Journal of Hip Preservation Surgery Vol. 7, No. 4, pp. 644–654
doi: 10.1093/jhps/hnab043
Advance Access Publication 19 May 2021
Research article

Consensus-based classification system for intra-operative management of labral tears during hip arthroscopy—aggregate recommendations from high-volume hip preservation surgeons

Ajay C. Lall[1,2,3], Shawn Annin[2], Jeff W. Chen[4], Samantha Diulus[2], Hari K. Ankem[2], Philip J. Rosinsky[2], Jacob Shapira[2], Mitchell B. Meghpara[2,3], David R. Maldonado[2], David E. Hartigan[5], Aaron J. Krych[6], Bruce A. Levy[6] and Benjamin G. Domb[1,2,3]*

[1]American Hip Institute, Chicago, IL 60018, USA,
[2]American Hip Institute Research Foundation, Chicago, IL 60018, USA,
[3]AMITA Health St. Alexius Medical Center, Hoffman Estates, IL 60169, USA,
[4]Vanderbilt Medical School, Nashville, TN, 37232, USA,
[5]Department of Orthopedic Surgery, Mayo Clinic, Phoenix, AZ, 85054, USA and
[6]Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN 55905, USA.

This study was performed in accordance with the ethical standards in the 1964 Declaration of Helsinki. This study was carried out in accordance with relevant regulations of the US Health Insurance Portability and Accountability Act (HIPAA). Details that might disclose the identity of the subjects under study have been omitted. This study was approved by the IRB. (IRB ID: 5276)

***Correspondence to: B. G. Domb. E-mail:** drdomb@americanhipinstitute.org

Submitted 14 December 2020; Revised 16 March 2021

ABSTRACT

The purpose of this study was to survey high-volume hip preservation surgeons regarding their perspectives on intra-operative management of labral tears to improve decision-making and produce an effective classification system. A cross-sectional survey of high-volume hip preservation surgeons was conducted in person and anonymously, using a questionnaire that is repeated for indications of labral debridement, repair and reconstruction given the torn labra are stable, unstable, viable or non-viable. Twenty-six high-volume arthroscopic hip surgeons participated in this survey. Provided the labrum was viable (torn tissue that is likely to heal) and stable, labral debridement would be performed by 76.92% of respondents for patients >40 years of age and by >84% of respondents for stable intra-substance labral tears in patients without dysplasia. If the labrum was viable but unstable, labral repair would be performed by >80% of respondents for patients ≤40 years of age and > 80% of respondents if the labral size was >3 mm and located anteriorly. Presence of calcified labra or the Os acetabuli mattered while deciding whether to repair a labrum. In non-viable (torn tissue that is unlikely to heal) and unstable labra, labral reconstruction would be performed by 84.62% of respondents if labral size was <3 mm. The majority of respondents would reconstruct calcified and non-viable, unstable labra that no longer maintained a suction seal. Surgeons performing arthroscopic hip labral treatment may utilize this comprehensive classification system, which takes into consideration patient age, labral characteristics (viability and stability) and bony morphology of the hip joint. When choosing between labral debridement, repair or reconstruction, consensus recommendations from high-volume hip preservation surgeons can enhance decision-making.

INTRODUCTION

In a patient who presents with hip or groin pain in the context of trauma, femoroacetabular impingement (FAI), capsular laxity/hip hypermobility, dysplasia or degeneration, there is a reported 22–55% prevalence of an associated labral tear [1–3]. Indeed, labral pathology represents an ever-increasing, common indication for hip arthroscopy. In the past, it was believed that the labrum had little functional importance and the appropriate treatment for symptomatic labral tears was excision [4]. However, within the last decade, there has been a paradigm shift away from the classical resection and/or debridement of symptomatic acetabular labral tears, and a move towards labral preservation [5, 6]. The inspiration for this change comes as a direct result of the better understanding of the anatomy, function and biomechanics of the hip joint, along with the development of advanced hip preservation techniques such as arthroscopic labral repair and labral reconstruction [6]. At its foundation, the main role of the labrum is to provide stability to the hip [7]. Its presence alone within the acetabular socket provides inherent stability, increasing the volume of the acetabulum by 33% [8]. Hip joint stability is a compromise between complementary static and dynamic forces that function in unison to maintain joint congruity throughout range of motion. Once labral injury is diagnosed, biomechanical evidence supports the role of restoring labral anatomy and architecture in reestablishing a more stable hip joint, with maintenance of a labral seal [9–11].

There is a plethora of studies describing improved patient-reported outcomes following hip arthroscopy in the management of intra-articular chondrolabral pathology [6, 12–16]. Existing knowledge supports labral preservation and, when appropriate, selective debridement or resection, in an effort to maintain functional hip mechanics [10, 15]. Currently, the Seldes classification is the gold-standard for the description of labral pathology; however, this classification only takes into consideration the location of the injury, either mid-substance or at the chondrolabral junction, without regard to the viability or stability of the pathologic tissue [8]. The purpose of this study was to survey high-volume hip preservation surgeons (performing >50 procedures per annum) [18–21] with regard to intra-operative decision-making of pathologic labra, including assessment of location, viability and stability. Consensus from expert surgeons' preferred treatment strategies will lead to an algorithmic approach to labral preservation and reconstruction using a new classification system. It was hypothesized that labral debridement, repair or reconstruction, in the setting of labral pathology would be a case-specific, highly important resource of treatment among high-volume hip specialist orthopedic surgeons.

MATERIALS AND METHODS

In June 2019, a cross-sectional survey questionnaire was administered to high-volume hip arthroscopy orthopedic surgeons who attended XXX conference. Based on a previous high-volume hip arthroscopy surgeon consensus, high-volume was defined as an orthopedic surgeon who is performing more than 50 hip arthroscopy procedures annually) [18–21]. Although the questionnaire itself was not a validated questionnaire, it contained a list of relevant indications hip arthroscopy surgeons consider and have debated regarding intra-operative indications dictating the decision of labral treatment.

The survey asked a series of 24 questions three times, once each for three different indications: debridement, repair reconstruction. Thus, a total of 72 questions were asked per participant. Each set of 24 questions were subcategorized based on considerations of patient age, labral size, location of tear, tear morphology, color and consistency of the labrum, lateral coverage as measured by Wiberg's lateral center-edge angle (LCEA), degree of cam morphology as measured by alpha angle, dynamic impingement testing and physical probing of the labrum (Supplementary Appendix). These attributes were selected as they were deemed to reflect the most relevant factors considered by arthroscopic hip surgeons during intra-operative decision-making for labral tear management. The questions were reported as multiple-choice questions, allowing for more than one choice with an additional section that allowed for a free text response. The participants completed their anonymous surveys either in-person or online.

The study was exempt from institutional review board approval because of the confidential and anonymous nature of the survey. Consent from each individual surgeon was obtained before participation. The lead surgeons (BGD (Benjamin G. Domb) and ACL (Ajay C. Lall)) developed the questionnaire for this study in consultation with the Institution Statistics Department. As it is a descriptive study of expert hip arthroscopy surgeon's current practice, no statistical analysis was required.

RESULTS

A total of 26 high-volume hip preservation surgeons responded to the survey and all of them completed the survey (100% response rate). The results of the three surveys are shown in Table I and Fig. 1.

Table I. Responses for each of the three surveys

Variable	*Subclass*	*Procedure [labral condition]*		
		Debridement (%) [viable and stable]	*Repair (%) [viable and unstable]*	*Reconstruction (%) [non-viable and unstable]*
Age (years)	<25	65.38	88.46	73.08
	25–40	53.85	84.62	76.92
	>40	76.92	50.00	69.23
Labral Size (mm)	<3	53.85	46.15	84.62
	3–5	50.00	84.62	42.31
	>5	61.54	84.62	50.00
Location of tear	Anterior	73.08	88.46	80.77
	Anterosuperior	76.92	84.62	96.15
	Posterior	80.77	65.38	65.38
Tear morphology	Chondrolabral junction	38.46	96.15	57.69
	Intra-substance	84.62	53.85	84.62
Color/consistency	Normal	69.23	100.00	15.38
	Calcification	34.62	30.77	92.31
	Os acetabuli	30.77	38.46	73.08
LCEA (°)	<18	19.23	57.69	53.85
	18–25	42.31	88.46	73.08
	>35	88.46	73.08	80.77
Alpha angle (°)	<60	84.62	80.77	80.77
	>60	61.54	88.46	88.46
Dynamic impingement testing	Labral seal present	88.46	80.77	26.92
	Labral seal absent	23.08	69.23	88.46
Probing of labrum	Stable	88.46	53.85	23.08
	Not stable	26.92	88.46	96.15

Surgeons could choose more than one subclass within each variable for each survey.

Patient age

Across labral treatment types, 76.92% of respondents preferred performing labral debridement in older patients (>40 years of age), provided the labra were stable and viable. In contrast, >80% of respondents preferred performing labral repair or reconstruction in younger patients (≤40 years of age) when presented with a non-viable labrum.

Labral thickness

When participants were asked to take into consideration labral size, 80.77% of respondents preferred to reconstruct labra <3 mm in thickness provided it was deemed unstable and non-viable. When labral thickness reached >3 mm, 84.62% of respondents elected to perform labral repair, provided the labrum was viable. Labral size did not seem

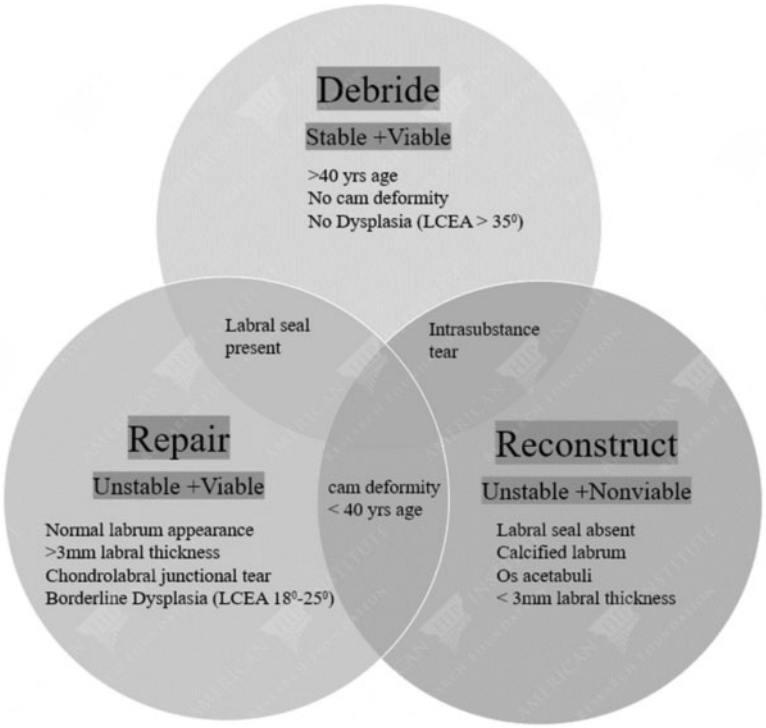

Fig. 1. Comprehensive Venn-diagram showing the cumulated results of the survey matched to a treatment modality. Each circle represents a different labral tear treatment modality, (1) *debridement;* (2) *repair*; and (3) *reconstruction*. Under each condition, surveyors were asked which indications would dictate their choice to debride, repair or reconstruct a torn labrum.

to affect decision-making for respondents when decision was taken to debride.

Labral tear location

Location did not seem to affect the decision-making of the respondents in terms of labral treatment grossly for debridement or repair. However, for a labrum that is unstable and of poor quality, 96.15% of respondents felt that the labrum would be more amenable to reconstruction if the tear is situated in the anterosuperior region compared with anterior or posterior locations.

Tear morphology

For tears located in the chondrolabral junction, most respondents (96.15%) preferred repairing the labrum. Tears found intra-substance were preferred to be either debrided by 84.62% of respondents, provided the labra were deemed stable and viable, or reconstructed by 84.62% of respondents, provided the labra were deemed unstable and non-viable.

Labral consistency

All respondents opted to repair labra that were non-viable yet stable and had normal-appearing tissue. The majority of respondents did not opt for labral reconstruction when the labrum had normal-appearing tissue. Reconstruction was more popular (92.31%) in cases of calcification of the labrum or in the presence of Os acetabuli (73.08%; Fig. 2).

Lateral center edge angle

Most respondents (88.46%) would only debride a labral tear in patients with an LCEA $> 35^{\circ}$. However, a majority of participants would opt for repair or reconstruction of a labral tear in patients that not only have adequate acetabular coverage but also present with borderline dysplasia (LCEA 18–25°), irrespective of labra viability. Patients with frank dysplasia (LCEA $<18^{\circ}$) were not considered candidates for hip arthroscopy by most respondents.

Alpha angle

Many respondents (84.62%) opted for debridement when there was no associated Cam deformity (alpha angle $> 60^{\circ}$). Consideration for alpha angle was not greatly different in indicating treatment management for most participants when considering performing labral repair or reconstruction, so long as it could be addressed appropriately.

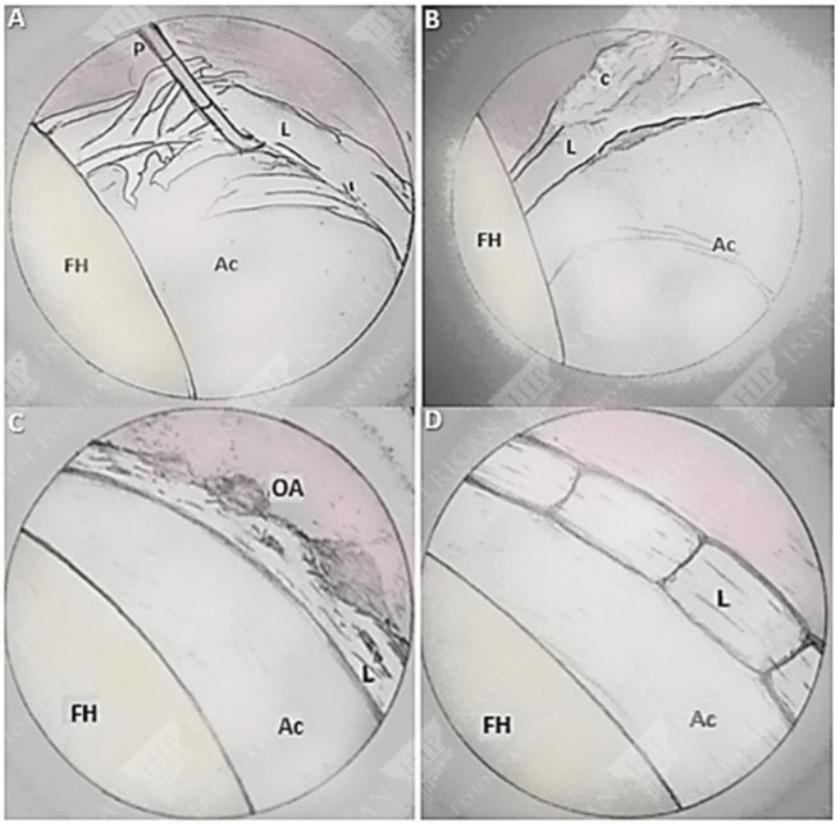

Fig. 2. Illustration of an arthroscopic view of the right hip showing (**A**) a shredded, non-viable labrum, (**B**) a labrum containing calcified deposits, (**C**) a labrum in close proximity to an Os Acetabuli and (**D**) a reconstructed labrum. Ac, acetabulum; c, calcified deposit; FH, femoral head; L, labrum; OA, Os Acetabuli; P, probe.

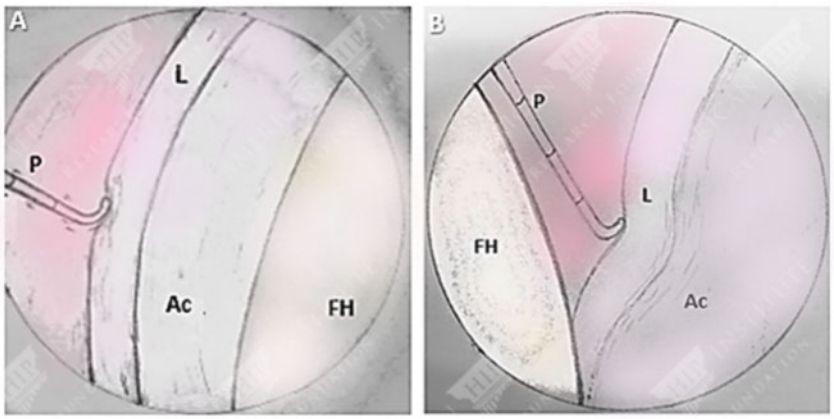

Fig. 3. Illustration of an arthroscopic view of the right hip showing (**A**) a viable and stable labrum amenable to debridement and (**B**) a viable but unstable torn labrum signified by architectural disruption by the probe, P. Ac, acetabulum; FH, femoral head; L, labrum.

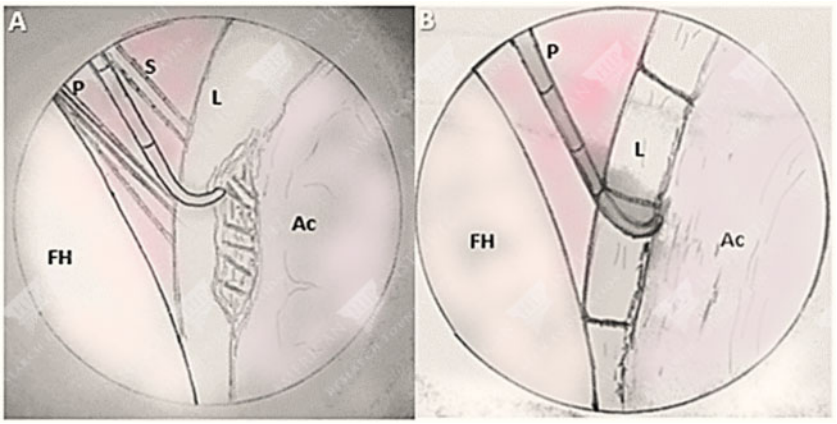

Fig. 4. Illustration of an arthroscopic view of the right hip showing (**A**) the labrum undergoing repair using sutures, and (**B**) the repaired, stable labrum unsusceptible to disruption by the probe. Ac, acetabulum; FH, femoral head; L, labrum; P, probe; S, suture.

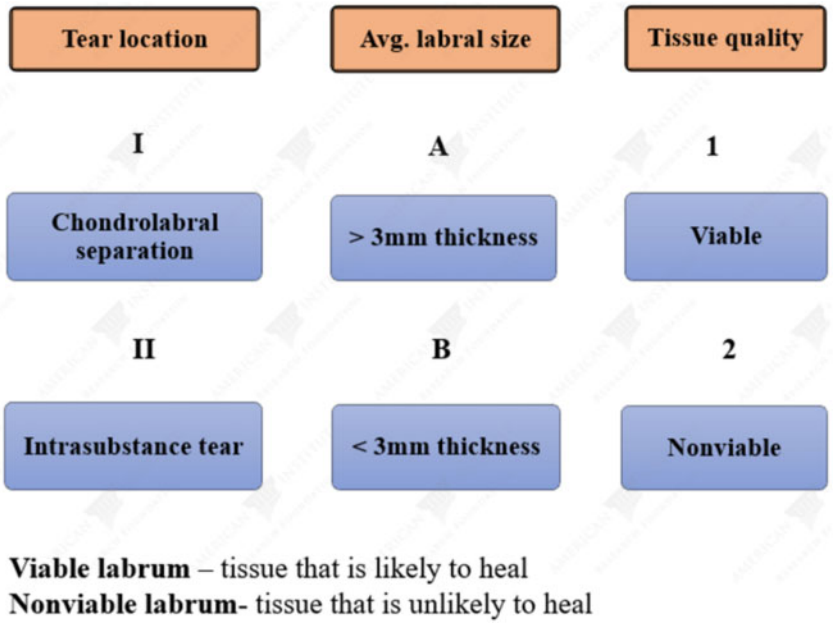

Fig. 5. Consensus-derived classification system. For example, a labral tear with chondrolabral separation, >3 mm residual thickness, and viable in appearance would be considered Type IA1. A particular labral tear treatment modality—'debridement', 'repair' or 'reconstruction' is chosen depending upon the stability of the labral tissue that is torn.

Dynamic impingement testing

With a torn labrum, most respondents would perform labral reconstruction (88.46%) when the labral seal was absent. If the labral seal was present, surgeons (88.46%) opted to debride the labrum, provided the labra was stable or repair (80.77%) the labrum, provided it was unstable.

Labral probing

Debridement was preferred (88.46%) when the labrum was stable upon probing (Fig. 3). Respondents (88.46%) preferred repairing the labrum when the labrum was found to be unstable but viable (Fig. 4), whereas they (96.15%) preferred to reconstruct the labra when it was both unstable and non-viable. Approximately one-quarter of those who responded, would reconstruct a stable labrum (23.08%).

Consensus-based classification system

After analysis of the results, an algorithmic classification system for labral tear management was derived (Fig. 5). We chose key variables identified by consensus data (labral

tear morphology [location/severity], labral size and labral tissue viability) which showed the most consensus between surgeons in delineating when they would perform either labral debridement, repair or reconstruction depending upon whether the torn labrum is stable or unstable. Subcategorization of the variables was based on observed differences between consensus findings. For example, intra-operative decision-making for labral size differed between labra <3 mm vs. labra 3–5 mm or >5 mm but did not differ between labra 3–5 mm vs. >5 mm.

DISCUSSION

The findings from this consensus study based on the survey conducted, confirm that accurate arthroscopic diagnosis of the various physical attributes of a torn labrum along with certain patient demographic and radiographic information are vital in hip preservation surgery treatment decisions. This information helped derive a classification system that may aid in effective intra-operative management of labral tears by helping improve decision-making. Utilizing this comprehensive classification system (Fig. 5) along with the decision tree provided in the Venn diagram (Fig. 1), using patient specific attributes such as age, labral characteristics (viability and stability) and bony morphology of the hip joint; hip arthroscopic surgeons may choose appropriate labral treatment between debridement, repair or reconstruction.

In the setting of a stable and viable labra, the majority of respondents agreed to debride the labral tear if it was in a patient above 40 years of age and was considered of normal looking quality, posteriorly located or intra-substance (i.e. Type IIA1 or IIB1) provided the labral seal was intact, there was normal acetabular coverage and there was no associated cam lesion. If a significant cam lesion was found to be associated with the labral tear, the respondents preferred to restore the labrum either by repair or reconstruction while addressing the cam appropriately. In the setting of an unstable yet viable labrum, most respondents were in agreement to repair the torn labrum provided the patient's age was below 40 years, the labrum was more than 3 mm in thickness, the tear was located anteriorly or near the chondrolabral junction, and the tissue was of normal quality (i.e. Type IA1), even if borderline dysplasia existed. Labral augmentation or reconstruction (segmental or circumferential) was the preferred approach by most of the respondents if the torn labrum was not viable and was unstable in nature. Moreover, respondents were more inclined to reconstruct the torn labrum if the labral thickness was less than 3 mm, the labrum being non-viable, that was calcified (i.e. type IB2 or IIB2), Os acetabuli was present, the tear was situated anterosuperiorly, or the labral seal was absent.

It was previously thought that the acetabular labrum was a vestigial remnant that, when damaged, caused 'catching' and 'locking' of the joint [22]. In order to prevent pain and overall sense of instability within the hip, historically, selective resection and labral debridement were the mainstay treatment for torn labrum. Analogous to the acetabular labrum, the history of the management of meniscal tears followed a similar course. Both structures are important in maintenance of a pressurized fluid layer that improves load distribution within the joint, thereby protecting underlying articular cartilage [23–25]. Long-term results of subtotal and total meniscectomy have been published showing clear progression to arthritis of the joint and inferior outcomes, recommended meniscal preservation approach, particularly in young patients with traumatic meniscal injury [26]. A similar trend emerged with regard to published patient reported outcomes following hip labral preservation by repair or reconstruction, having superior outcomes and lower conversion rates to total hip arthroplasty (THA), compared with patients who underwent segmental resection and or debridement [12, 27, 28]. However, with narrowed indications and appropriate patient selection, recent literature has shown labral debridement to produce patient outcomes comparable to labral preservation techniques [17, 29]. These indications came as a direct result of studies delineating the determinants of poor outcomes during labral management. Meftah *et al.* [13] showed that labral debridement in patients with residual post-operative cam type FAI produces inferior outcomes. However, when the underlying bony pathology is accurately managed, selective debridement can produce improved patient-reported outcome scores. Furthermore, a number of biomechanical studies that focused on labral suction seal which helps maintain a pressurized fluid layer, improving load distribution and overall stability within the hip joint, suggested that reduction of labral thickness may disrupt the physiological seal between the labrum and femoral head [25, 30–32]. Several other studies have shown an association between acetabular labral tears and early onset osteoarthritis. When the normal labral architecture is disrupted, contact stress between the acetabulum and femoral head may increase as much as 92% [33–35].

Philippon *et al.* [36] published a simplified algorithm for acetabular labral tears in 2012 based solely on intra-operative findings of the labrum. They advocated for debridement to be performed only if there was enough tissue to maintain normal labral function and repair/reconstruction of torn or detached labra. Herickhoff and Safran [37] also examined the surgical decision-making for labral repair and

debridement and found that intra-operative appearance of the labrum is the most important factor. They also realized that the indications to repair a torn acetabular labrum are highly variable among hip arthroscopic surgeons. Hence, this study attempts to simplify a complex subject into a comprehensive scheme for addressing labral tears. To further expand on the aforementioned studies, our expert consensus study describes indications for repair and reconstruction, as opposed to only labral debridement or repair. In cases where the labrum is found to be shredded, of poor consistency (i.e. calcified), or unstable, >80% of respondents believe other means of treatment should be sought in order to restore this suction seal relationship, consequently improving patient outcomes.

Labral reconstruction is a relatively new technique for addressing labral tears. Due to the technically demanding nature of the procedure, only few reports of short-term, let alone mid-term, outcomes are published to date [38–42]. Indications for labral reconstruction have revolved around labra that are non-viable and hence, not amenable to repair. What constitutes a non-viable labrum is not clearly defined within the literature. Maldonado *et al.* [31] performed the only consensus study specifically examining the indications, graft type and technique for labral reconstruction amongst high-volume hip preservation surgeons [18–21]. Similar to the present study, labra that were of poor tissue quality were indicated for labral reconstruction by the majority of respondents. Labra that previously failed repair or inadequate reconstruction were deemed non-viable and were also indicated for labral reconstruction. In addition, our study advocates for labral reconstruction in young adults with compromised labral consistency, as in cases of Os acetabuli or labral calcifications. Additionally, labral reconstruction was preferred (by >75% of respondents) if labral thickness is <3 mm, there is an absent labral seal, and/or the tear is located anterosuperiorly. Presumably, anterosuperior location of non-viable labra having an impact on decision-making may be due to the ease of joint access for accurate diagnostics earlier in the learning curve [43, 44]. Moreover, labral management was discouraged in patients with frank dysplasia, presumably because they are indicated for periacetabular osteotomy rather than isolated hip arthroscopy. When comparing a systematic review performed by Mana *et al.* [45] to one performed by Ayeni *et al.* [38], a trend of improvement in patient outcomes and decreased failure rates and/or conversion to THA within the last 5 years in patients undergoing labral reconstruction was revealed. However, the indications for performing the procedure (young, active adults with a 'functional' labrum) were yet to be fully elucidated. With more comprehensive indications for labral reconstruction via expert consensus, the field of hip preservation can theoretically expect more reproducible patient reported outcomes following this technically demanding procedure.

In summary, taking into consideration patient age, labral characteristics (viability and stability), as well as bony morphology of the hip joint, optimal surgical management of injured labra follow consensus-based algorithms. To expand on the current literature, this study presents a simple, comprehensive intra-operative diagnostic classification system (Fig. 5), based on consensus recommendations from high-volume hip preservation surgeons [18–21]. This novel system considers location (I or II), labral thickness (A or B) and viability (1 or 2). As an example, a labrum with an unstable tear pattern of chondrolabral separation, >3 mm residual thickness, and viable appearance would be considered a Type IA1 labrum, which is amenable to labral repair. Whether performing labral debridement, repair or reconstruction, we strongly believe this classification system can aid arthroscopic hip surgeons and enhance intra-operative decision-making, in an attempt to achieve reproducible improvements in patient outcomes.

Strengths

Given the expertise of study respondents, this study contains a number of strengths that should be highlighted. First, this is the first consensus study to collect aggregate recommendations of high-volume arthroscopic hip surgeons regarding indications for labral debridement, repair and reconstruction. Moreover, the circumstances for each management pathway were used to create an algorithmic classification system for labral pathology. The results of this study provide clinicians with consensus-based criteria readily applicable in the intra-operative setting.

Limitations

Inherent limitations of this consensus study exist and need to be acknowledged. The questionnaire used for survey purposes was not a validated one. This study presents opinions and the expertise of high-volume specialized arthroscopic hip surgeons, which are not necessarily generalizable. Though based on previous publications [18–21], the number of cases required to define a high-volume hip arthroscopy surgeon, was arbitrary and requires validation. Although there are several physical attributes of a torn labrum that were surveyed and could be considered, only three variables (Seldes type, thickness and tissue viability) were taken into consideration while coming up with the classification, which we agree is an important limitation of this study. However, we strongly feel that these are the most commonly studied attributes of a torn labrum, based

upon which most treatments are performed across the published literature. Although our classification did not include stable and unstable categories, we believe the decision tree provided in the Venn diagram would complement the classification system allowing surgeons to choose appropriate labral treatment. Last, the survey assumes that each surgeon will interpret the scenarios similarly.

CONCLUSION

Surgeons performing hip arthroscopy for labral management may utilize the comprehensive classification system provided here, which takes into consideration patient age, labral characteristics (viability and stability) and bony morphology of the hip joint. When choosing between labral debridement, repair or reconstruction, consensus recommendations from high-volume hip preservation surgeons can enhance decision-making.

SUPPLEMENTARY DATA

Supplementary data are available at *Journal of Hip Preservation Surgery* online.

Data Availability

The data underlying this article will be shared on reasonable request to the corresponding author.

FUNDING

This study was performed at the American Hip Institute.

CONFLICT OF INTEREST STATEMENT

Dr. Domb reports grants and other from American Orthopedic Foundation, during the conduct of the study; personal fees from Adventist Hinsdale Hospital, personal fees and non-financial support from Amplitude, grants, personal fees and non-financial support from Arthrex, personal fees and non-financial support from DJO Global, grants from Kaufman Foundation, grants, personal fees, non-financial support, from Medacta, grants, personal fees, non-financial support and other from Pacira Pharmaceuticals, grants, personal fees, non-financial support and other from Stryker, grants from Breg, personal fees from Orthomerica, grants, personal fees, non-financial support and other from Mako Surgical Corp, grants and non-financial support from Medwest Associates, grants from ATI Physical Therapy, grants, personal fees and non-financial support from St. Alexius Medical Center, grants from Ossur, outside the submitted work; In addition, Dr. Domb has a patent 8920497 - Method and instrumentation for acetabular labrum reconstruction with royalties paid to Arthrex, a patent 8708941 - Adjustable multi-component hip orthosis with royalties paid to Orthomerica and DJO Global, and a patent 9737292 - Knotless suture anchors and methods of tissue repair with royalties paid to Arthrex and Dr. Domb is the Medical Director of Hip Preservation at St. Alexius Medical Center, the Clinical Instructor at the University of Illinois College of Medicine, a board member for the American Hip Institute Research Foundation, AANA Learning Center Committee, the Journal of Hip Preservation Surgery, the Journal of Arthroscopy; has had ownership interests in the American Hip Institute, Hinsdale Orthopedic Associates, Hinsdale Orthopedic Imaging, SCD#3, North Shore Surgical Suites, and Munster Specialty Surgery Center. Dr. Lall reports grants, personal fees and non-financial support from Arthrex, non-financial support from Iroko, non-financial support from Medwest, non-financial support from Smith & Nephew, grants and non-financial support from Stryker, non-financial support from Vericel, non-financial support from Zimmer Biomet, personal fees from Graymont Medical, outside the submitted work; and Dr. Lall is the Co-Medical Director of Hip Preservation at St. Alexius Medical Center, the Clinical Instructor at the University of Illinois College of Medicine, and member of the AANA Learning Center Committee. Dr. Maldonado reports non-financial support from Arthrex, non-financial support from Stryker, non-financial support from Smith & Nephew, non-financial support from Ossur, outside the submitted work; and Dr. Maldonado is an editorial board member of the Journal of Arthroscopy. Dr. Meghpara reports non-financial support from Smith & Nephew, non-financial support from Stryker, non-financial support from Arthrex, outside the submitted work.Dr. Shapira reports non-financial support from Arthrex, non-financial support from Stryker, non-financial support from Smith & Nephew, non-financial support from Ossur, outside the submitted work. Dr. Rosinsky reports non-financial support from Arthrex, non-financial support from Stryker, non-financial support from Smith & Nephew, non-financial support from Ossur, outside the submitted work. Dr. Hartigan reports food and beverage from Desert Mountain Medical, Goode Surgical, Arthrex, Zimmer Biomet Holdings; travel and lodging from Styrker, Smith & Nephew, Arthrex, Desert Mountain Medical; grant support from Arthrex; educational support from Biomet Orthopedics, Smith & Nephew, Arthrex, Goode Surgical; and non-consulting fees from Arthrex. Dr. Krych reports food and beverage from Arthrex, Gemini Medical, Ceterix Orthopedics; travel and lodging from Arthrex and Musculoskeletal Transplant Foundation; grant support from Exactech; Royalty from Arthrex; non-consulting fees from Arthrex; educational support from Arthrex; consulting fees from Depuy Orthopaedics, Arthrex; honoraria from Vericel

Corporation, Musculoskeletal Transplant Foundation; consulting fees from Joint Restoration Foundation and Responsive Arthroscopy; honoraria from Joint Restoration Foundation. Dr. Levy reports food and beverage from Arthrex, Smith & Nephew, Linvatec; educational support from Arthrex; travel and lodging from Arthrex, Smith & Nephew, Linvatec; Royalty from Arthrex; consulting fees from Arthrex, Smith & Nephew; and non-consulting fees from Arthrex, Smith & Nephew, Linvatec Corporation.

REFERENCES

1. McCarthy JC, Noble PC, Schuck MR *et al.* The Otto E. Aufranc Award: the role of labral lesions to development of early degenerative hip disease. *Clin Orthop Relat Res* 2001; 393: 25–37.
2. Ejnisman L, Philippon MJ, Lertwanich P. Acetabular labral tears: diagnosis, repair, and a method for labral reconstruction. *Clinics in Sports Medicine* 2011; **30**: 317–29.
3. Narvani AA, Tsiridis E, Kendall S *et al.* A preliminary report on prevalence of acetabular labrum tears in sports patients with groin pain. *Knee Surg Sports Traumatol Arthrosc* 2003; **11**: 403–8.
4. Kelly BT, Weiland DE, Schenker ML *et al.* Arthroscopic labral repair in the hip: surgical technique and review of the literature. *Arthroscopy* 2005; **21**: 1496–504.
5. Forster-Horvath C, von Rotz N, Giordano BD *et al.* Acetabular labral debridement/segmental resection versus reconstruction in the comprehensive treatment of symptomatic femoroacetabular impingement: a systematic review. *Arthroscopy* 2016; **32**: 2401–15.
6. Domb BG, Yuen LC, Ortiz-Declet V *et al.* Arthroscopic labral base repair in the hip: 5-year minimum clinical outcomes. *Am J Sports Med* 2017; **45**: 2882–90.
7. Ferguson SJ, Bryant JT, Ganz R *et al.* The acetabular labrum seal: a poroelastic finite element model. *Clin Biomech (Bristol, Avon)* 2000; **15**: 463–8.
8. Seldes RM, Tan V, Hunt J *et al.* Anatomy, histologic features, and vascularity of the adult acetabular labrum. *Clin Orthop Relat Res* 2001; 382: 232–40.
9. Philippon MJ, Nepple JJ, Campbell KJ *et al.* The hip fluid seal–Part I: the effect of an acetabular labral tear, repair, resection, and reconstruction on hip fluid pressurization. *Knee Surg Sports Traumatol Arthrosc* 2014; **22**: 722–9.
10. Nepple JJ, Philippon MJ, Campbell KJ *et al.* The hip fluid seal–Part II: the effect of an acetabular labral tear, repair, resection, and reconstruction on hip stability to distraction. *Knee Surg Sports Traumatol Arthrosc* 2014; **22**: 730–6.
11. Cadet ER, Chan AK, Vorys GC *et al.* Investigation of the preservation of the fluid seal effect in the repaired, partially resected, and reconstructed acetabular labrum in a cadaveric hip model. *Am J Sports Med* 2012; **40**: 2218–23.
12. Krych AJ, Kuzma SA, Kovachevich R *et al.* Modest mid-term outcomes after isolated arthroscopic debridement of acetabular labral tears. *Knee Surg Sports Traumatol Arthrosc* 2014; **22**: 763–7.
13. Meftah M, Rodriguez JA, Panagopoulos G *et al.* Long-term results of arthroscopic labral debridement: predictors of outcomes. *Orthopedics* 2011; **34**: e588–92.
14. Amar E, Sampson TG, Sharfman ZT *et al.* Acetabular labral reconstruction using the indirect head of the rectus femoris tendon significantly improves patient reported outcomes. *Knee Surg Sports Traumatol Arthrosc* 2018; **26**: 2512–8.
15. Domb BG, Battaglia MR, Perets I *et al.* Minimum 5-year outcomes of arthroscopic hip labral reconstruction with nested matched-pair benchmarking against a labral repair control group. *Am J Sports Med* 2019; **47**: 2045–55.
16. Ben Tov T, Amar E, Shapira A *et al.* Clinical and functional outcome after acetabular labral repair in patients aged older than 50 years. *Arthroscopy* 2014; **30**: 305–10.
17. Chen AW, Yuen LC, Ortiz-Declet V *et al.* Selective debridement with labral preservation using narrow indications in the hip: minimum 5-year outcomes with a matched-pair labral repair control group. *Am J Sports Med* 2018; **46**: 297–304.
18. Gupta A, Suarez-Ahedo C, Redmond JM *et al.* Best practices during hip arthroscopy: aggregate recommendations of high-volume surgeons. *Arthroscopy* 2015; **31**: 1722–7.
19. Chen AW, Steffes MJ, Laseter JR *et al.* The education and training of future hip preservation surgeons: aggregate recommendations of high-volume surgeons. *J Hip Preserv Surg* 2018; **5**: 307–11.
20. Chen AW, Steffes MJ, Laseter JR *et al.* How has arthroscopic management of the iliopsoas evolved, and why? A survey of high-volume arthroscopic hip surgeons. *J Hip Preserv Surg* 2020; **7**: 322–8.
21. Domb BG, Stake CE, Finch NA *et al.* Return to sport after hip arthroscopy: aggregate recommendations from high-volume hip arthroscopy centers. *Orthopedics* 2014; **37**: e902–5.
22. Dehao BW, Bing TK, Young JLS. Understanding the ligamentum teres of the hip: a histological study. *Acta Ortop Bras* 2015; **23**: 29–33.
23. Makris EA, Hadidi P, Athanasiou KA. The knee meniscus: structure-function, pathophysiology, current repair techniques, and prospects for regeneration. *Biomaterials* 2011; **32**: 7411–31.
24. Bert JM. Editorial commentary: knee meniscus and hip labrum: the dilemma of degenerative tears. *Arthroscopy* 2018; **34**: 2709–10.
25. Ferguson SJ, Bryant JT, Ganz R *et al.* An in vitro investigation of the acetabular labral seal in hip joint mechanics. *J Biomech* 2003; **36**: 171–8.
26. Salata MJ, Gibbs AE, Sekiya JK. A systematic review of clinical outcomes in patients undergoing meniscectomy. *Am J Sports Med* 2010; **38**: 1907–16.
27. Krych AJ, Thompson M, Knutson Z *et al.* Arthroscopic labral repair versus selective labral debridement in female patients with femoroacetabular impingement: a prospective randomized study. *Arthroscopy* 2013; **29**: 46–53.
28. Tibor LM, Leunig M. Labral resection or preservation during FAI treatment? A systematic review. *HSS J* 2012; **8**: 225–9.
29. Menge TJ, Briggs KK, Dornan GJ *et al.* Survivorship and Outcomes 10 Years Following Hip Arthroscopy for Femoroacetabular Impingement: labral Debridement Compared with Labral Repair. *J Bone Joint Surg Am* 2017; **99**: 997–1004.

30. Song Y, Ito H, Kourtis L *et al.* Articular cartilage friction increases in hip joints after the removal of acetabular labrum. *Journal of Biomechanics* 2012; **45**: 524–30.
31. Maldonado DR, Lall AC, Walker-Santiago R *et al.* Hip labral reconstruction: consensus study on indications, graft type and technique among high-volume surgeons. *J Hip Preserv Surg* 2019; **6**: 41–9.
32. Storaci HW, Utsunomiya H, Kemler BR *et al.* The hip suction seal, part i: the role of acetabular labral height on hip distractive stability. *Am J Sports Med* 2020; **48**: 2726–32.
33. Altenberg AR. Acetabular labrum tears: a cause of hip pain and degenerative arthritis. *South Med J* 1977; **70**: 174–5.
34. Robertson WJ, Kadrmas WR, Kelly BT. Arthroscopic management of labral tears in the hip: a systematic review of the literature. *Clin Orthop Relat Res* 2007; **455**: 88–92.
35. Ferguson SJ, Bryant JT, Ganz R *et al.* The influence of the acetabular labrum on hip joint cartilage consolidation: a poroelastic finite element model. *J Biomech* 2000; **33**: 953–60.
36. Philippon MJ, Peixoto LP, Goljan P. Acetabular labral tears: debridement, repair, reconstruction. *Oper Tech Sports Med* 2012; **20**: 281–6.
37. Herickhoff PK, Safran MR. Surgical decision making for acetabular labral tears: an international perspective. *Orthop J Sports Med* 2018; **6**: 2325967118797324.
38. Ayeni OR, Alradwan H, de Sa D *et al.* The hip labrum reconstruction: indications and outcomes–a systematic review. *Knee Surg Sports Traumatol Arthrosc* 2014; **22**: 737–43.
39. White BJ, Herzog MM. Labral Reconstruction: when to Perform and How. *Front Surg* 2015; **2**: 27.
40. White BJ, Patterson J, Herzog MM. Bilateral hip arthroscopy: direct comparison of primary acetabular labral repair and primary acetabular labral reconstruction. *Arthroscopy* 2018; **34**: 433–40.
41. Perets I, Hartigan DE, Chaharbakhshi EO *et al.* Circumferential labral reconstruction using the knotless pull-through technique-surgical technique. *Arthrosc Tech* 2017; **6**: e695–8.
42. Domb BG, El Bitar YF, Stake CE *et al.* Arthroscopic labral reconstruction is superior to segmental resection for irreparable labral tears in the hip: a matched-pair controlled study with minimum 2-year follow-up. *Am J Sports Med* 2014; **42**: 122–30.
43. Groh MM, Herrera J. A comprehensive review of hip labral tears. *Curr Rev Musculoskelet Med* 2009; **2**: 105–17.
44. Kim K-W, Baek J-H, Ha Y-C. Prevalence and locations of acetabular labral sulcus in patients undergoing arthroplasty for hip fracture. *Arthroscopy* 2012; **28**: 1373–80.
45. Al Mana L, Coughlin RP, Desai V *et al.* The hip labrum reconstruction: indications and outcomes-an updated systematic review. *Curr Rev Musculoskelet Med* 2019; **12**: 156–65.