Management of the Acetabular Labrum

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KEYWORDS

• Acetabular labrum • Labral reconstruction • Labral repair • Labral debridement
• Hip preservation

KEY POINTS

- The acetabular labrum is a biomechanically important structure that stabilizes the hip and protects the articular cartilage.
- The labrum has free nerve fibers and can be a pain generator.
- Painless restoration of normal hip biomechanics should be the goal of clinical correction of labral dysfunction through labral debridement, labral repair, or labral reconstruction.
- Labral debridement, repair, and reconstruction can be viable treatment options in the correct clinical setting.

INTRODUCTION

A normal-functioning acetabular labrum can be an important component of a stable, long-lasting, and well-functioning hip joint. A compromised labrum can be the source of significant disability and pain. Painless restoration of normal hip biomechanics should be the goal of arthroscopic treatment of labral dysfunction through labral debridement, repair, or reconstruction.

Biomechanically, multiple in vivo studies have demonstrated the function of the labrum. Ferguson and colleagues[1,2] demonstrated that the labrum distributes joint forces, stabilizes the hip, and acts as a seal to promote lubrication and preserve cartilage, and with its removal, the articular cartilage layers compress 40% more quickly. Other investigators have shown that the labrum contributes to hip stability by increasing acetabular surface area, volume, and stiffness, and by creating a negative intra-articular pressure that results in resistance to displacement.[3] The hip fluid seal provided by the labrum maintains pressure within the joint to protect the cartilage

Disclosure Statement: Dr A.B. Wolff is a Consultant for Stryker. There is no commercial bias in the material of this article.

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matrix from as much as 90% of the load and decreases friction between the femoral head and acetabulum.[4,5]

To restore these labral functions, 3 surgical options exist: debridement, repair, and reconstruction. Historically, debridement was the only option. In 2006, Espinosa and colleagues[6] demonstrated superior results among patients in whom the labrum was refixed to the acetabular rim after open surgical dislocation for correction of femoroacetabular impingement (FAI). In this study, only 28% of the resection group had excellent results, whereas 80% of the labral reattachment group had excellent results. This work, in concert with improved arthroscopic instrumentation and techniques, led to an attempt to preserve the labrum and restore its anatomy and function to approximate that of a "normal" hip. In 2009, Larson[7] reported superior outcomes among his patients who underwent arthroscopic refixation of the labrum versus debridement. Of the patients in the refixation group, 89% had good to excellent results compared with only 66% of patients who underwent debridement. These results have continued to be superior at midterm follow-up (92% vs 68%).[8] Several studies have supported these findings and demonstrated significantly better clinical outcomes with repair when compared with resection or debridement.[8,9]

Understanding that patients generally fare better with a repair and that the hip has improved mechanical properties with a functioning labrum led to the development of labral reconstruction techniques as an option for patients with labral tissue that was missing or damaged beyond repair. Although labral reconstruction had been reported in a case series of 5 surgical dislocations,[10] Philippon and colleagues[11] were the first to describe their promising early results in a large series with arthroscopic labral reconstruction in patients without osteoarthritis.[12] More recently, White and colleagues[13] showed excellent 2-year results in a series of 152 consecutive hips that underwent arthroscopic labral reconstruction. Domb and colleagues[14] found significantly better results in patients undergoing arthroscopic labral reconstruction compared to those undergoing labral resection for labra damaged beyond repair as measured by Non-arthritic Hip Score (NAHS) and hip outcome score (HOS)-activities of daily living (ADL) scores. Taking it a step farther, Matsuda and Burchette[15] compared their results with arthroscopic labral reconstruction with refixation in a matched cohort study and found that NAHS scores were significantly higher in the reconstruction group at 2-year follow-up. Similarly, Wolff and colleagues[16] recently reported on 1-year follow-up in a consecutive series of 107 patients, that the 46 who underwent circumferential labral reconstruction had an improvement across all outcome measures statistically indistinguishable from the patients who underwent labral repair despite being significantly older with more severe labral damage (or deficiency). Furthermore, in the reconstruction group, 35% were revisions compared with 3% of the repair group[16] (**Table 1**).

DEBRIDEMENT, REPAIR, RECONSTRUCTION: DOES IT MATTER?

Although there is a substantial and growing body of evidence that suggests both labral repair and reconstruction (probably more so than debridement) can help patients with hip pain, these treatments are not often performed in isolation. Increasing numbers of labral repairs among reporting investigators have historically paralleled not only advances in our understanding and ability to treat other conditions of the hip often performed concomitantly (ie, correction of FAI), but also a refinement of techniques, of patient selection, and a more thorough understanding of rehabilitation. Thus, some portion of the historically inferior results with labral debridement is likely attributable to the learning curves of both individual hip surgeons and the community of hip

Table 1
Published open and arthroscopic labral reconstruction outcomes

Study	Open vs Arthroscopic/ Graft	n	Sex	Age	Follow-up	Convert to THA	Preoperative Outcome	Postoperative Outcome
Sierra and Trousdale	Open/ligamentum teres capitis autograft	5	3 M, 2 F	33 (19–50) y	10 (5–20) mo	1 (20%)	• 3 "severe pain" • 2 "moderately severe pain" • UCLA: 5 (2–6)	• 3 "no pain" • 1 "moderate pain" • 1 "same pain as preoperatively" • UCLA: 8 (6–10)
Walker et al	Open/ligamentum teres capitis autograft or fascia lata autograft	20	5 M, 14 F	29 (16–50) y	26 (12–56) mo	3 (15%)	Not reported	• UCLA: 8.5 (5–10)
White et al	Arthroscopic/iliotibial band allograft	152	64 M, 78 F	39 (16–58) y	28 (24–39) mo	13 (10%)	• MHHS: 54 • LEFS: 41 • VAS rest: 5 • VAS ADLs: 6 • VAS sport: 8	• MHHS: 88 • LEFS: 68 • VAS rest: 2 • VAS ADLs: 2 • VAS sport: 3 • Satisfaction: 9/10
Philippon et al	Arthroscopic/iliotibial band autograft	47	32 M, 15 F	37 (18–55) y	18 (12–32) mo	4 (9%)	• MHHS: 62	• MHHS: 85 • Satisfaction: 8/10
Geyer et al	Arthroscopic/iliotibial band autograft	76	42 M, 33 F	39 (18–64) y	49 (36–70) mo	18 (24%) + 1 (1%) resurface	• MHHS: 59 • HOS-ADL: 69 • HOS-Sport: 41 • SF-12 physical: 42 • SF-12 mental: 55	• MHHS: 83 • HOS-ADL: 81 • HOS-Sport: 67 • SF-12 physical: 50 • SF-12 mental: 53 • Satisfaction: 8/10

(*continued on next page*)

Table 1
(*continued*)

Study	Open vs Arthroscopic/ Graft	n	Sex	Age	Follow-up	Convert to THA	Preoperative Outcome	Postoperative Outcome
Boykin et al	Arthroscopic/iliotibial band autograft	21	19 M, 0 F	28 (19–41) y	41 (20–74) mo	2 (10%)	• MHHS: 67 • HOS-ADL: 77 • HOS-Sport: 56 • SF-12 physical: 44 • SF-12 mental: 49	• MHHS: 84 • HOS-ADL: 85 • HOS-Sport: 77 • SF-12 physical: 51 • SF-12 mental: 54 • Satisfaction: 8/10 • Returned to play: 18 (86%)
Matsuda and Burchette	Arthroscopic/gracilis autograft	8	7 M, 1 F	35 (18–58) y	30 (24–37) mo	0 (0%)	• NAHS: 42	• NAHS: 92 • Satisfaction: 7 "high,"1 "moderate"
Domb et al	Arthroscopic/gracilis tendon autograft	11	7 M, 4 F	33 (18–45) y	26 (24–32) mo	0 (0%)	• NAHS: 53 • HOS-ADL: 59 • HOS-Sport: 39 • MHHS: 55 • VAS: 7	• NAHS: 78 • HOS-ADL: 80 • HOS-Sport: 60 • MHHS: 82 • VAS: 3 • Satisfaction: 8/10

Abbreviations: ADLs, activities of daily living; HOS-ADL, hip outcome score-activities of daily living; HOS-Sport, hip outcome score-sports-specific subscale; NAHS, nonarthritic hip score; MHHS, modified Harris hip score; SF-12 mental, short form-12 mental component; SF-12 physical, short form-12 physical component; VAS, visual analog scale for pain.

Data are expressed as count (%) or mean (range).

From White BJ, Herzog MM. Labral reconstruction: when to perform and how. Front Surg 2015;2:27.

surgeons at large. Furthermore, as evidenced by most patients doing well with labral debridement and from studies such as that of Register and colleagues[17] finding labral tears in 69% of asymptomatic individuals on MRI, we know that there are many people who can tolerate an imperfect labrum.

DEBRIDEMENT, REPAIR, RECONSTRUCTION: IT PROBABLY MATTERS

Although there are those who can tolerate an imperfect labrum, there are clearly those who cannot. Aside from the clinical data that show fairly convincingly the superiority of labral restoration to debridement, there are in vivo studies that offer some rationale as why this may be.

The Labrum is a Pain Generator

Haversath and colleagues[18] reported that there is pain-associated free nerve expression within the labrum, predominately at its base with the highest concentration anterosuperiorly.

The Labrum is a Fibrocartilaginous Structure

Seldes and colleagues[19] described the histology of the labrum as a cartilaginous structure similar to a meniscus. The knee literature shows good results with repair of certain types of acute meniscal tears,[20] but notably bad results with repair of complex, degenerative meniscal tears.[21,22] Although not completely analogous structures, it would be difficult to imagine that a complex degenerative tear of a fibrocartilaginous structure in the hip would heal at a markedly higher rate by placing sutures around it. Furthermore, Haemer and colleagues[23] demonstrated that degeneration and tearing of the labrum leads to increased permeability resulting in loss of fluid support and increased consolidation rate of the articular cartilage in a finite element model.

Biomechanical Function Can Be Restored Through Repair or Reconstruction

Biomechanical studies have pointed to at least partial restoration of time zero hip biomechanics after a repair or reconstruction of a compromised labrum. In a cadaveric model, Nepple and colleagues[24] found labral reconstruction and repair significantly improved stability to distractive forces compared with labral resection, as well as improving intra-articular fluid pressurization compared with labral tear and partial resection conditions. Interestingly, they also found that labral reconstruction outperformed labral repair in improving fluid pressurization and maintaining it over time.[3] Similarly, Lee and colleagues[25] found that while segmental anterosuperior labral resection resulted in significantly decreased contact areas and increased contact pressures, these areas and pressures were partially restored by labral reconstruction.

AUTHOR'S TREATMENT ALGORITHM FOR LABRAL MANAGEMENT

Based on the previously described evidence and the author's personal experience, this is the treatment algorithm I currently use (**Fig. 1**, **Table 2**). Surgeons should select the appropriate treatment for any individual patient based on their own experience with the procedure and what they feel will offer the patient the best chance at a good outcome.

- *Labral debridement*
  - Peripheral tear of the without instability at its base
    - Labrum must be of functional size after debridement
  - Labrum is damaged beyond repair and a reconstruction is not possible.

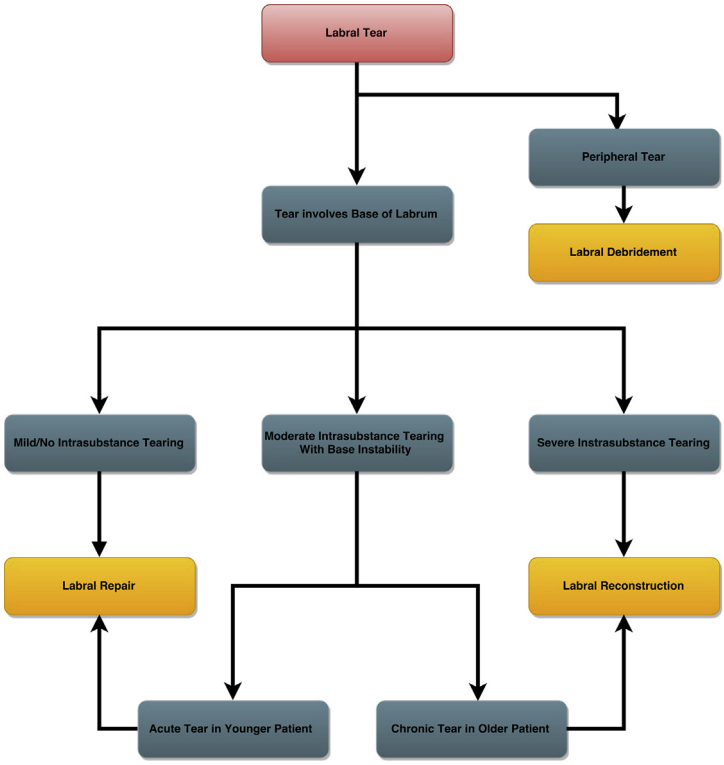

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Fig. 1. Flow chart depicting the author's treatment algorithm.

- Favored when the pathology and pain generation do not appear to be of labral origin

- *Labral repair*
  - The labral base is unstable or detached
  - Intrasubstance tearing is mild or moderate
- *Labral reconstruction*
  - Segmental labral defect
  - Severe intrasubstance damage (Fig. 2)

Table 2
Surgical considerations for labral treatment

	Restores Anatomic Function	Removes Pain-Generating Tissue	Technical Complexity	Long-Term Follow-up Studies Exist
Labral debridement	Low[a]	High	Low	Medium
Labral repair	High	Low[c]	High	Medium
Labral reconstruction	High[b]	Very High	Very High	Low

[a] If insufficient labral tissue remains after debridement.
[b] If appropriately tensioned circumferential seal is restored.
[c] If sufficient intact labral tissue remains, this can be repaired following debridement of damaged pain-generating tissue.

Fig. 2. Labrum with severe intrasubstance damage in a 24-year-old male hockey player with severe CAM type FAI.

- Diminutive labral remnant after debridement
  - Insufficient labral tissue is considered to be less than 2 to 3 mm because it lacks the surface area to heal and repair may not create a sufficient fluid seal[26]
- Favored in revision of failed labral repair

Controversial Indications for Labral Reconstruction

Revision hip arthroscopy

In a patient who has undergone a previous hip arthroscopy either with a labral debridement or repair, it is often the case in which the labral tissue is compromised. Similarly, it is at times unclear at the time of arthroscopy what the cause or causes of the failure of the previous procedure are. As the labrum itself can be a pain generator, resection and reconstruction can be a useful tool to remove damaged pain-generating tissue and replace it with aneural tissue of better quality and better mechanical properties. Additionally, resection of the labrum provides unlimited access to the rim of the acetabulum to correct any bony or chondral irregularity that may be present but "hidden" beneath the labrum.

Labral tears with moderate intrasubstance damage

In patients with moderate intrasubstance damage and instability at the base of the labrum, there are several factors that can be considered in the decision of whether to repair or reconstruct the labrum:

a. Younger patients are more likely to heal a repair than older patients. I favor reconstruction in older patients.
b. More acute tears are more likely to heal than chronic tears. I favor repair in more acute settings.
c. Severe CAM-type FAI if corrected will likely provide a favorable environment for labral healing. I favor repair in these settings.
d. Intrasubstance synovitic changes or fatty changes (as often seen with paralabral cysts on MRI) likely indicate a more advanced degree and chronicity of tissue compromise. I favor reconstruction in these settings.

Coxa Profunda Pincer Deformities

Coxa profunda deformities often are accompanied by (or caused by) ossification of the labrum (particularly posteriorly). In these cases, to adequately correct the deformity, a labral resection must be performed. I will then perform a labral reconstruction. In cases in which the labrum has not ossified but there is a deformity that requires a labral

takedown and a substantial osteoplasty of the acetabular rim, the labral tissue will often not fit appropriately onto the recessed acetabular rim or will be damaged in the process of removing it. Additionally, in these cases, access to the rim is markedly easier and more thorough if the labrum is entirely resected.

SURGICAL TECHNIQUES

Labral Debridement and Repair

Step by step description of procedure

After the patient is positioned, prepped, and draped as described elsewhere, the following steps are undertaken:

- Traction is applied.
- The distracted hip is visualized fluoroscopically; approximately 10 mm of joint space is typically adequate.
- A spinal needle is used to set the anterolateral portal. This is typically placed approximately 1 cm anterior and superior to the tip of the greater trochanter, but should be adjusted so as to have a useful portal that does not penetrate the labrum or scuff the femoral head. This is visualized fluoroscopically to ensure optimal position.
- A Seldinger technique is used to create an anterolateral portal using a nitinol wire passed through the spinal needle that is then removed. An arthroscopic cannula is then placed over this guidewire.
- The camera is inserted into the joint. *At this point, no arthroscopic fluid is used as there is no outflow portal.*
- A spinal needle is then used to localize the mid anterior portal, which is placed at approximately the midpoint, in the medial-lateral plane between the tip of the greater trochanter and the antero-superior iliac spine and approximately 7 cm distal to the anterolateral portal. *The placement of this portal is variable and dependent on anatomy. Fluoroscopy is of limited utility. In general, if you are having trouble, consider that this portal is placed much more in-line with your antero-lateral portal than you might think. There are commercially available devices to help with placement of this portal, but these are of questionable value. Practice and familiarity with the procedure are your best tools.*
- Typically the next step is to perform a capsulotomy connecting the anterolateral and midanterior portals. This is done with a banana knife or beaver blade. *This step is occasionally unnecessary in patients in whom peripheral compartment work is not indicated and/or patients in whom instability is an issue. When performing the capsulotomy, be sure to leave a sufficient capsule on the acetabular side so that it may be repaired at the end of the procedure.*
- At this point, the entire central compartment is visible and should be inspected and the labrum should be probed to assess for tears and instability.
- If a labral tear is encountered, it should then be assessed for extent and whether it is amenable to repair. Tears with instability at the base should be repaired. Peripheral fraying of the labrum should be debrided. *In patients with complex degenerative tears with significant intrasubstance tearing and synovitis, consideration should be given to resection and reconstruction (see previously).*

Labral debridement

- If labral debridement is indicated, this is performed with an arthroscopic shaver, an electrocautery, and/or an arthroscopic biter.
- The base of the labrum should be left intact if possible.

Labral repair

- If a labral repair is performed, the next step is to identify the acetabular rim to which the labrum is usually still at least partially attached.
- The bone of the acetabulum is exposed with a shaver and/or an electrocautery device with careful attention paid to labral preservation.
- If there is significant damage at the chondro-labral junction, or a significant acetabuloplasty is to be performed based on preoperative imaging demonstrating significant pincer-type FAI, then burring of the acetabular rim is undertaken to effect an appropriate pincer correction or to eliminate the area of damage at the chondro-labral junction. *DO NOT OVER-RESECT THE ACETABULAR RIM, AS THIS WILL DESTABILIZE THE HIP.*
- Burring is then undertaken to correct the bony aspect of the pathology.
- Damaged labrum and damaged and/or redundant articular cartilage is then resected with an arthroscopic biter, shaver, and/or electrocautery device.
- If there is no detachment or significant damage on the articular side of the chondro-labral junction and there is no need for a significant acetabuloplasty, the chondro-labral junction may be preserved. In this case, burring is performed only to the extent necessary to get to a surface of bleeding bone for labral repair/refixation.
- Place anchors into the acetabular rim.
  - This can be done through either of the existing portals, or through a distal anterolateral (DALA) portal localized with a spinal needle and placed approximately 5 to 8 cm distal to the anterolateral portal.
  - It is often easier to place all of the anchors at one time and then proceed to the repair, as the acetabulum is most exposed at this time.
  - The drill guide should be positioned as close as possible to the acetabular rim to effect anatomic repair.
  - The surgeon should consider drilling these holes himself for the purposes of tactile feedback while the assistant holds the camera focused on the acetabular articular surface to ensure that there is no violation of same.
  - Similarly, the holes for anchor placement should not violate the extra-articular portion of the bone either, particularly anteriorly as the bone is thin in this area and a protruding anchor can be an irritant to the psoas tendon.
    - Perforation through the extra-articular side of the acetabulum can be checked by palpation with a nitinol wire
- Place a clear cannula for suture management into the midanterior portal.
- Retrieve the post suture limb from the anterior-most suture anchor.
- Pass the other suture limb from the most anterior anchor through the chondro-labral junction.
- Grasp this suture limb and retrieve it through the cannula. It is at this point when the surgeon must decide whether to use a simple loop suture or a vertical mattress (also known as a "base-refixation suture")[26] (see **Fig. 2**).
  - Although I prefer the vertical mattress configuration in most settings, I feel that the anatomy of the patient's labrum ought to dictate the suture configuration.
    - For more cylindrical and smaller labra, a simple loop suture is preferable.
    - For more hypertrophic and/or meniscoid labra, a vertical mattress is preferable to restore the original anatomic configuration (**Figs. 3** and **4**).
    - Sutures are then tied using standard arthroscopic knot tying technique. In large etched tears, it can be beneficial to use an arthroscopic grasper placed through the distal accessory portal to hold appropriate tension on the labrum during suture fixation.

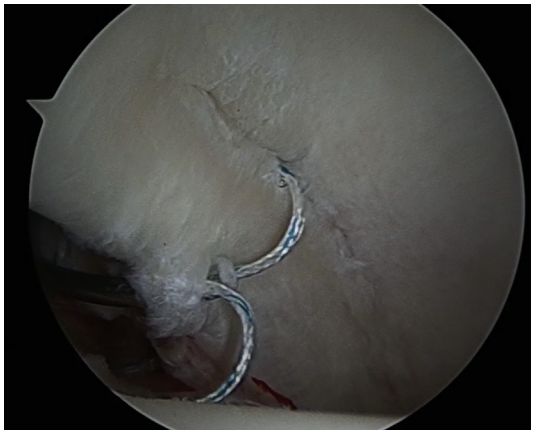

Fig. 3. Suture retrieval through the labrum for a vertical mattress stitch configuration.

- *Alternatively, the sutures for labral repair can be placed first and then passed through knotless anchors that are then placed into the acetabular rim.*

LABRAL RECONSTRUCTION PREFERRED TECHNIQUE AND RATIONALE

Although labral reconstruction likely offers a superior solution for certain difficult labral problems, the difference in some patients between a repair/debridement and a reconstruction may be marginal. It is imperative that the surgeon undertake this procedure with careful consideration of the significant technical difficulty and narrow margin for error in patients who are otherwise young and healthy. Likewise, it is incumbent on each individual surgeon to decide whether, in their hands, the increased risk and length of the procedure is likely to be of meaningful benefit to the patient.

There are a wide variety of techniques and graft choices used in the literature on labral reconstruction. There is no high-level evidence to distinguish between these

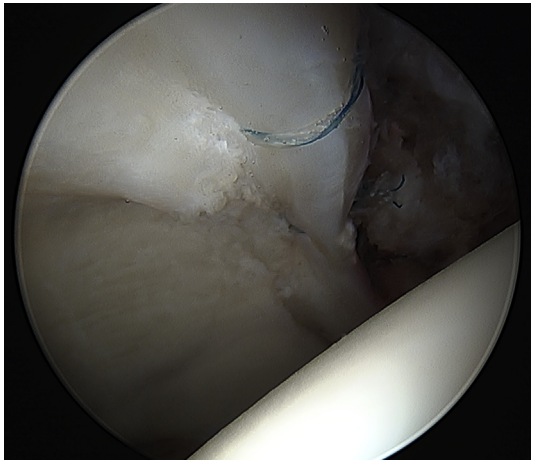

Fig. 4. Labral fixation showing a looped suture at a more circumferential portion of the labrum and a vertical mattress suture configuration at a more meniscoid portion of the labrum father anteriorly.

techniques and graft choices. Thus, surgeons are left to decide what they are most comfortable with based on their experience, the goals they are trying to accomplish, and their comfort level with accessing the far-reaches of the acetabulum. The 2 main choices in labral reconstruction are length of reconstruction and graft choice.

Length of Reconstruction: Longer is Better

Much of the labral reconstruction literature, both biomechanical and clinical, reflects use of relatively short grafts of 3 to 4 cm that reconstruct typically the anterosuperior portion of the labrum. Although these results are encouraging, it has been my personal experience[16] as well as that reported by White and colleagues[13] that longer grafts fare better. The likely reasons for this are twofold:

1. Segmental grafts have 2 junction points with the native labrum in high-stress areas. Restoring the hoop stress stability of the labral seal at 2 high-stress points with side-to-side fixation is a technical challenge to reproducibly achieve. A circumferential labral graft (as described later in this article) has either no junction points or one far posteroinferiorly at an area of low stress.
2. The labrum is a known pain generator. Resecting more labral tissue results in greater pain relief, as long as stability is also restored.

Graft Choice

The choice of graft is probably less important than the length and technique of the reconstruction. The demands on a labral graft or native labrum are that it must act as a collagen scaffold for integration onto the acetabular rim and that it must be strong enough to withstand the forces across it. The forces to which a labrum is subjected are far exceeded by those of other structures that are routinely reconstructed with grafts around the body. Thus, although the literature on graft choice in anterior cruciate ligament (ACL) reconstruction shows a trend toward higher failure rates in allografts than in autografts, with its high torsional and tensile demands, the ACL is hardly an analogous structure to the acetabular labrum, thus this failure rate is likely not applicable.

The autograft choices that have been described are ligamentum teres in an open approach[10] (not a feasible arthroscopic choice), iliotibial band,[11] and hamstring.[12,13] Although not disqualifying, each of these grafts carries increased surgical site morbidity, a cosmetic cost and an increase in operative time relative to an allograft.

Whether the graft is an autograft or allograft, the tissue choices are similar. I have used anterior tibialis, posterior tibialis, semitendinosus and fascia lata allografts, and iliotibial band autografts. In my experience, the most consistent grafts can be made from fascia lata allografts. Using my preferred technique, the graft is tubularized using absorbable sutures to a size of 6 mm × 90 to 100 mm (**Fig. 5**).

Technique

- The native labrum is resected from the transverse acetabular ligament anteroinferiorly to the 8 o'clock position posteroinferiorly.
  - To access the anteroinferior acetabular rim, it is preferable to incise a small portion of the iliofemoral ligament adjacent to the psoas fossa instead of

Fig. 5. 90 × 6 mm graft for labral reconstruction from fascia lata allograft following tubularization using multiple absorbable braided sutures.

extending the capsulotomy through this important stabilizing portion of ligament.
  - Alternatively, the anteroinferior labrum and rim can be easily accessed with the hip out of traction and in approximately 40° of flexion.
- The rim of the acetabulum is burred throughout the length of the proposed reconstruction. Acetabular osteoplasty is performed if necessary.
  - Posteroinferiorly, the rim is burred behind the labrum to approximately the 7:30 position while the labral remnant is left intact in this area. This allows fixation of the graft to the labrum in an area of low stress and obviates the need for cutting excess graft, as any excess is minimal and is fixated outside of the native labrum.
  - The posteroinferior labrum is usually undamaged. If this is not the case, the labrum should be resected to the transverse acetabular ligament posteroinferiorly. In this situation, excess graft may need to be excised.
- Through the DALA portal, anchors are placed around the rim with the exception of the posteroinferior anchor (Fig. 6).
  - All anchors should be positioned as close to the articular surface as possible without violation of same so as to achieve restoration of suction seal by the labral graft.
  - The anteroinferior anchor(s) are sometimes more easily placed through the midanterior portal. If this is the case, it is more efficient to place these through the cannula just before passage of the graft.
- The posteroinferior anchor is placed at approximately the 7:30 position behind the labral remnant.
- The lead suture from the posteroinferior anchor is passed in a vertical mattress fashion through the native labral remnant and tagged for future passage through the posterior portion of the graft.
- Sutures from all anchors are retrieved through the anterolateral portal to keep them out of the way.
- A clear cannula is placed through the mid anterior portal and the sutures from the anteroinferior anchor are retrieved through this portal.

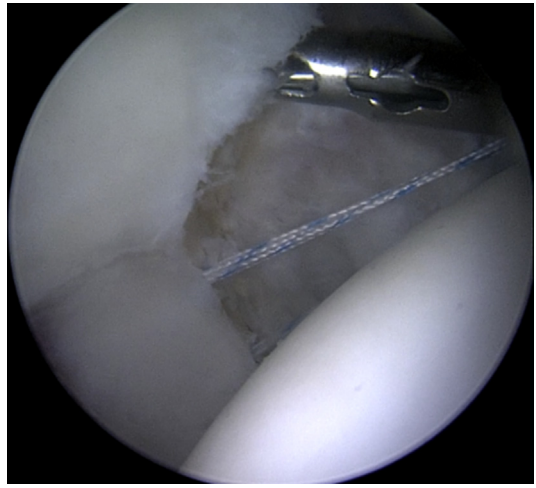

Fig. 6. Placement of third anchor through DALA portal. Camera is in anterolateral portal. Sutures from first anchor are visible anteroinferiorly and from second in the iliopsoas fossa.

- The lead suture limb is weaved through the end of the graft.
- The post suture limb is pulled to draw the graft into the cannula while the graft is gently pushed down the cannula by a blunt device until the graft is fully in the joint.
  - Tension should be kept on the sutures from the other anchors during graft passage to avoid tangles.
- Once the graft is positioned on the rim of the acetabulum anteroinferiorly, the suture that the graft has been passed down is tied and then cut.
- The sutures from the second suture anchor are then retrieved through the cannula, and passed around and/or through the graft.
- Through the DALA portal, a blunt grasper is used to manipulate and tension the graft on the acetabular rim. It is held in the desired position with the desired tension by an assistant while the suture is tied.
- This process is repeated sequentially across the rim of the acetabulum, proceeding anteriorly to posteriorly.
  - Typically at approximately the 12 o'clock position, the clear cannula needs to be moved to the DALA portal and the camera to the mid anterior portal with graft manipulation taking place through the anterolateral portal
- For the posteroinferior suture, the limb that was previously passed through the native labrum now should be passed through the graft. This should be done in an area of the graft that will appropriately tension the graft so that it lies circumferentially on the rim and is not overtensioned or undertensioned.
  - Once this suture is passed at the optimal spot on the graft, the sutures are retrieved and tied through the cannula. The post suture should be free and the lead suture should be in a vertical mattress through the labrum and the graft so that when this suture is tied, appropriate tension is achieved, the graft and the labrum are lying opposed with the graft and any remaining length situated extra-articularly (**Fig. 7**).
- At this point, the labral graft is probed throughout. It is not uncommon to find spots that need extra fixation. Additional anchors should be placed in these spots and sutures passed and tied as in a labral repair.

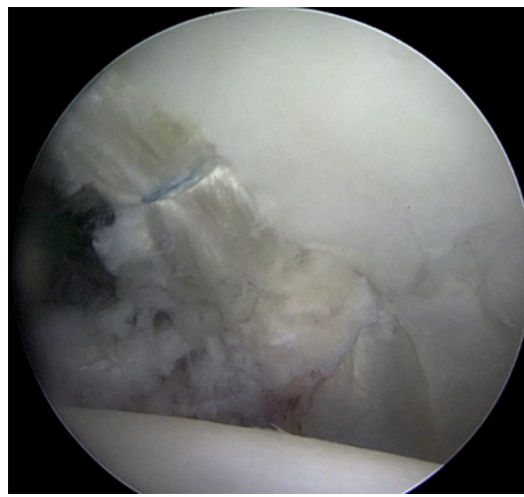

Fig. 7. Labral graft is approximated to the native labral remnant posteroinferiorly. There is a contiguous seal established with excess graft remaining extra-articularly.

Fig. 8. Dynamic examination following labral reconstruction with reestablishment of seal on femoral head.

- The hip is then taken out of traction and a dynamic examination is performed to ensure restoration of suction seal and lack of impingement (**Fig. 8**).

POSTOPERATIVE CARE

For labral debridement, labral repair, and labral reconstruction, patients have protected weight-bearing with crutches for typically 2 to 4 weeks until their gait has normalized. I do not restrict patients differentially based on how the labral treatment performed. It is not unusual for patients undergoing a circumferential reconstruction to feel very little pain very quickly. It is imperative that these patients are instructed to take it slowly regardless of how they feel.

Weight-bearing will be more restricted for greater duration of time based on concomitant procedures (eg, chondral restorative procedure, capsular plication, gluteal tendon repair). Passive motion is begun immediately either with a continuous passive motion machine or with a stationary bike without resistance.

Time to initiation of physical therapy is variable, but is usually within 3 to 4 days. Gentle range of motion and isometric exercises are begun in the early phases with progression to more active strengthening focused on the core and gluteal musculature, and establishing a normal gait pattern as weeks progress. Manual therapy can be a valuable adjunct during the recovery phase.

Depending on the goals and rate of progress of the patient, a gradual return to running can begin at 10 to 12 weeks. Although some investigators have reported successful return to competitive athletics as early as 3 months, most advocate a minimum of 4 to 6 months, particularly for high hip-demand sports, such as football, lacrosse, soccer, ballet, or wrestling. For more information, see Malloy P, Gray K, Wolff AB: Rehabilitation After Hip Arthroscopy: A Movement Control-Based Perspective, in this issue. Videos and full protocols also are available at www.andrewwolffmd.com.

SUMMARY

Indications for treatment of hip labral pathology are in evolution. On the one hand, there are individuals who can tolerate a severely damaged or missing labrum, while on the other there are those whose hip function is severely compromised due to labral imperfection. Given the difficulty distinguishing between these patients, the goal with

arthroscopic hip surgery should be to restore the labral anatomy to approximate that of a normal hip and to remove pain-generating irreparable labral tissue. With those goals in mind, debridement, repair, and reconstruction all can be of utility in the treatment of hip labral pathology.

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