You should think seriously about attending the AOSSM (sports medicine) annual meeting in Quebec City next June. This historic city has a very European ambience. You can either stay in a very modern hotel in the old city, close to the convention center, or at an interesting small hotel in the quaint old lower town (about 20 minutes walk to the convention center). I spent the past weekend in the city and would recommend the Auberge Saint-Antoine hotel (1 888 692-2211). There are plenty of fine restaurants on the pedestrian only roads in the old town, and lots of jogging paths along the river to wear off the excessive indulgences. You don’t have to be proficient in French, even I can order a meal!

Journal Club Articles – October 2003

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The Twist Lock Concept of Tissue Transport and Suture Fixation Without Knots: Observations Along the Hong Kong Skyline.

Steve Burkhart and Kiriacos Athanasiou

This is an interesting article for all those who have difficulty with knot tying. We have a knotless anchor for the Bankart repair, and now we have a concept by Steve Burkhart for a knotless cuff repair technique. Burkhart observed that the scaffolds that were used to build the Hong Kong skyscrapers were held together with lashings that are locked together without the use of knots. This led to the development of a push in anchor that twisting the ends of the suture from the rotator cuff. The pushing in of the anchor into the bone adjusted the tension on the suture, pulling the cuff tissue down to the bone. It is a very simple concept, but you may have to read the article and view the photos to understand how it works. The twisting, rather than tying the knot, is stronger due to the friction between the sutures. The biomechanical testing showed that this was a very strong construct, 12% greater than suture anchors, even in porotic bone. The pullout strength was found to be 67N, which is greater than the rotator cuff can exert (60N). The weak link in this construct is suture breakage, No 2 Ethibond breaks at 13N, so fiber wire would be an ideal suture. Burkhart has previously shown that knot security is dependant on 3 factors, internal interference, slack, and friction. The twist lock concept improves on all three of these factors to improve its strength. There is less damage to the suture by twisting compared to knotting.

Use of a Hinged External Knee Fixator After Surgery for Knee Dislocation.

James Stannard MD, Todd Sheils MD, Gerald McGwin PhD, David Volgas MD Jorge E Alonso MD.

This was a non-randomized prospective trial of the compass knee hinge external fixator used after ligament reconstruction for dislocated knees. Thirty nine patients were followed up for a mean of 2 years. Group A had the external fixators applied, and had 7% failure by clinical examination (2+ or 3+ laxity).
Group B, without the fixators, had 29% failures. These failures were broken down into ACL, PCL and posterolateral corner reconstructions. The posterolateral reconstructions had the highest failure rate when the fixators were not used. This suggests that early motion can be achieved with the fixators without compromising the stability. The disadvantage of the current protocol for multiple ligament reconstruction is that the rehab is quite restricted with immobilization in extension and only passive motion exercise for the first 4-6 weeks. The range of motion was not significantly different in the 2 groups. Group B did use a hinged brace post-op, but had a higher rate of failure of the posterolateral corner reconstruction. This failure rate may have been lower if they used a more rigid immobilization post-op.

The technique of reconstruction of the PCL was an Achilles tendon allograft inlay with 2 femoral tunnels. The ACL was reconstructed 2 months later, at the time of removal of the fixator, with BTB or hamstring autograft. The posterolateral corner was either repaired or reconstructed acutely with semitendinosus allograft. This paper showed that the best results were achieved with rigid immobilization with the fixators, which allowed a range of motion, avoiding arthrofibrosis. It also demonstrated the excellent results using the Achilles tendon allograft posterior inlay technique with double femoral tunnels for PCL reconstruction.

Revision ACL reconstruction

It is interesting that in my sports medicine practice we still do very few ACL revisions. I was discussing this with some of the instructors at the weekend AANA knee course in Chicago and found out that in many regions, revisions may be as high as 30% of the cases done. In our town of 1 million, there are only 4 surgeons who do ACL reconstructions. Compare this to some areas where everyone, including shoulder surgeons, are having a go at doing ACL reconstructions! This obviously produces more technical failures.
What are some of the common causes of failure? The cause of failure is either recurrent laxity or stiffness. Most of the our failures are re-injury of the graft resulting in recurrent laxity.

Fig 2. The anterior placement of the femoral tunnel.
A common technical cause of graft failure is the anterior placement of the femoral tunnel. Fig 2. This usually happens because the back of the notch has not been well visualized.
In another situation, the graft may fail because of a too vertical position of the femoral tunnel, Fig 3. This occurs when the femoral tunnel is drilled through the tibial tunnel. If the tibial tunnel is not placed next to the MCL on the tibia, the femoral tunnel can’t be drilled at the 10 or 2 o’clock position on the lateral wall of the femoral notch. If the tunnel is inadvertently drilled too vertical, then the femoral tunnel has to be drilled through the anteromedial portal with the knee flexed at 120 degrees.

Our most common cause of failure is trauma. The athlete who you see sitting in the waiting room 2 years after his ACL reconstruction most likely has a tear of the opposite ACL. The commonly quoted rates for graft failure are 5% for the ACL reconstructed knee and 8% for the opposite normal knee.

How do you approach a failed ACL reconstruction?
First is this a failure to persistent pain and swelling due to lack of motion, or is this a failure of the graft with resulting laxity?
If it is a failure due to lack of motion, be cautious about attempting releases in the face of regional pain syndrome (used to be called reflex sympathetic dystrophy).
If there is global loss of motion, osteopenia on x-ray and a positive bone scan, then consider complex regional pain syndrome to be the diagnosis. This is usually best managed with conservative measures and a consult to the pain service.
If there is only lack of extension, an arthroscopic debridement of the anterior notch will often regain the extension loss. This anterior scar or anterior placement of the graft, can usually be confirmed on the MRI. If there is lack of extension, then medial and lateral releases, as well as release of the pre-tibial space, may regain the flexion.
If there is incorrect anterior placement of the graft, this may have to be removed to regain the range of motion.
Fig 4. The lateral x-ray done in full hyperextension to assess the anterior placement of the tibial tunnel.

If the problem is persistent laxity, then the cause of graft failure should be determined. Plain x-rays will usually be sufficient to assess the tunnel placement, Fig 4. The location and type of the fixation should also be noted as well as a plan for removal of the hardware if necessary. Fig 5.

Fig 5. The type and location of the hardware is noted to plan removal.
If the femoral tunnel is placed way too anterior, it is easy to drill a new femoral tunnel behind this. If the tunnel is placed slightly anterior, Fig 5, then the new tunnel may broach into the old tunnel. This old tunnel may have to be filled with a bone graft (from a coring reamer in the tibia).

A similar approach applies to the large tibial tunnel, Figs 6 and 7. Sometimes when drilling a new tunnel, the result is a very large tibial tunnel. The size of the tunnels may be determined on the pre-op MRI, and a staged operation with bone graft as the first stage followed with ACL reconstruction in 6 months. Some large tunnels can be approached by using a large Achilles allograft, and placing the bone plug into the tibial tunnel.

Fig 6 and 7. The large tibial tunnel.
Fig 8  Loss of fixation of the tibial bone plug
Sometimes there is loss of fixation of the tibial bone plug. Fig 8. This can also happen when the bone plug is pushed up the tunnel by the insertion of the screw. What is the best graft choice for revision ACL reconstruction? I favor using autogenous graft unless the patient is hyperlax. This patient with generalized laxity may be a candidate to go directly to an allograft. Give them some good collagen! If they have failed a hamstring graft, I would suggest a hamstring harvest from the opposite knee. If they are a failure of a patellar tendon graft, I favor an allograft reconstruction. My allograft of choice is the tibialis tendon. It is readily available and the price is right. It can be secured on the femoral side with an endobutton and on the tibial side with a cortico-cancellous interference fit screw.

We generally use the same rehab protocol as for a primary reconstruction. If we have done an additional reconstruction of the posterolateral corner, or the MCL ligament, then a short period of immobilization in extension, followed by brace protection, is usually prescribed.

Post op ACL reconstruction infection.
Fortunately this is a relatively rare situation. The clinical picture ranges from a raging septic knee to a very benign persistent effusion. The knee should be scoped and irrigated with at least 15 liters of fluid. Cultures are obtained and the appropriate IV antibiotics are instituted. If the systemic signs, temperature, and lab findings ESR, CRP do not settle within a few days, the arthroscopy should be repeated. An MRI should be done looking for a pocket of pus. This usually occurs with a posterior incision used to access the posterior compartments of the knee or for meniscal repair. This localized abscess may be responsible for the persistent symptoms. If the patient has continued symptoms in spite of repeat arthroscopy and opening of any infected portals, then consideration should be given to removing the graft and the hardware. In many years of experience, I have not yet had to remove the graft. The infections that I had were controlled with repeated arthroscopic lavage and IV antibiotics.
ACL revision with removal of hardware

You do not always have to remove the tibial hardware in revision cases. This was a patellar tendon reconstruction done in 1995. The patient sustained a re-injury this year playing ultimate Frisbee and tore the graft. I was planning on locating and removing the tibial screw Fig 9 and 10. (the femoral side was fixed with a BioScrew)

I was unable to locate the screw at the time of harvest of the hamstrings and drilled a new tunnel beside the screw. Fig 11 is the view up the tibial tunnel, demonstrating the edge of the metal screw beside the new tibial tunnel. Sometimes it is better to be lucky, than good. By the way, on drilling the femoral tunnel, there was no evidence of the BioScrew. So maybe they do disappear by 8 years!

Fig 9 and 10. The x-ray showing the location of the tibial screw.
Fig 11. The arthroscopic view of the edge of the metal screw.

The Internet for Orthopaedists

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