

2nd Annual Emerging Techniques in Orthopedics Meeting—Las Vegas



Quadriceps Tendon Construction in MPFL

Quadriceps tendon construction is a reliable technique for medial patellofemoral ligament (MPFL) reconstruction and for some revision surgical cases, Christian Fink, MD, from Matjaz Veselko, Christian Hoser, Austria stated. Fink is a consultant for Karl Storz GmbH & Co KG and Synthes Inc. “It avoids bone tunnels, screws, and anchors in the patella, and therefore avoids the risk of patella fracture,” he stated. In addition, it can be used in children with open physes, has good short-term clinical results, and promising biomedical results.

Fink began his presentation citing a study by Steensen and colleagues published in 2005, which found no recurrent dislocations after 37 month following MPFL reconstruction using a quadriceps tendon graft. “He reported excellent results, but it didn’t quite cross the ocean and it was not very popular in Europe at this time,” Fink noted.

Later, a study presented by Veselko at the 2008 Macedonian Arthroscopy Society meeting evaluated quadriceps tendon transfer using a different technique previously reported by Steensen and colleagues. They used a longitudinal approach, a tendon graft of approximately 10 cm, attached it distally but underneath the medial tendinous part anterior to the patella, fixed it with 2 sutures on the side, and used an interference screw in the bone tunnel. “The down side of this [procedure],” Fink commented, “is that we know there is a big exposure, and it was tricky to prepare this strip of quadriceps tendon; we all know there

is scars from harvesting quadriceps tendon.”

During this time, Fink and his team developed minimally invasive tools to harvest quadriceps tendon for anterior cruciate ligament reconstruction, and found that they needed to slightly modify their tools. In 2010, Fink and Hoser developed a minimally invasive surgical technique using a transverse incision of 2.5 to 3 cm, tendon grafts were harvested of 8 to 10 cm in length, 10 to 12 mm wide and 3 mm thick; sutures were used, the medial border of the patella was prepared in such a way as to get good healing, and placed the femoral tunnel under fluoroscopy. “Interestingly, you can use this technique in adolescents with open growth plates, because you don’t have to use an interference screw, you can use maybe one suture anchor at the femoral insertion or just use sutures for fixation.”

In 2007, Schöttle and colleagues assessed radiographic landmarks for femoral tunnel placement in MPFL reconstruction, Fink continued. The authors found a reproducible anatomical and radiographic point, located 1 mm anterior to the posterior cortex extension line, 2.5 mm distal to the posterior origin of the medial femoral condyle, and proximal to the level of the posterior point of the Blumensaat line on a lateral radiograph. “This radiographic point may be useful for both intraoperatively and postoperatively,” Schöttle and colleagues concluded.

Fink and colleagues recently investigated the biomechanics of their own procedure, which was submitted to the University of Münster, Germany/OSM Research Foundation (Innsbruck, Austria). Specifically, they used 13 fresh frozen human cadaveric knees where the MPFL was fixed with the femoral insertion part in a tendon clamp, and positioned in an uniaxial testing machine. “The stiffness—which is the most important—of the original MPFL is quite low, approximately 30 N/mm and the stiffness of the quadriceps tendon construct is almost the same,” Fink observed. “The yield load and maximal load, which were just fixed with 2 sutures, is about the same as the original MPFL.”

In another study, Lenschow and colleagues looked at hamstring reconstruction and found stiffness of 87 to 97 N/mm. “It is a much different construct, and that is why we are a little bit concerned that sometimes of over constraining the hamstring constructs,” Fink concluded. ■



The audiocast of this lecture is available online. See, Minimally Invasive MPFL Reconstruction Using Quadriceps Tendon: A European Experience.

Lessons Learned From 30 Years of Shoulder Arthroscopy

In an honored professor lecture, James C. Esch, MD, Orthopedic Specialists of North County Inc, Oceanside, California, discussed the he learned lessons from 30 years of shoulder arthroscopy and whether after all this time, he and other surgeons know what they are doing. Esch is Consultant for Smith & Nephew Inc, Endoscopy Division, and has stock options in KFx Medical (Carlsbad, California).

“Together we have been studying shoulder arthroscopy of 30 years,” he said. Orthopedic surgeons come to meetings to learn more about shoulder arthroscopy and to become better surgeons. Surgeons trust what they hear and observe, he added, and use the information to become the best possible surgeon to their patients.

“Shoulder arthroscopy was developed by individuals in private practice interested in solving a problem,” Esch began, then listed his mentors, including Lanny Johnson, MD, who in 1976, developed the needlescope. At first, arthroscopic shoulder surgery focused on understanding labrum anatomy and repairing labrum to the bone, Esch explained. For instance, Lanny Johnson, MD, developed a staple for fixation, while Eugene Wolf, MD, was a proponent of screw fixation. Other advances included resorbable tack devices, trans-osseous sutures, and the metallic suture punch.

Then came Harvard Ellman, MD, who, according to Esch, was the bridge to traditional shoulder surgeons and suggested that cuff-repair was necessary. To that end, several surgeons developed techniques geared toward cuff repair, such as Lonnie Paulos, MD, who developed subacromial space surgery and mini-open rotator cuff repair, Tom Sampson described co-planning, and Stephen Snyder, developed the use of mini-open tools. “The rapid expansion of shoulder arthroscopy by community surgeons created conflict with most traditional shoulder surgeons,” Esch noted.

Taking a closer look at long-term instability recurrences in a young population, Esch cites results from Caspari, who found that his instability surgery had a higher instance of failure 5 years postoperatively (28%). Other surgeons, including O’Driscoll and Walch stopped using this technique in favor of others. Then Castagnia and Wilhelms reported 10-year results with a 21% failure rate for their instability surgery. “So maybe we are not doing as good as we think we are,” Esch continued. “And then we still have rotator cuff repair concerns: single row, double row, partial cuff tear, biceps tear.”

In 2008, Jennifer A. Coghlan and colleagues conducted a systematic review on surgery for rotator cuff disease. They searched several different databases, including the Cochrane Controlled Trials Register, MEDLINE, and EMBASE, and included trials that were randomized or quasi-randomized clinical trials with rotator-cuff disease patients and surgi-

cal interventions, compared with placebo, no treatment, or any other treatment. Overall, they included 14 randomized controlled trials (N = 829), and found that “surgery may not lead to differences in pain, compared with different exercise programs,” Esch stated. “Maybe exercise is just as good and it doesn’t seem to make any difference.”

According to current American Academy of Orthopaedic Surgeons (AAOS) guidelines, rotator cuff repair is an option for patients with chronic, symptomatic full thickness tears (level IV, weak recommendation) and routine arthroscopic subacromial decompression is not required at the time of rotator cuff repair. While some surgeons may resent these guidelines, Esch explained, the AAOS reinforces that their guidelines are based on evidence-based medicine, are transparent, and treatment is based on mutual communication between patient and physician. “We are afraid for our patients and we believe that our patients with cuff repairs do better,” Esch stated. “But the patients trust us that we are doing the best for them.” Better data is needed, he emphasized.

Esch believes take-down and repair of tears works best in his hands. “So, where do I fit?” Esch’s educational background consisted of a classical education, which was followed by a similar education at Notre Dame, where information was very much black and white. However, his philosophical education challenged this concept. “I am challenged by whether our arthroscopic shoulder surgical results are upheld by data or just a belief system,” Esch continued. “The men who championed these procedures were my



mentors, which are now referred to in the medical industry as key opinion leaders.” Are key opinion leaders true mentors and proponents of the truths, he questioned.

“My challenge in 30 years of presenting shoulder arthroscopic programs is to find the best and most honest teachers, and continue to look at the results,” Esch concluded. “We need to continue to look at evidence that may challenge our beliefs in our shoulder results.” ■

Stem Cells in Degenerative Knees: Dream or Reality

Stem cells and regenerative medicine is the way to the future, according to Kristin Comella, MS, Stem Cell Scientist from the Ageless Regenerative Institute LLC, in Weston, Florida. “We train physicians to look at using these stem cells in a variety of different indications,” she explained. In particular, the Ageless Regenerative Institute is dedicated to standardizing and elevating the field of regenerative medicine through research and education, and collaborate with academic centers in the United States and researchers from around the world.

In 2001, they published one of the first studies showing that new meniscal tissue could be grown using mesenchymal stem cells in goat knee joints after a partial meniscectomy.

In certain instances, Comella explained, the term *stem cell therapy* is used, however it does not fully encompass the field

of regenerative medicine. “Regenerative medicine is actually using a variety of different techniques, not just stem cell therapy, such as platelet rich plasma,” she said. “I think what will eventually happen, is that the term *platelet rich plasma* or *stem cell therapy*, will become outdated, and instead, we will talk about regenerative medicine as a whole.”

The idea, according to Comella, is to use your own body’s capability to heal, take it from one location, enrich it, place it in a new location, and promote healing. This is possible because stem cells exhibit plasticity and are multipotent, she explained.

“Approximately 5 years ago, we started working with stem cells from fat tissue,” Comella stated. “And I have to say, that from all the stem cells I have worked with, the fat-derived stem cells are one of the most interesting cells available.” In one study, investigators took bone marrow (BM) stem cells from one group of rats, labeled it with fluorescent proteins, and placed the cells in the BM of another group of rats, and fed these rats a high-fat diet. Samples of their adipose tissue had traces of the fluorescent marker. “This indicates that the stem cells from the BM actually migrated to the fat tissue to support the high-fat diet,” Comella suggested. “Stem cells from the BM are actually the same ones as in the fat tissue.”

Current methods used to isolate adipose stem cells include tumescent liposuction, washing to remove red blood cells, enzymatic digestion, centrifugation to separate stromal vascular fraction, filtration, and preparing the cells to inject into the patient, the presenter listed. The technique used by Comella and her team, include cells and platelet rich plasma combination therapy. “As we saw, in many cases platelet rich plasma has not been successful,” she noted. “If you are going into a stem cell rich environment, platelet rich plasma can be very successful. However, with many chronic disorders, it’s a stem cell poor environment.”

Of more than 1500 patients who have undergone the procedure, 85% of patients improve in terms of pain scale, and range of motion, Comella stated. Altogether, they use 30 different protocols. For instance, she mentions cases they have seen where patients have non-healing diabetic ulcers recommended for amputation. After injecting the cells intramuscularly along the leg, up to the wound, and they found that they were able to avoid amputation in 75% of the cases. “The issue is ischemic blood flow and these cells in the adipose tissue are very angiogenic, so they can be used in these indications,” Comella explained.

In another case of a patient with radiation necrosis who was also recommended to have an amputation; eight months after the procedure, the patient was completely healed. “A lot of this can be applied to cases you see in the office and we have trained over 200 doctors to do this in their clinic, and this is something we do regularly in our clinic,” Comella concluded. “Stem cell and regenerative medicine is the way to the future, and I urge you to get involved in regenerative medicine.” ■

