Dynamic Transosseous Equivalent Surgical Technique (PerfectPrint™)

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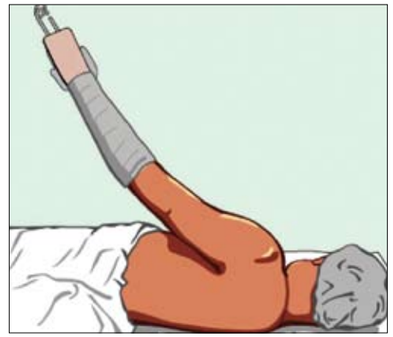
Patient preparation and positioning

Place the patient in your routine position for shoulder arthroscopy. It is important to perform an examination and possible manipulation under anesthetic before the patient is prepped and draped as some degree of stiffness is common.

For lateral decubitus position, only apply enough forearm traction to hold the patient's arm in approximately 45° of abduction and 10° of foreword flexion. (3-7 lbs). Make sure you are able to adduct the arm to the neutral position as this may be required for the placement of the medial row anchors. For beach chair position, position the arm in the routine fashion. The arm should be able to be freely rotated. (Figure 1)

Figure 1. The patient is then prepped and draped in the routine sterile fashion.



Procedure Introduction

Usually, three portals are required for this technique. The standard posterior portal is used to visualize the glenohumeral joint structures, the rotator cuff tear and to visualize the subacromial bursa. Two lateral portals are utilized, and their placement is critical and will be described below. They are referred to as superolateral or proximal lateral and inferolateral or distal lateral portals.

Using the terms superior and inferior is a little confusing as it applies to the beachchair position. For consistency I will refer to them as the proximal and distal lateral portals.

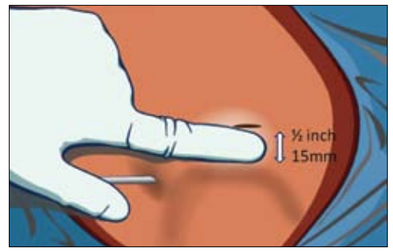
Starting the Procedure

A glenohumeral arthroscopy is performed in the routine fashion.

Distal Lateral (Inferolateral) Portal

A distal lateral portal is created lateral to the acromion, in line with the posterior corner of the acromioclavicular joint.This portal is placed approximately one fingers breadth (15mm) lateral to the edge of the acromion. This proximal lateral portal is a little more proximal than the traditional "midlateral"portal and is required for the correct approach of the SmartStitch into the rotator cuff tear. (Figure 2)

Figure 2.



Once the rotator cuff tear is identified an ArthroWand® is introduced, through the tear into the glenohumeral joint to debride the articular surface of the tear. Once this is complete the Wand is removed from the joint and placed into the subacromial bursa.

A decompression of the subacromial space is performed and this may include an anterior and lateral acromioplasty as required to allow visualization and instrumentation into the subacromial bursa. Make sure to remove adequate bursal tissue, especially posterior, to allow visualization of the posterior aspect of the tear. Debride a minimal amount of the cuff as required.

Particular attention is applied to preparation of the greater tuberosity. As we wish to maximize the attachment of the supraspinatus to its footprint it is important to prepare the tuberosity medially to the articular surface and laterally to the very tip of the tuberosity. After the ArthroWand is used to remove all residual soft tissue use either the burr used for the acromioplasty or, if the bone is soft, use a soft tissue rasp. Be careful not to breach the cortex of the bone, especially laterally where the cortex is thinner, so as not to compromise fixation of the lateral row of anchors. Decortication should not be performed at or around the implant insertion sites.

Planning the Repair (Figure 3)

Insert the SmartStitch® with the first suture cartridge into the torn edge of the rotator cuff tear, preferably at its anterior aspect.

**Do not pull the loop of the suture through completely as is done with the conventional methods, but keep both the loop and the suture ends at approximately the same length outside the portal.* (Figure 4)

Perform appropriate soft tissue releases to gain maximum mobility of the tendon and plan how many sutures will be placed anterior and posterior to your initial suture.

Figure 3.

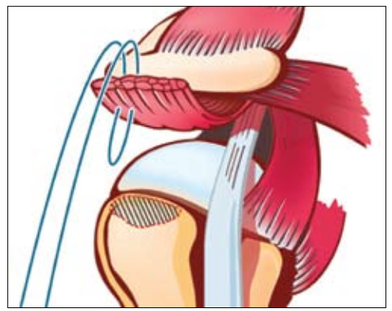
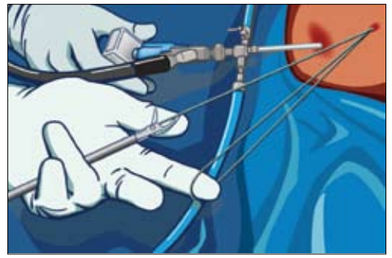


Figure 4.



Proximal Lateral (Superolateral) Portal (Figure 5)

Now prepare the proximal portal. Use an outside- in technique with a needle to place this portal as close to the acromion as possible and also midway to the tear in an anterior posterior position. Make sure the needle can approach the medial aspect of the footprint, at the articular margin, in a perpendicular position in both planes. Sometime a more generous lateral acromioplasty may be required to gain adequate access to the medial aspect of the greater tuberosity. Adducting the arm to the neutral position may be required to obtain a perpendicular approach to the medial aspect of the footprint. (Figures 6-7)

Figure 5.

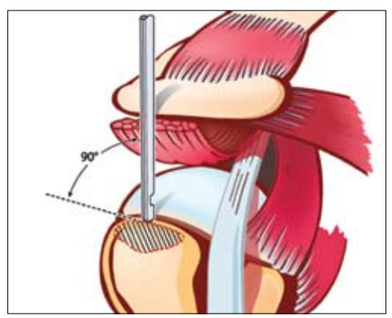


Figure 6. Good approach to the medial row.

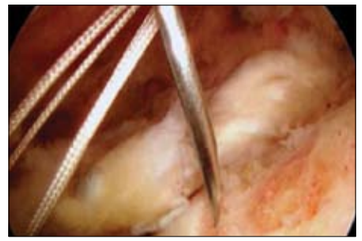
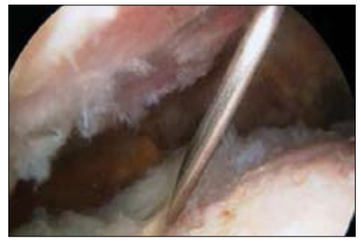


Figure 7. Bad approach. Too oblique.



If a cannula is not used (I do not) for this portal use the ArthroWand to release enough deltoid attachment to the acromion to allow easy passage of the instruments and prevent a soft tissue bridge.

Insertion of Medial Row Implants (Figure 8)

Technique Tip:

To avoid suture management issues I fix the medial side of the loop using an Opus® Magnum®2 implant after insertion of each suture. To help in visualization I try where possible to suture front to back, that is, towards the scope.

Therefore after insertion of the first suture and preparation of the proximal lateral portal, fix the deep, i.e., articular side of the stitch which would be the loop end of the stitch, for the medial side of the footprint. (Figure 9)

With a suture grasper retrieve the suture loop placed with the SmartStitch from the deep surface of the tendon through the proximal lateral portal. To maximize the footprint, create the medial bone hole using the implant's corresponding drill or punch on the border of the articular cartilage. (Figure 10) Adducting the arm to the neutral position may be required for the perpendicular placement of the medial row anchors.

Figure 8.

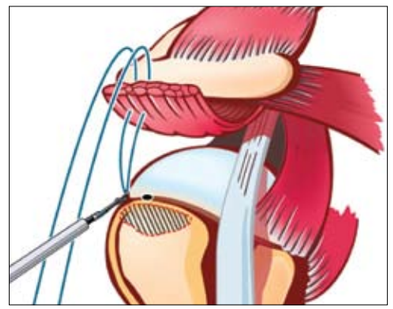


Figure 9.

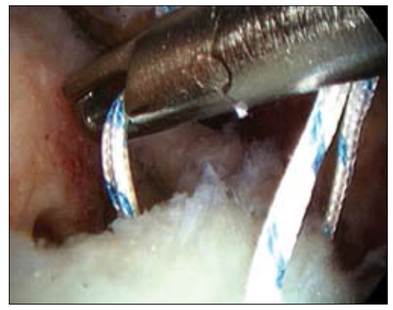
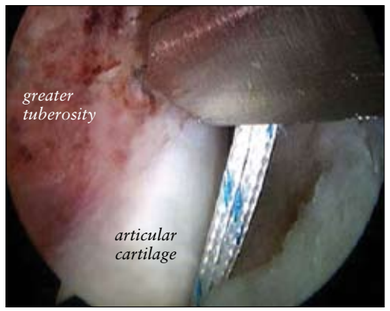


Figure 10.



Attach the deep surface suture to an Opus® Magnum®2 implant being careful to only load 1 inch / 2.5cm of suture into the anchor before ratcheting. (Figure 11)

Please note the standard technique of 2 inches of suture before ratcheting does not apply as we are not fully snaring the suture, but just loading it through the implant before deployment. Turn the black *Suture Ratchet Knobs* by two half turns only, or 15 clicks. This will retract the suture snare and enough suture into the implant to engage the suture once locked. Any more will leave you short when fixing the lateral row. (Figures 12-13)

Figure 12.

Figure 13.

Insert the implant into the bone hole and lock the implant with one pull of the *Hand Lever*. Check the suture is wholly within the implant by turning the black *Suture Ratchet Knobs* by just one half turn, then press the suture lock button and pull the *Hand Lever* three times. (Figures 14)

Withdraw the Magnum² Inserter handle. Pull on the remaining suture from the lateral distal portal to remove any slack. Cut-off the suture stump sticking out of the medial row implant. (Figure 15)

Repeat this process for any other double row sutures, fixing the medial row after inserting each suture. (Figure 16)

Plan your suture and implant placement based on the type of tear. I usually use dual row sutures for the centre of the tear and single row sutures for the most anterior part of the tear to not interfere with the biceps tendon. I sometimes use a single row suture on the posterior aspect of the tear depending on its configurations.

Figure 11.

Figure 14.

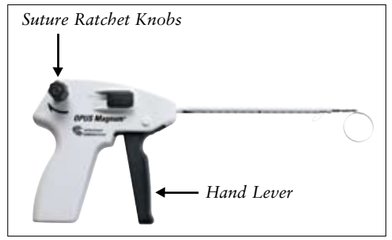
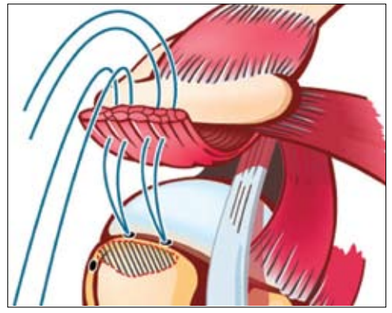


Figure 15.

Figure 16.



Insertion of Lateral Row Implants (Figure 17)

Once all the sutures have been inserted and the medial rows implants are fixed you can proceed with attaching the lateral row.

It is easier to insert the lateral row implants from the back forwards, that is, away from the scope.

The process of fixing the lateral row can proceed quite smoothly and I therefore can prepare my scrub nurse with the number of anchors that will be required. At this stage the sutures should still all be exiting the lateral distal portal. (Figure 18)

Retrieve the sutures, one at a time, from the lateral distal to the proximal portal. Locate the correct position for the lateral row implants at the *very lateral* aspect of the greater tuberosity. Prepare the hole, attach the suture to the implant, remember 2 inches/5cm here, and insert the implant into the hole. Tighten/Cinch the suture using the black *Suture Ratchet Knobs*, observing the loop over the tendon, before locking the implant into the bone. If there is any problem with suture entanglement or soft tissue bridge it is not too late to withdraw and reinsert the implant before bone lock is established. Then deploy the bone lock by pulling the *Hand Lever* and fully tension the suture using the *Ratchet Knobs*. To lock the suture, press the *Suture Lock* button, and pull the *Hand Lever* three times. Remove the inserter handle and cut the stump of suture. Repeat this process with the other sutures, working from posterior to anterior (away from your scope) if possible. (Figures 19-20)

Figure 17.

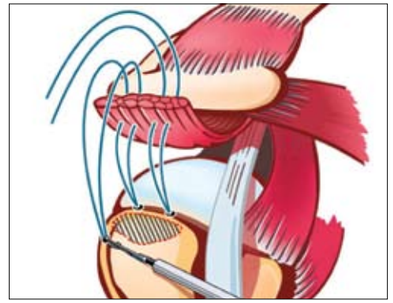


Figure 18.

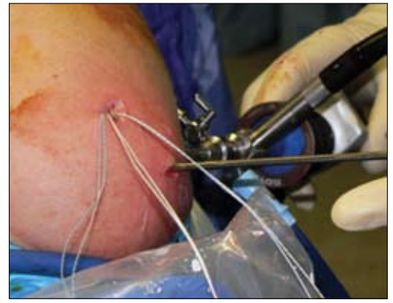
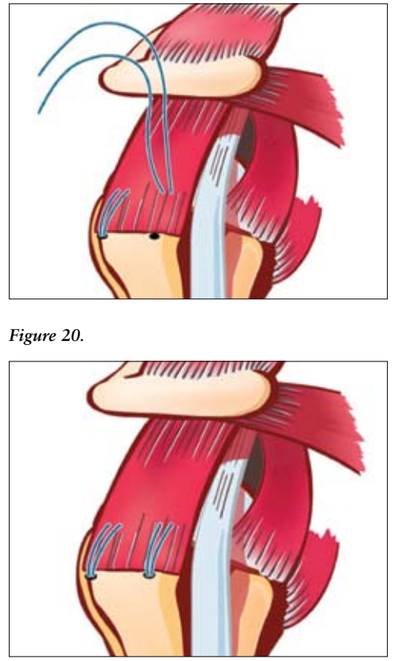


Figure 19.

Figure 20.



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