

Meniscus resection versus repair

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Introduction

Meniscectomy is the commonest arthroscopic procedure that is done, but we rarely talk about it. How often have you read an operative report that stated that a total meniscectomy had been performed. Yet it is known that if when resecting a radial tear of the lateral meniscus you go to the rim, or meniscal synovial border, you have lost the hoop integrity, of the meniscus and this segmental resection is the same as a total meniscectomy. This will very quickly lead to degenerative changes in the joint, especially on the lateral side. Brian Cole in a very nice cadaver study published in AJSM in 2006 showed that the more meniscus you resect the higher the peak contact stress are on the articular surface, and that a segmental resection is the same as a complete meniscectomy. We would like to repair all meniscal tears, but this is simply not possible, so what are the indications for meniscal repair, and what techniques should be used? This summary will hopefully unravel some of the truths and myths.

Indications and Contraindications.

First of all, who is a candidate for meniscal repair? The algorithm for meniscal repair should consider the following factors:

- Location
 - The ideal type of meniscal tear to consider repairing is the peripheral tear. Arnoczky described the peripheral vascular region of the meniscus, and this led to the classification of zones of meniscal tears. The peripheral tear was also referred to as the red on red tear, or red on white, indicating the degree of vascularity.

The red on red tear is amenable only to suture repair. The red on white tear pattern may be repaired with fixators as they have a sufficient rim to gain purchase. The most common tear seen is in the red on white region, which has an acceptable successful repair rate when bioabsorbable devices are used.

- Morphology of the tear
 - Size
 - The short 2 cm tear has the best successful repair rate
 - Appearance
 - The vertical longitudinal tear is ideal for repair
 - The degenerative horizontal cleavage tears or flap tears are not generally considered repairable.
- Chronicity of tear
 - The acute tear is usually more amenable to a repair. Chronic tears often become shredded, or degenerative, and are no longer suitable for repair.
- Patient factors
 - A meniscus tear should not be repaired in the unstable ACL deficient knee. Due to the abnormal kinematics of the ACL deficient knee the failure rate in the unstable knee is much higher than the stable or reconstructed knee.
 - The younger patient has a higher success rate. The older patient often has the type of degenerative tear that is non repairable. There may be less vascularity in the older meniscus, and thus less healing potential. There is no age limit to a meniscus repair, but most surgeons would consider 40 years of age to be the upper limit.
 - The rehab must be modified to avoid weight bearing flexion in the immediate post-op period. (ie a full squat) The unrestricted rehab after ACL reconstruction and meniscal repair has been supported in the literature by both Barber and Shelbourne.

- 50% of acute ACL tear's are associated with meniscal tears, and at least half of these should be considered for meniscal repair.
- There is some controversy about the small posterior flap tear of the lateral meniscus associated with an acute ACL injury. Most people feel that this should simply be excised.
- The stable longitudinal tear of the lateral meniscus posterior to the popliteus may be left alone.
- Any stable tear may be simply treated with trephination and abrasion of the rim to cause bleeding and enhance healing
- Healing can also be enhanced by drilling the notch to produce marrow bleeding in the non ACL reconstruction situation.

In summary, the best candidate for meniscal repair is the young patient with a 2 cm long peripheral, longitudinal or vertical, acute meniscal tear. The short isolated posterior horn tear can be repaired with bioabsorbable fixators. The large bucket handle tear should be repaired with a combination of sutures for the mid-portion and implant sutures for the posterior segment.

You should always consider a meniscal repair, rather than a meniscectomy in the young athlete to protect his articular cartilage for the future.

Why should you repair a meniscus?

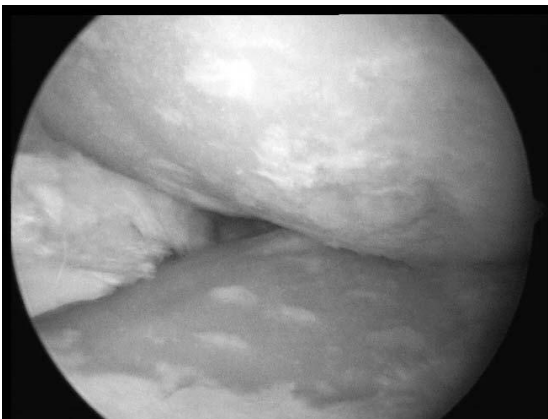


Fig 1. The post meniscectomy medial compartment.

The meniscus should be preserved to protect the articular cartilage. This photo is the degenerative medial compartment after an open menisectomy 20 years previously.

To Repair or not to Repair: Which tears can you leave alone?

The short stable tear can be left alone. Fox Shelbourne, and Grana have published series of satisfactory results with either no treatment, or treatment by abrasion and trephination for the short stable tears.

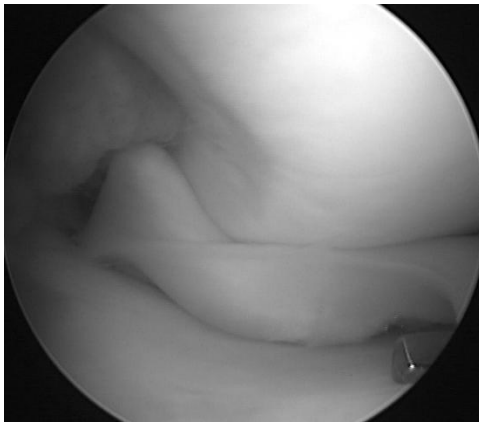


Fig 2. The unstable meniscal tear.

This is an unstable medial meniscal tear.

What is the definition of the unstable tear? The tear that is more than half the length of the meniscus, and subluxes under the femoral condyle when probed is unstable.

Shelbourne has shown that the short 1 cm stable tear that is associated with the acute ACL injury can be left alone. The follow up of these untreated tears shows no increase in late meniscal symptoms or increase in the late menisectomy rate.



Fig 3. The incomplete tear.
This is an incomplete, superior surface posterior horn lateral tear that is stable and can be left alone.

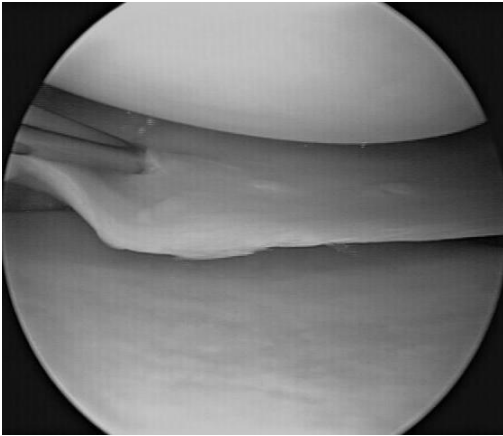


Fig 4. Trephination of the meniscal tear with an 18 gauge spinal needle.

Some of the incomplete tears can also be treated by trephination. This stable incomplete tear of the medial meniscus is trephinated in 6+ places with a number 18 gauge spinal needle. This can also be done with a regular 18 gauge needle from outside in. In a study by Zhongnan, and also by Fox good results were obtained by trephination alone in this type of tear.

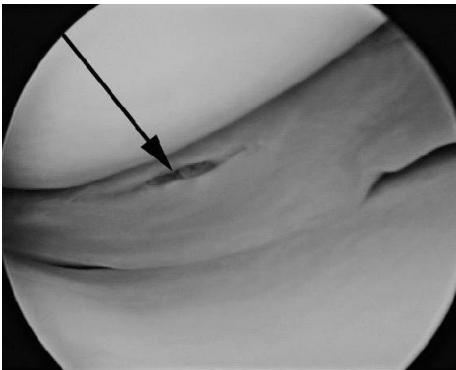


Fig 5. The vertical posterior segment tear.

This is a repairable longitudinal posterior segment tear of the medial meniscus. This tear should be repaired early to prevent its extension into a bucket handle tear. When this tear is probed, the inner segment subluxes under the femoral condyle, indicating that the tear is unstable.

Contra-indications to Meniscal Repair



Fig 6. The displaced, irreducible bucket handle tear.

The chronic, deformed, displaced bucket handle tear that subluxes each time the knee is flexed should be excised. After the bucket handle is reduced, the knee should be flexed to see if it remains reduced. If it only has a tendency to sublux, then a suture may be placed to see if this will stabilize the fragment. If it still subluxes then the best decision is to remove the unstable portion.

The Degenerative Tear



Fig 7. The degenerative bucket handle tear.

What is the definition of a degenerative tear? The horizontal tear is obviously degenerative, but the vertical posterior segment tear that rolls when probed, and has started to delaminate, is also degenerative. The bucket handle tear with a radial tear in the middle is also degenerative. The horizontal, shredded degenerative tear cannot be repaired and should be resected back to stable peripheral rim.

Contra-Indications to the use of Meniscal Fixators.

The meniscal fixators should **not** be used in the small tight knee. This means that most children should have a suture repair.

The tear of the lateral meniscus in the region of the popliteal tendon should not be repaired with fixators

The very peripheral meniscal tear does not have a rim for the fixator to gain purchase should be repaired with sutures.

The Complications of Meniscal Repair.

Meniscal repair is a very safe and effective procedure, but as with any other surgical procedure, selecting the proper technique and applying this with skill ensures a outcome free of complications. There are several complications that are associated with repair of the meniscus with either sutures or implants.

Complications due to the Meniscal Fixators

- Damage to the articular surface due to a prominent head of the device. This is avoided by inserting the device below the surface of the tissue.
- Neuro-vascular damage due to the insertion technique or a device that is too long. Be careful with the depth of penetration of the devices.
- Fracture of the device due to the shearing action of knee motion, Avoid the rigid devices and use the suture based implants.
- Loosening and migration of the fixator either inside or outside of the knee joint.
- Insufficient tissue approximation, resulting in failure of the meniscal tear to heal. Be sure that the appropriate number of devices are used to ensure a secure repair.

Complications of Suture Repair

- Injury to the saphenous nerve on the medial side and the peroneal nerve on the lateral side of the knee. Make an adequate incision to insert a retractor to protect the nerves and vessels.
- Transverse loop suture that easily pullout of the tissue and do not approximate the tissue at the repair site. Use vertical loop sutures to capture the circumferential bundle of collagen.
- Damage to the articular surface with the cannula used to insert the needles. Slowly distract the medial compartment to visualize the tear and have sufficient space to insert the cannulas.

Summary

Meniscus repair in a suitable patient with the appropriate tear is efficacious. The use of the bioabsorbable devices should be used judiciously, and in large tears in combination with sutures. At the present time we do not know how much fixation strength is required to allow a torn meniscus to heal, consequently any of the devices may work. The stimulation of the synovium with the subsequent bleeding and the production of a fibrin clot may be all that is

necessary to promote healing of the meniscal tear. The final outcome of the procedure is judged by the clinical result.

My current approach is to use non-absorbable sutures from inside out, with a separate incision to retrieve the sutures, and tie them over the capsule. I use the bioabsorbable fixators in the posterior, difficult to access region. If the tear is small, 2 cm, I may use the fixators alone, or suture based implants.

Meniscectomy

If you are not able to do a repair, then partial meniscectomy is a reasonable choice. Just how bad is a meniscectomy in the long term? The long term subjective results of meniscectomy are not all that bad, compared to the objective results that demonstrated significant degenerative changes on x-ray. The study by Shelbourne showed no improvement in repair over resection of a bucket handle tear. These results were short term, and perhaps over the long term, the subjective and objective results will deteriorate. The following abstracts summarize the current long-term outlook after partial meniscectomy.

Chambat and Neyret reviewed partial medial meniscectomy at a mean of 11 years post-op and found 91% were normal or nearly normal. 22% had degenerative changes on their x-rays.

Higuchi found that 79% of the patients at 12 years had satisfactory subjective scores, but half had degenerative changes on x-rays.

Shelbourne found that the outcome after repair and resection of bucket handle tears associated with ACL reconstruction were the same at 6-8 years post-op.

Sheller found that at 5-15 years follow-up only 66% of lateral meniscectomies were good and excellent, and 78% had degenerative changes.

Conclusion

Above all, do no harm.

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