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Arthroscopic Proximal Biceps Tenodesis Technique with PopLok™

Mark Albritton, M.D., McDonough, Georgia

A complete systematic diagnostic evaluation is performed. The biceps tendon is evaluated for signs of inflammation and/or tearing (**Figure 1**). The tendon is always pulled medially into the joint to evaluate the portion of the tendon that normally rests within the groove, a common place for biceps pathology. The posterior portal is the viewing portal for the tenodesis. A 7mm Hex Flex® or Dry-Doc® cannula is placed in the anterior portal in the lateral aspect of the rotator interval.

Working through the anterior cannula, the biceps is debrided and the soft tissue within the biceps groove is carefully excised. Meticulous removal of soft tissue from the groove is critical for clear visualization to insure correct placement of the PopLok™ anchor. The tissue can be removed with a combination of electrocautery and a motorized shaver.

A free strand of #2 Hi-Fi® suture is passed through the anterior cannula superior to the biceps tendon and retrieved inferior to the biceps, looping the tendon. A Spectrum medium crescent hook is passed through the anterior cannula and pierces the biceps tendon at its lateral aspect within the joint, staying medial to the looping suture (**Figure 2**). The Super Shuttle™ suture passer is then advanced into the joint. The crescent hook is removed, leaving the shuttle through the biceps tendon. The distal portion of the shuttle is retrieved into the anterior cannula. Both tails of the Hi-Fi suture that exit the anterior cannula are loaded into the Super Shuttle eyelet and are shuttled through the biceps, creating a locking hitch (**Figure 3**). The intra-articular portion of the biceps tendon, 1cm distal to the hitching stitch, is excised with a basket forceps, and the stump is removed with a shaver.

Through the anterior cannula, a pilot hole is created within the distal biceps groove using the punch for the 3.5mm or

4.5mm PopLok (**Figure 4**). The Hi-Fi sutures exiting the anterior cannula are loaded into the PopLok anchor. The PopLok is inserted into the pilot hole and the inserter is gently tapped until the laser line reaches the cortex. The sutures are tensioned, pulling the biceps securely down to the prepared bone. The anchor is deployed, securing the PopLok, sutures, and biceps tendon. The inserter is removed and the suture tails are cut (**Figure 5**).



fig. 1



fig. 3



fig. 2



fig. 4



fig. 5

Anatomic Single Bundle ACL Reconstruction With The Bullseye® System

John Xerogeanes, M.D., Atlanta, Georgia

ACL reconstruction is one of the common procedures performed on the knee. Over the last 5 years the most popular technique for ACL reconstruction, the trans tibial technique, has been questioned. Thus, in hopes of improving the long term outcome of a good operation, anatomic techniques for ACL reconstruction have been explored. One of the most popular of these is the anatomic single bundle ACL reconstruction.

In order to allow a technique to be utilized by many surgeons, proper instrumentation must be developed. Over the last twenty years, the instrumentation and implants for ACL reconstruction have been developed specifically for the transtibial approach. We have now developed instrumentation specifically for the anatomic single bundle technique.

While the technique and instrumentation for creating the tibial tunnel is similar to standard ACL reconstruction, for the femoral tunnel it is vastly different. There are several key steps in performing a successful truly anatomic single bundle ACL reconstruction. The first is learning the anatomy of the ACL footprint and its specific landmarks. The second is optimally viewing both the footprint and the landmarks.

For the femoral footprint, optimal visualization requires moving the arthroscope from the standard anteriorlateral portal, to an anterior medial portal which is tight against the patella tendon. This allows us to easily visually identify the superior boarder (intra condylar ridge or residents ridge) as well as the full remnant of the femoral footprint. **(Figure 1 and 2)**



fig. 1

ACL footprint from standard AL portal



fig. 2

ACL footprint from auxiliary AM portal (with marking on intracondylar ridge (residents ridge))

Once the footprints are identified, the tunnels can be anatomically created. In order to drill the femoral tunnel, an auxiliary anterior medial portal is created. This portal is made so the femoral tunnel guide pin is nearly touching the medial femoral condyle. This proximity to the condyle is necessary to drill the tunnel at the optimal angle, in the center of the femoral footprint. **(Figure 3)**



fig. 3

Needle or pin coming through auxiliary AM portal near medial femoral condyle

We have designed both a drill and femoral guide which allow this to be possible. The Bullseye® footprint guide is a specially made guide which shows an outline of the femoral tunnel opening when placed against the femoral footprint. **(Figure 4)** When it is placed through the auxiliary AM portal, it is engineered to lie flat against the



fig. 4

Bullseye® femoral footprint guide

footprint with the knee at **90 degrees. (Figure 5)** It has multiple sizes from 5 – 12mm. Thus, if one needs an 8mm tunnel, the 8mm guide is over the footprint in the desired position. The ACL pin is then drilled through the cannulation in the guide. When the pin is over-drilled, a tunnel exactly correlating to the guide will be constructed.

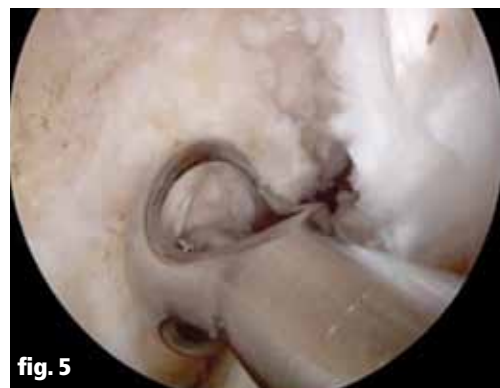


fig. 5

Bullseye® Guide in place in joint

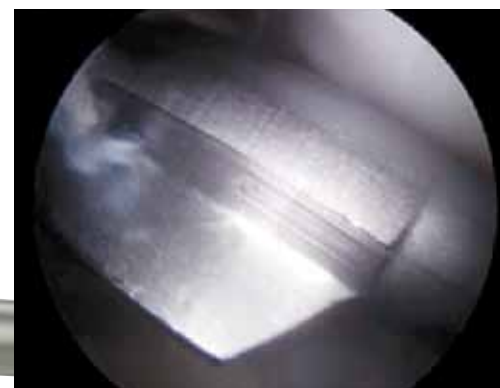
After the pin is placed, the Sentinel® Drill Bit is utilized to create the tunnel. The Sentinel reamer has a cutting flute on only one side, with the rest of the drill head being smooth. **(Figure 6)** This allows for the drilling of the femoral guide pin with the smooth side facing the femoral condyle and the fluted side facing away from the cartilage. Thus, this allows the surgeon to safely drill the tunnel with no chance of causing femoral articular cartilage injury. This drill comes in sizes from 5 – 12mm increasing in .5mm increments.



Sentinel® Drill Bit

fig. 6

For full explanation and demonstration and explanation of both the anatomic single bundle ACL technique and instrumentation, please see our web site at www.linivatec.com



Sentinel in joint sliding past MFC through AAM portal

My Experience with the SRS Shoulder Restoration System for Rotator Cuff Repair

Jeffrey S. Abrams, M.D., Princeton, New Jersey

Rotator cuff tears are the most common problems that we treat in our community. There has been an ongoing debate whether to choose a single-row or double-row technique to repair the detached tendons. Current wisdom suggests that footprint coverage and initial tendon stability are improved with additional anchor fixation points. Success with single-row procedures has been achieved with use of additional sutures (i.e., a ThRevo® Anchor) and delaying rehabilitation. This allows the initial tendon healing stage to occur without disturbance. There are ideal candidates for either technique from a physiological and age perspective, as well as tear characteristics (i.e., chronicity, retraction, and tendon loss). Currently, patient selection is based on quality and length of tendon, degree of muscle changes on MRI, size and shape of tear, and patient's anticipated activities. For example, we could choose a medial single-row repair with 4.5mm CrossFT™ PEEK anchors for a 60-year-old golfer with a large retracted crescent tear.



If there was an L-shaped medial extension, I would choose a larger anchor, either 5.5mm or 6.5mm three suture CrossFT at the apex to allow combined mattress and simple suture repair.



I do see and repair patients over 70 years old who continue to be active. I have continued to use Super Revo® screws for a number of reasons. First, I think that there is an advantage to being able to see anchors on plain radiographs in patients with soft bone.



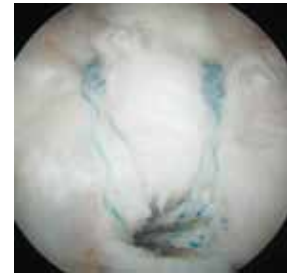
Secondly, revision surgery due to additional trauma is less likely than in younger individuals. Third, there is more available footprint for biologic attachment when you compare

the metallic eyelets to fully-threaded anchors. For those of you who own surgery centers, costs of anchors will play a role in managing budgets.

Approximately one-third of the cases have a second row using lateral PopLok™ anchors. These are patients with preserved length of tendon, good quality muscle on MRI or CT, and active lifestyles due to employment or recreational sports. Consider the lateral anchor as a technique to reinforce the stress margins of the repair (i.e., the anterior portion of the supraspinatus). This technique can anchor the repair, compress the tendon onto the footprint, and become fixed in bone with less osteopenia. In some ways, this is actually a true fence post construction, since angulated posts are not very common.



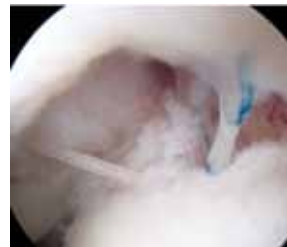
When applying fully-threaded CrossFT anchors to a large crescent tear, surgeons can choose simple or mattress suture techniques. If one anticipates a lateral anchor, placement adjacent to articular cartilage will maximize bone quality and create "anchor spread" to optimize available surface to heal. Placement of



mattress sutures that are tied prior to placement of lateral PopLok anchors will reduce the pullout stresses on the lateral anchor.

If we choose a single-row system, then combining a mattress suture with a simple suture or a two-stitch anchor provides additional pullout strength of the tendon suture interface.

Patients with articular-sided extensions when the lateral tendon attachment is preserved are ideal candidates with 4.5mm CrossFT medial anchors placed along the articular margin. Here, mattress sutures are used to secure the tendon to the footprint.



The SRS Shoulder Restoration System provides the surgeon with additional options to repair detached rotator cuff tendons. Small medial anchors, large fully-threaded lateral anchors, and knotless anchors that can create fence post reinforcement in a double-row repair provide surgeons with excellent options that are surgically prudent,

complement different rehabilitation potentials, and work with financial concerns of outpatient surgery centers.



SHOULDER RESTORATION SYSTEM

NEW

For more information on the SRS go to:

srs.linvatec.com

Hamstring ACL reconstruction

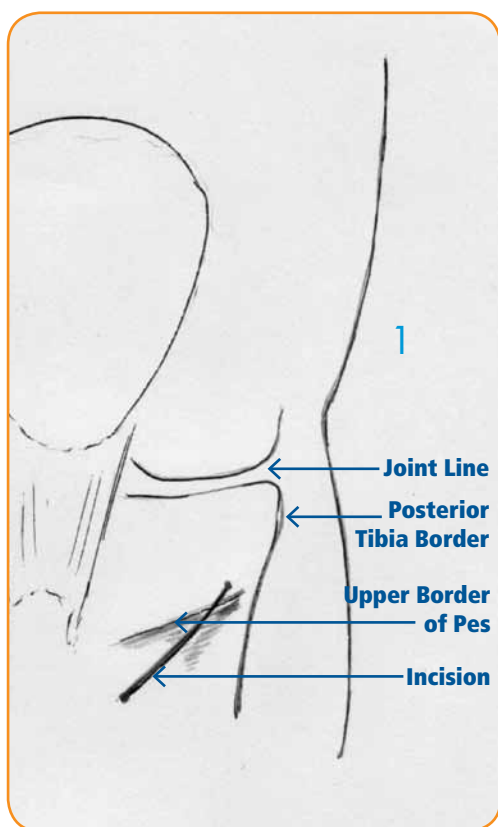
Stephen Reed, BM, BCh, MA, MSc, FRCS(C), Orthopaedic Surgeon, Humber River Regional Hospital, Toronto, Canada

I have been performing arthroscopic hamstring ACL reconstructions almost exclusively for nearly twelve years. Since then, the technique originally imparted to me in Brisbane, Australia by Dr. Peter Myers has become widely accepted and as much a gold standard as the bone-patellar tendon-bone procedure. Over the years my technique has changed and I hope evolved for the better. As another of my antipodean mentors, Dr. Peter Welsh, advised me: "A surgeon should always be thinking about what they do. If you are doing exactly the same operation you were ten years ago then you are not thinking."

Some of the modifications to my technique have happened as a result of changes in technology and, always aspiring to the lofty goal of "evidence based practise", from reviewing the literature. Others, however, are simple variations that have made the procedure easier, more reproducible and, without the benefit of objective double-blind investigation, more successful with less complications.

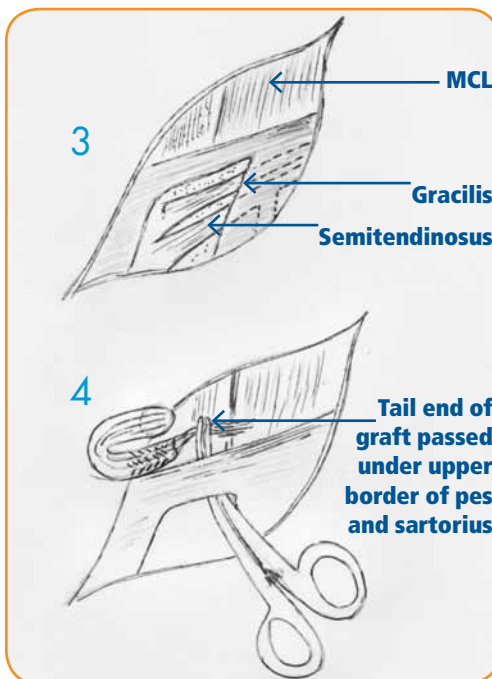
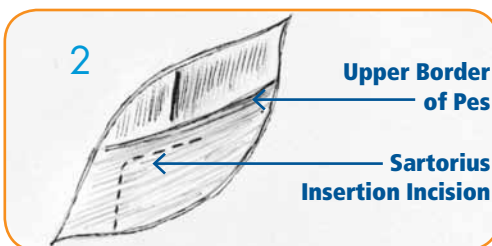
The following are some of my personal modifications, specifically with regard to harvesting and finishing the tibial side of the graft.

1. My incision is slightly oblique rather than vertical, referenced from the tibial tubercle, joint line, posterior border of the tibia and the palpable rolled upper border of the pes (in thin individuals at least).



Although this is a well-recognized option, I have found it to reduce the incidence of lateral shin numbness, simplify harvesting of the graft and allow easier application of the SE™ Graft Tensioner (ConMed Linvatec). To further avoid sensory nerve damage, the initial incision is shallow, followed by blunt dissection with scissors and wet gauze to clear fat away from the pes.

2. Having exposed the pes I make a dog-leg incision just below the upper border of the pes (the rolled superior border of sartorius), angling vertically downward nearer the tubercle. This flap of sartorius tendon insertion can then be reflected inferiorly to expose the gracilis and semitendinosus tendons. The flap is preserved for later repair.
3. Graft harvest is carried out in the normal manner with the ConMed Linvatec Graft Tendon Harvester. I find that, especially for the semitendinosus, hyperflexing the knee allows blunt dissection with a finger above the reflected tendon expansion to the medial gastrocnemius. The harvester can then be placed above the expansion and the tendon stripped. In some cases I include the expansion when freeing the



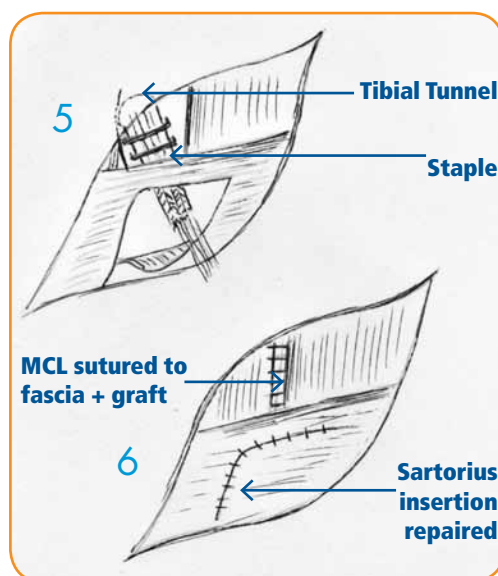
distal end of the tendon and incorporate it into the sutured end of the graft.

The remainder of the graft preparation is fairly standard and my preference is to use a cross-pin system for femoral side fixation. Of note, I often find the tibial end of the graft to be slightly larger, normally by about half a millimetre, and this is reflected in tibial and femoral tunnel sizes. A benefit of this has been added flexibility in drilling of the femoral tunnel through the tibial tunnel (currently ACL heresy?), allowing access to the low wall position otherwise only accessible through the anteromedial portal.

- 4 – 6. Having used the ConMed Linvatec SE Graft Tensioner and fixated the tibial side with a Matryx® Interference Screw (ConMed Linvatec), I complete the tibial side as follows. I fixate the graft additionally with two Stapilizer staples just below the tunnel. I then pass the tail end of the graft under the upper border of the pes and cut the sutures. The flap of sartorius is then repaired with sutures that catch the end of the graft. Above the pes, the fascia lateral to the tunnel is brought over the graft and sutured to the lateral border of the MCL, thus completely covering the tunnel and the graft. I have found the following benefits to this technique:

- a. Less irritability over the tibial incision.
- b. Additional MCL stability.
- c. An intact and functioning sartorius insertion.

No doubt some or all these modifications are currently standard for many hamstring ACL surgeons. And no doubt there are many more surgical idiosyncrasies out there of which I am unaware (but anxious to discover!). Hopefully, however, my notes and ideas will spark a light in a few eyes and help as we all strive slowly toward perfection.



Integrating Musculoskeletal Ultrasound Into Your Practice

Don Buford, M.D., Dallas, Texas, donbuford@verizon.net

As clinicians taking care of patients with musculoskeletal injuries, we should all ask ourselves the following questions:

1. Would you be interested in a portable device that allows you to diagnose many musculoskeletal conditions, allows you to perform dynamic physical exams, and allows you to visualize injections to ensure accurate placement?
2. Would you be interested in an imaging modality that is noninvasive, emits no radiation, provides high resolution "real time" imaging, and whose image is not degraded by surgical implants?
3. Would you be interested in getting a tax break for adding an office modality that pays for itself in less than a year?

If any of your answers are "yes", then I would encourage you to learn about musculoskeletal ultrasound.

Musculoskeletal ultrasound is not a new or experimental technology. The first report of musculoskeletal ultrasound was published in 1958 by K.T. Dussik who measured the acoustic reflections of many different tissues.

With ongoing engineering, computer hardware, and software advancements, musculoskeletal ultrasound has expanding clinical applications and the machines are now the size of laptop computers. However, within the United States musculoskeletal ultrasound remains a significantly underutilized imaging modality with no standard training curriculum in musculoskeletal training programs (orthopedics, rheumatology, physiatry, podiatry) where it would be most useful. Even within radiology the modality is underutilized at best. The dynamic nature of ultrasound and the ability to combine ultrasound evaluation with a history and physical exam makes it an ideal tool for the practicing clinician.

Like all imaging modalities, musculoskeletal ultrasound does have specific advantages and disadvantages inherent to the technology.

Musculoskeletal ultrasound advantages:

1. Images muscle, tendon, soft tissues, and bone surfaces
2. Provides dynamic or "live" soft tissue imaging
3. Portable and relatively inexpensive
4. High resolution imaging modality without radiation
5. Images are not degraded by surgical implants
6. No known long term side effects

Musculoskeletal ultrasound disadvantages:

1. Operator and hardware dependent imaging modality
2. Relatively limited high resolution imaging depth (approx. 9cm)
3. Can't image thru bone or gas
4. No scout image as with MRI or CT
5. Clinician learning curve

There are ultrasound scanning protocols and clinical applications for every major joint in the body. Because of the ability to image soft tissue anatomy in real time, ultrasound is the ideal modality to guide joint and soft tissue injections. With rising interest in platelet rich plasma injections to support and accelerate soft tissue

healing, ultrasound is a perfect modality to guide office based platelet rich plasma injections.

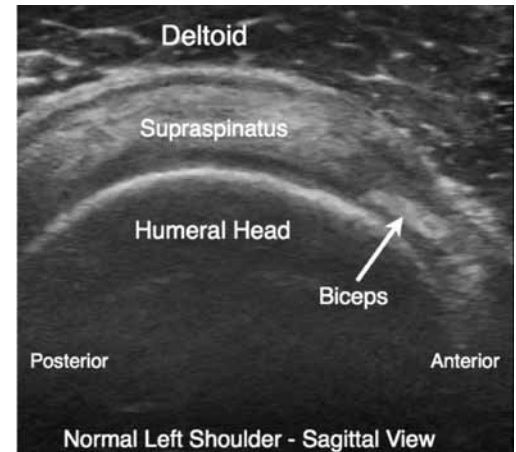
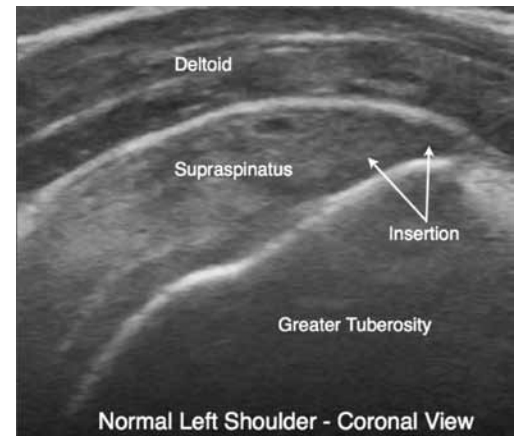
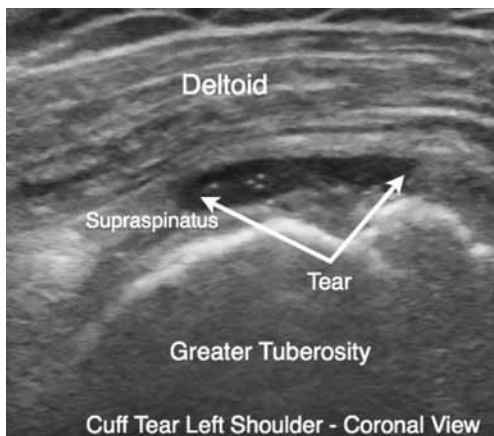
The shoulder is the most common body area scanned. Ultrasound can be used to diagnose rotator cuff tears, calcific tendinitis, biceps tendon pathology, subacromial bursitis, and the coracohumeral interval. Ultrasound cannot image intra-articular pathology so other imaging modalities may still be necessary. Ultrasound technology has progressed to a point where portable office based ultrasound machines now provide diagnostic accuracy equal to MRI scanning for partial and full thickness rotator cuff diagnosis. A meta-analysis published in June, 2009, in the American Journal of Roentgenology reviewed 65 clinical studies and found that ultrasound was equal in sensitivity and specificity to non contrast MRI scanning for rotator cuff tear diagnosis.

Adding ultrasound as an ancillary service makes financial sense for the clinician, the patient, and the insurance company. There are well established CPT codes for ultrasound examinations (76880) and ultrasound guided needle placement (76942). At Medicare reimbursement rates, most clinicians find that only 2 uses per week will pay for the ultrasound machine lease. Using ultrasound instead of MRI to evaluate a patient who might have a rotator cuff tear costs 75% less than using a non contrast MRI scan as the initial diagnostic test. With current concerns over rising health care costs and rising MRI utilization, ultrasound is ideally situated as

a low cost and effective alternative from the payor's perspective. Some patients may need additional MRI or CT imaging for surgical planning. However in my practice, using ultrasound as an initial screen has significantly reduced the cost of the health care that I provide to shoulder patients.

Interested clinicians can get experience with musculoskeletal ultrasound at several training courses in the United States. An internet search of "musculoskeletal ultrasound training" will give links to upcoming current courses. Some courses are 2 – 3 days long and cover musculoskeletal ultrasound scanning applications for the entire body. Some courses are joint specific and provide a more intensive training for one body part. In 2008, Dr. Ben DuBois and I started a one day course on shoulder ultrasound and platelet rich plasma applications. Our course is designed to give orthopedists, physiatrists, sports medicine doctors, rheumatologists, and other clinicians the education and hands on training needed to decide if the modality would be useful in their practice. More information is available at our website at www.shouldersono.com. The next course is on Saturday, January 9th, in Las Vegas.

It is our hope that those with an inquisitive mind and the patience to learn a "new" technology will see musculoskeletal ultrasound become routine in their clinical practices as it has in ours.



Bullseye® System

A new modular instrumentation system from Conmed Linvatec that provides you with precise, flexible and intuitive options for your anatomic reconstructions.

Bullseye® Femoral Footprint Guide

The femoral footprint guide provides visualization of the placement and size of the femoral tunnel in the true anatomic location when accessed from the AAM portal.

- Simulates true (oblique) femoral footprint
- Visual reference for sizing footprint
- “Windows” for visualization of guide pin
- Places guide pin in the center of the femoral footprint
- Color coded rings for size identification

Native Footprint Ruler

The footprint ruler provides measurement in the AP and SI orientations for ACL stump measurement on both the femoral and tibial sides.

- Provides a measurement of size of footprint (height and length measurements)
- Provides a measurement of size of tunnel(s) that can fit in native footprint location



2009 CONMED LINVATEC MEETING SCHEDULE

Oct. 30 – 31	Boston Sports and Shoulder Symposium, New England Baptist — Waltham, MA
Oct. 30 – Nov. 1	OLC - AANA Hip Course — Rosemont, IL
Nov. 5 – 7	Orthopaedic Surgery Controversies, Nottage — Napa Valley, CA
Nov. 12 – 14	5th Annual Association of Clinical Elbow & Wrist Arthroscopy Course — Naples, FL
Nov. 13 – 14	OLC – AAOS/ASSH Elbow and Wrist Arthroscopy Course — Rosemont, IL
Nov. 19 – 21	Fall AANA Course — Palm Desert, CA
Nov. 19 – 21	OLC – AAOS/OTA Orthopaedic Extremity Trauma Course — Rosemont, IL
Dec. 3 – 6	OLC – AANA Resident Course — Rosemont, IL
Dec. 9 – 12	Current Concepts in Joint Replacement – Winter Meeting — Orlando, FL
Dec. 14 – 16	SOMOS – Society of Military Orthopaedic Surgeons Annual Meeting — Honolulu, HI
Feb. 12 – 14	OLC – AAOS Foot and Ankle Course — Rosemont, IL
Feb. 19 – 21	OLC – AANA Hip Course — Rosemont, IL
Feb. 26 – 28	OLC – AANA Shoulder Course — Rosemont, IL

Call for Submissions:

Do you have some tips or pearls on how to perform a particular procedure? Perhaps you have an interesting case study you would like to share with your colleagues. If so, please send us your submission and we will follow up with you regarding inclusion in the next ConMed Linvatec Sports Medicine Newsletter!

Please e-mail all submissions to badikes@linvatec.com or call (727) 399-5174 with any questions or comments.