An Algorithm for the Diagnosis and Treatment of Cartilage Lesions Accompanying ACL Injury

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I Diagnosis of Cartilage lesions Accompanying ACL by MRI
   A. MRI is really the only way to diagnose articular cartilage lesions pre-operatively.
   B. Although we use a 3T MRI, we have found the overall predictive value to be low.
   C. In our experience magnets less than 1.5 Tesla are not useful.
   D. Be Prepared at Surgery
      a. Every ACLR should be approached as though a significant articular cartilage lesion may be present since there is no good way to know beforehand whether one exists, even with high field MRI.

II HTO with ACLR
   A. My opinions on HTO are contained in the just released AAOS Instructional Course Lectures Chapter which I authored, along with Roli Jakob and Ned Amandola, who also were my panelists for the last 3 years at the AAOS annual meeting ICL on HTO.

III ACLR-HTO Treatment Algorithm
   A. We have found HTO to be highly effective for the treatment of DJD.
   B. However, we have found ACLR by itself to improve rather than worsen DJD, therefore, we do not always perform ACLR and HTO simultaneously.
   C. Indications for HTO with ACLR
      a. Must have:
         i. Radiographic medial DJD
         ii. Medial symptoms in addition to radiographic findings.
         iii. Varus of four degrees or more.
      b. We do not perform HTO for varus, no matter how severe, if the patient does not have both DJD and medial symptoms.
   D. Simultaneous vs Staged HTO with ACLR
      a. If procedures will be staged, always perform ACLR first.
      b. The HTO may become unnecessary.
   E. Case Study - 51 year old athletic female attorney.
      a. 3 prior orthopaedic opinions had recommended TKA.
      b. I offered simultaneous or staged ACLR with HTO. She chose staged.
      c. 6 months after ACLR, her medial pain was completely gone.
d. Seven years later, she still has no knee pain at all.

B. ACLR with Simultaneous HTO
   a. I use uniplanar external fixation for HTO.
   b. Microfracture is done for full thickness lesions.
   c. Full extension must be gained pre-operatively.
   d. Post-op therapy must be done carefully, but we have not had a problem regaining motion.

C. HTO Technique with ACLR
   a. Our mini-incision technique is published in the just released AAOS Instructional Course which I authored on HTO.

D. Case study – 12 year follow-up after ACLR & HTO
   a. This physical therapist presented 12 years after simultaneous ACLR and HTO with pain in his contra-lateral knee.
   b. No problems in the original knee since surgery.

E. ACLR & Meniscal Allograft Transplantation (MAT)
   a. May perform simultaneously or staged.
   b. In either case, perform MAT first. The looseness of the knee facilitates the MAT.

F. Case study – 16 year old basketball player with 2 failed allografts
   a. Had 2 previous allograft ACL reconstructions. Each time the graft became infected and had to be removed.
   b. Had lateral and medial meniscectomies.
   c. Treated with staged, 3 step procedure.
      i. First he had bone grafts done to prepare for the ACL.
      ii. At the second surgery, he had bilateral meniscal allograft transplantation.
      iii. Third surgery, ACLR with hamstring autograft.

IV All aspects of the cartilage injured and ACL deficient knee must be addressed.

A. Correct as needed:
   a. Malalignment must be corrected with osteotomy.
   b. Stability must be addressed with ACLR.
   c. MAT must be performed where substantial meniscal deficiency exists in a non-arthritic knee.
   d. ACI or MF must be performed where full thickness defects exist.

B. Simultaneous or Sequential?
   a. Every case is different.
   b. Simultaneous cases can be quite long, but results are usually good.
c. If you are not experienced in osteotomy, ACI, MAT or ACLR, it is unwise to try to perform them at the same time.

C. Case Study – 27 year old Olympic level skier.
   a. 2 failed BPTB ACLRs by a world famous US surgeon, first from ipsilateral and the with graft from contralateral leg.
   b. I performed ACLR with 6 strand ST/GR graft with AC biopsy.
   c. 4 months later performed ACI.
   d. 10 months later, had ACI trimmed. Gave an excellent 2nd look.
   e. She returned to skiing and has had no further problems.

D. Priorities
   a. In my experience, reconstructing the ACL is paramount.
   b. ACLR can produce good outcomes, even in the presence of cartilage deficiency.
   c. But cartilage restoration in the face of ACL deficiency will never produce a good outcome.

V Autograft for Revision
   A. The failure rate for allograft is clearly higher, 17% vs 5% in our published meta-analysis.
   B. I would recommend always using autograft for revisions with cartilage deficiency.
   C. These patients cannot afford to have yet another ACL graft failure.

VI Cartilage Restoration Priorities
   A. The most important factor is alignment. An unloaded cartilage deficient compartment will often do quite well, especially if microfracture (MF) is added to osteotomy.
   B. However, cartilage restoration, whether MF, ACI, or MAT will usually fail if varus or valgus are not corrected.
   C. This is especially important to remember because many surgeons are happy to perform ACI, MF or MAT, but have some fears about performing HTO.
   D. But failure to perform HTO (or Distal Femoral Osteotomy where needed) is the most common cause I see of failed cartilage surgery.

References:
