive of Physical Therapy Performance, Healthcare Resource Utilization, and Post-operative Symptoms After Anterior Cruciate Ligament Reconstruction

SS-20

May 18, 2017, 2:05 PM

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Introduction: Certain psychological traits including anxiety or fear of pain, individual differences in pain coping strategies, and severe subjective pain prior to surgery can adversely affect outcomes after elective orthopaedic surgery. This study investigated the predictive effect of preoperative pain perceptions physical therapy performance, healthcare resource utilization, and persistent symptoms after anterior cruciate ligament (ACL) reconstruction.

Methods: A total of 72 patients who underwent ACL reconstruction completed a battery of preoperative self-administered survey instruments related to subjective pain, subjective knee symptoms (IKDC), anxiety related to pain (PCS), fear of reinjury or pain from movement (TSK and FABQ), pain coping methods (brief COPE, and PCM). The association between these preoperative scores and number of post-operative pain scripts, office visits, office telephone encounters, re-injury and return to sport within 12 months as well as physical therapist documented effort were analyzed.

Results: Increased preoperative pain scores were predictive of a higher requested number of post-operative pain scripts (R-square 0.10, $p=0.007$), pain-related telephone encounters in the first month ($p=0.002$) and decreased return to sport ($p=0.04$). High pain catastrophizing scores (PCS) and kinesiophobia scores were associated with poor perceived effort in rehabilitation ($p=0.002$ and $p=0.04$), decreased rates of return to sport ($p=0.001$ and $p=0.03$), and increased re-injury rates ($p=0.04$ and $p=0.02$). High IKDC scores were predictive of post-operative complications ($p=0.01$), total number of pain scripts ($p=0.02$), and number of telephone encounters in the first year ($p=0.005$). Score on the PCM emotion focused items were predictive of total number of pain scripts filled ($p=0.03$) and number of telephone encounters in the first year ($p=0.03$).

Conclusion: Preoperative pain perceptions are significantly associated with effort in physical therapy, and functional outcomes. Maladaptive pain perceptions appear to be predictive of higher healthcare resource utilization post-operatively as well as higher re-injury rates.

Return to Sport after Tibial Tubercle Osteotomy for Patellofemoral Pain and Osteoarthritis

SS-21

May 18, 2017, 3:40 PM

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Introduction: Anteromedialization (AMZ) tibial tubercle osteotomy (TTO) is an effective treatment for moderate patellofemoral osteoarthritis, patellofemoral compression syndrome, and coronal malalignment in patellofemoral instability. There is limited literature regarding its capacity to reliably return patients to sports. The objective was to determine the rate of return to sport after AMZ TTO for patellofemoral pain or arthritis.

Methods: This was a retrospective review of consecutive patients who underwent unilateral or bilateral AMZ TTO for patellofemoral pain or arthritis. All patients had minimum 1 year follow up. Final follow up consisted of an additional patient-reported questionnaire with questions regarding physical fitness and sporting activities and Kujala score.

