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Comparison of early outcomes of arthroscopic labral repair or debridement

A STUDY USING THE UK NON-ARTHROPLASTY HIP REGISTRY DATASET

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Aims
This study uses prospective registry data to compare early patient outcomes following arthroscopic repair or debridement of the acetabular labrum.

Methods
Data on adult patients who underwent arthroscopic labral debridement or repair between 1 January 2012 and 31 July 2019 were extracted from the UK Non-Arthroplasty Hip Registry. Patients who underwent microfracture, osteophyte excision, or a concurrent extra-articular procedure were excluded. The EuroQol five-dimension (EQ-5D) and International Hip Outcome Tool 12 (iHOT-12) questionnaires were collected preoperatively and at six and 12 months postoperatively. Due to concerns over differential questionnaire non-response between the two groups, a combination of random sampling, propensity score matching, and pooled multivariable linear regression models were employed to compare iHOT-12 improvement.

Results
A total of 2,025 labral debridements (55%) and 1,659 labral repairs (45%) were identified. Both groups saw significant ($p < 0.001$) EQ-5D and iHOT-12 gain compared to preoperative scores at 12 months (iHOT-12 improvement: labral repair = +28.7 (95% confidence interval (CI) 26.4 to 30.9), labral debridement = +24.7 (95% CI 22.5 to 27.0)), however there was no significant difference between procedures after multivariable modelling. Overall, 66% of cases achieved the minimum clinically important difference (MCID) and 48% achieved substantial clinical benefit at 12 months.

Conclusion
Both labral procedures were successful in significantly improving early functional outcome following hip arthroscopy, regardless of age or sex. Labral repair was associated with superior outcomes in univariable analysis, however there was no significant superiority demonstrated in the multivariable model.

Level of evidence: III

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Introduction
The labrum is a soft-tissue structure projecting from the acetabular rim of the hip joint. It plays an important role in the maintenance of normal hip stability, cartilage consolidation, maintenance of a suction seal, and articular lubrication.[1] These functions are compromised in the event of a labral tear,[2-11] and the tear itself may contribute directly to pain due to the structure's nociceptive nerve supply, which is richest close to the acetabular attachment.[12,13] Labral injury is common and may occur in up to half of patients who present with mechanical hip symptoms.[14] A tear may occur in isolation or, more commonly, in association

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Table I. Concurrent acetabular and femoral procedures recorded by labral procedure group.

Procedure group	Labral repair (n = 1,659)		Labral debridement (n = 2,025)	
	Procedure type	**n (%)**	**Procedure type**	**n (%)**
Acetabular	Acetabular labral repair*	1,659 (100)	Acetabular labral debridement*	1,822 (90)
	Acetabular cartilage debridement	452 (27.2)	Acetabular cartilage debridement	505 (24.9)
	Acetabular rim recession (labral reattachment)	273 (16.5)	Acetabular rim recession (simple)	378 (18.7)
	Acetabular rim recession (simple)	251 (15.1)	Acetabular labral resection*	258 (12.7)
	Subspinous resection	54 (3.3)	Acetabular cartilage reattachment	103 (5.1)
	Acetabular cartilage reattachment	8 (0.5)	Acetabular rim recession (labral reattachment)	53 (2.6)
			Subspinous resection	27 (1.3)
Femoral	Cam removal	1,334 (80.4)	Cam removal	1,333 (65.8)
	Femoral cartilage debridement	17 (1)	Femoral cartilage debridement	44 (2.2)
			chondral treatment	10 (0.5)

Note that multiple procedures may be recorded on the same patient (e.g. labral debridement and labral resection).
n (%) refers to the number of each acetabular or femoral procedure performed as a proportion of the number of patients in the labral procedure group (and not as a proportion of the number of procedures).
*Denotes procedures used to define surgical groups.

with a predisposing condition including capsular laxity, dysplasia and, more frequently, due to femoroacetabular impingement (FAI) arising from abnormal contact between the femoral head and the acetabulum, which may progress to articular injury and subsequent early secondary osteoarthritis (OA).[15]

There is debate as to the benefit of labral repair (including reattachment) over debridement or resection; some studies report improved outcomes following repair, and others report no clinically meaningful difference in clinical outcomes between these two procedures.[16-20] Existing studies are largely limited to small case series from specialist centres or small randomised controlled trials, the results of which may not be generalisable to a non-specialist practice. There is therefore a need for a large sample population study to report outcomes of these labral procedures.

The Non-Arthroplasty Hip Registry (NAHR) is a UK registry which has prospectively collected data for patients treated with open and arthroscopic non-arthroplasty hip surgery since 2012.[21] The aim of this study was to use data from the NAHR to 1) report pre- and postoperative outcome scores up to 12 months for patients who underwent arthroscopic labral repair or labral debridement, and 2) to compare patient-reported outcomes between these two cohorts, including by age and sex.

Methods

Approval for this study was granted following a standardsed procedure and review by the NAHR user group.[22] Ethical approval was not required for this study. NAHR data submission is open to all NHS and private hospitals in the UK, and can be entered electronically via a dedicated and secure portal by surgeons who have been registered as NAHR users.[22]

All adult patients (> 18 years) in whom an arthroscopic labral debridement (acetabular procedure recorded as 'debridement' or 'resection') or labral repair, in addition to any concurrent procedure to treat FAI pathology, was recorded between 1 January 2012 and 31 July 2019, were extracted from the NAHR dataset in August 2020 after the following exclusions: 1) cases where both labral repair AND debridement were both recorded during the same procedure; 2) patients with other intra-articular pathology as evidenced by concurrently recorded procedures, including osteophyte excision, microfracture, or acetabular grafting (we did not exclude patients based on intraoperative grading of OA); 3) any patient who underwent a concurrent procedure which was unclassified (e.g. "Other" femoral or acetabular procedure); 4) patients who underwent concurrent extra-articular procedure (including psoas release, trochanteric bursa debridement, loose body removal, iliotibial-band release, biopsy and gluteal tendon repair, and femoral core decompression); and 5) cases in which there was a prior or subsequent (e.g. revision) procedure recorded on the same hip within the NAHR.

Patient and surgical factors. Patient demographics and data related to diagnosis and surgical procedure were collected and uploaded by surgeons or their deputy using a standardized form. Concurrent femoral and acetabular procedures performed were also determined for all patients (Table I). To stratify by FAI pathology, arthroscopies were classified into four groups dependent upon the index procedure performed for FAI, which comprised 1) 'Cam': excision of cam lesion (with no recorded procedure to treat pincer pathology during the same surgery); 2) 'Pincer': resection of an acetabular or subspinous pincer lesion (with no recorded procedure to treat cam pathology during the same surgery); 3) 'Mixed': excision of

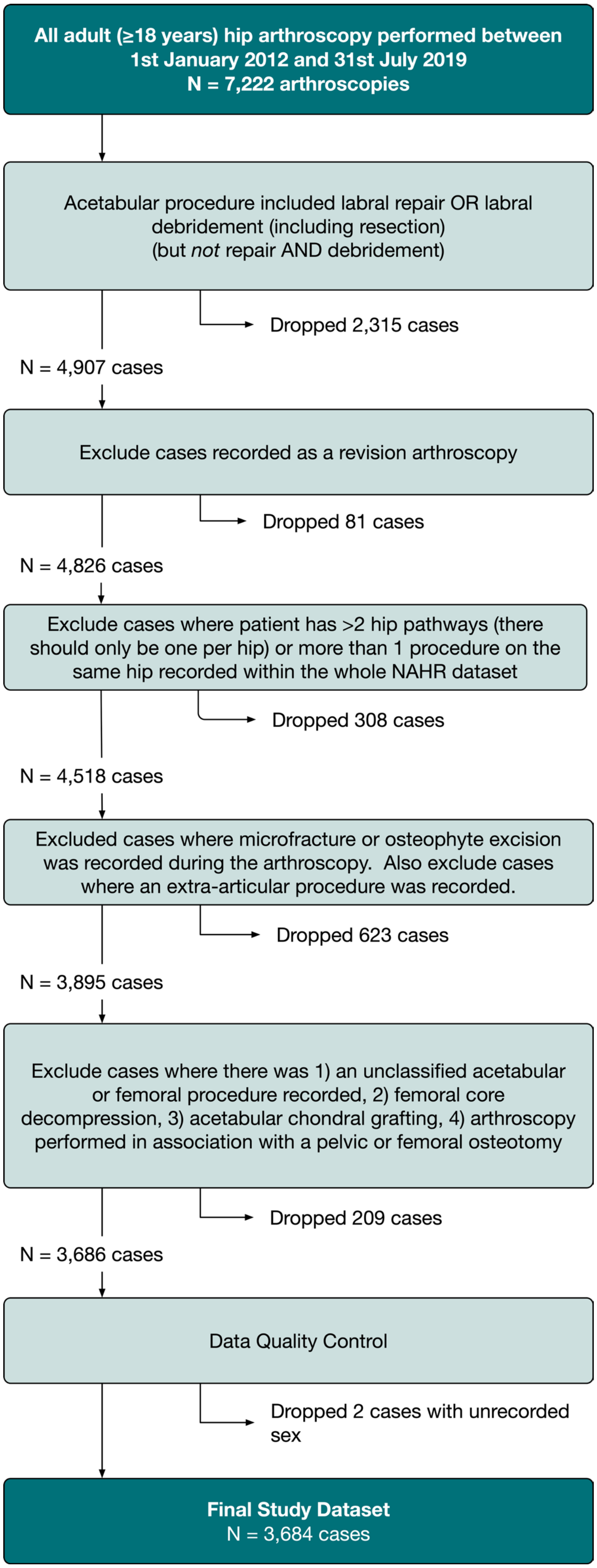

Fig. 1

Study flow diagram. NAHR, Non-Arthroplasty Hip Registry.

both a cam and pincer lesion during the same operation; and 4) 'None' – where no procedure was recorded to address an impingement lesion.

Clinical outcomes. Patients who consented to data collection received online questionnaires to determine patient-reported outcome measures (PROMs), including the EuroQol five-dimension questionnaire (EQ-5D) and the International Hip Outcome Tool 12 (iHOT-12), preoperatively and at six and 12 months postoperatively. The EQ-5D is the five-point question discriminator associated with the EQ-5D five-level questionnaire (EQ-5D-5L). The iHOT-12, a short version of iHOT-33, is a tool for the assessment of non-arthritic hip problems in young, active patients. A mean visual analogue scale score for the individual items of the iHOT-12 is calculated using a validated method.[23]

For patients who returned both preoperative and postoperative iHOT-12 scores, we determined the score improvement by calculating the difference between these two values, which represents our primary outcome. We report the proportion who had had an increase of13 points and 28 points – corresponding to the literature reported thresholds for minimum clinically important difference (MCID) and substantial clinical benefit (SCB), respectively, in addition to reporting the proportion of cases achieving iHOT-12 improvement thresholds between 0 and60.[24,25]

Statistical analysis. Data for BMI were cleaned by allocating all cases with a reported BMI greater than 60 kg/m^2 to a 'missing' group. Categorical data were compared using the chi-squared test. Between-group comparisons of continuous data were performed using the independent-samples *t*-test. Within-group comparisons of continuous data (e.g. 12-month iHOT-12 score improvement) were performed using the paired *t*-test. BMI was consolidated into three groups for the purpose of the multivariable modelling. The primary outcome measure was iHOT-12 improvement versus preoperative baseline at 12 months. A combination of random sampling, propensity score matching, and pooled multivariable linear regression modelling were used to attempt to mitigate bias that may arise due to differences in follow-up rates between labral procedure groups, and is described fully in Supplementary Material. Statistical analysis was performed in STATA (Release 15; StataCorp, USA) and R (R Foundation for Statistical Computing, Austria) and a p-value of < 0.05 was deemed significant.

Results

A total of 3,684 hip arthroscopies comprising 2,025 labral debridements (55%) and 1,659 labral repairs (45%) were identified, representing 75% (3,684 of 4,907) of all cases in which one of these discrete procedures was recorded in the NAHR during the period of observation (Figure 1). There was increased use of labral repair techniques in

Table II. Demographic details by labral procedure group.

Variable	Labral procedure			p-value
	Labral repair	**Labral debridement**	**Overall**	
Cases, n (%)	1,659 (45)	2,025 (55)	3,684 (100)	
Mean age, yrs (SD)	35.2 (10.4)	37.3 (10.4)	36.4 (10.4)	< 0.001*
Sex, n (%)				< 0.001†
Female	1,048 (63.2)	1,132 (55.9)	2,180 (59.2)	
Male	611 (36.8)	893 (44.1)	1,504 (40.8)	
Mean BMI, kg/m² (SD)‡	25.3 (4.5)	26.1 (4.7)	25.7 (4.6)	< 0.001*
BMI group, n (%)				< 0.001†
< 25 kg/m²	584 (35.2)	454 (22.4)	1,038 (28.2)	
25 to 30 kg/m²	348 (21.0)	363 (17.9)	711 (19.3)	
≥ 30 kg/m²	152 (9.2)	183 (9.0)	335 (9.1)	
Missing	575 (34.7)	1,025 (50.6)	1,600 (43.4)	
FAI type, n (%)				< 0.001†
Cam	865 (52.1)	1,015 (50.1)	1,880 (51.0)	
Pincer	86 (5.2)	120 (5.9)	206 (5.6)	
Mixed	469 (28.3)	318 (15.7)	787 (21.4)	
None	239 (14.4)	572 (28.2)	811 (22.0)	

*Independent-samples *t*-test.
†Chi-squared test.
‡Data available for 1,084 patients (65.3%) in the labral repair group, 1,000 patients (49.4%) in the labral debridgement group, and 2,084 patients overall (56.6%).

favour of labral debridement over time (repair vs debridement: 2012 = 9% vs 91%; 2018 = 63% vs 37%; Supplementary Figure c). Overall, 59% (2,180) of all cases were female, with a slightly higher proportion in the labral repair (63%; n = 1,048) versus the debridement group (56%; n = 1,132) (p < 0.001, chi-squared test) (Table II). Patients who underwent labral repair were significantly younger and had lower BMI compared to those who underwent labral debridement; however BMI was missing in half of all cases. Overall, iHOT-12 questionnaires were returned for 78% (2,873) preoperatively, 41% at six months, and 38% at 12 months, however a substantially smaller proportion were available for follow-up in the labral debridement group at each timepoint (Table III).

Outcome by labral procedure. Labral repair and debridement groups started from a similar baseline iHOT-12 score (repair = 32.2 (95% CI 31.3 to 33.1), debridement = 31.9 (95% CI 30.9 to 32.8), Table III). The labral repair group achieved significantly higher raw iHOT-12 scores at six months (repair = 58.9 (95% CI 57.0 to 60.8), debridement = 55.9 (95% CI 54.0 to 57.9); p = 0.037, independent-samples *t*-test) and 12 months (repair = 61.9 (95% CI 59.8 to 64.0), debridement = 57.4 (95% CI 55.3 to 59.6); p = 0.004, independent-samples *t*-test) postoperatively (Figure 2).

Both groups saw significant (p < 0.001, paired *t*-test) iHOT-12 gain compared to preoperative baseline scores at six months (repair = +27.2 (95% CI 25.2 to 29.2), debridement = +25.0 (95% CI 22.9 to 27.1)) which was maintained at 12 months (repair = +28.7 (95% CI 26.4 to 30.9), debridement = +24.7 (95% CI 22.5 to 27.0)) with improvement being significantly greater in the repair group by 12 months (p = 0.015, independent-samples *t*-test). EQ-5D Index scores also showed significant improvement from baseline for both groups (p < 0.001, paired *t*-test), however there were no statistically significant between-group differences in either raw scores or magnitude of improvement at six or 12 months.

Overall, 65.5% (811 of 1,238 cases returning pre- and postoperative scores) of patients achieved the MCID (≥ 13 points) and 47.7% achieved the SCB (≥ 28) for iHOT-12 by 12 months. A significantly higher proportion of patients achieved SCB in the labral repair group (repair = 51.2%, debridement = 43.9%; p = 0.010, paired *t*-test) at 12 months. Reporting mean scores can hide great successes and failures, and so we present data for the proportion of patients achieving iHOT-12 improvement for thresholds grouped by labral procedure in Figure 3. Full data on patients achieving each threshold level of iHOT-12 improvement are provided in Supplementary Table i.

We further compared labral debridement and repair PROMs within strata of FAI pathology types, which revealed significant improvement in iHOT-12 and EQ-5D index scores across all groups, with similar proportions achieving MCID and SCB (Supplementary Table ii).

Impact of age. Outcomes for patients aged under and over 40 years were compared for both labral procedures (Figure 4). Older patients undergoing labral repair had significantly higher preoperative iHOT-12 scores than younger patients (under 40 years = 31.1 (95% CI 30.1 to 32.2), over 40 years = 34.2 (95% CI 32.5 to 36.0); p = 0.002, independent-samples *t*-test) however preoperative scores were similar for both age groups in the labral

Table III. Outcomes by labral procedure group.

Variable	Repair	Debridement	Overall	p-value
iHOT-12				
Preop iHOT-12*	32.2 (31.3 to 33.1); n = 1,447 (87.2%)	31.9 (30.9 to 32.8); n = 1,426 (70.4%)	32.0 (31.4 to 32.7); n = 2,873 (78.0%)	0.625†
Six-month iHOT-12*	58.9 (57.0 to 60.8); n = 770 (46.4%)	55.9 (54.0 to 57.9); n = 742 (36.6%)	57.4 (56.1 to 58.8); n = 1,512 (41.0%)	0.037†
Change iHOT-12 to 6 mths‡	+ 27.2 (25.2 to 29.2); n = 679 (40.9%); p < 0.001§	+ 25.0 (22.9 to 27.1); n = 638 (31.5%); p < 0.001§	+ 26.1 (24.7 to 27.6); n = 1,317 (35.7%); p < 0.001§	0.133†
% Achieving MCID iHOT-12 at 6 mths	Yes = 457 of 679 (67.3%); No = 222 of 679 (32.7%)	Yes = 414 of 638 (64.9%); No = 224 of 638 (35.1%)	Yes = 871 of 1,317 (66.1%); No = 446 of 1,317 (33.9%)	0.355¶
% Achieving SCB iHOT-12 at 6 mths	Yes = 325 of 679 (47.9%); No = 354 of 679 (52.1%)	Yes = 285 of 638 (44.7%); No = 353 of 638 (55.3%)	Yes = 610 of 1,317 (46.3%); No = 707 of 1,317 (53.7%)	0.245¶
12-month iHOT-12*	61.9 (59.8 to 64.0); n = 717 (43.2%)	57.4 (55.3 to 59.6); n = 669 (33.0%)	59.7 (58.2 to 61.2); n = 1,386 (37.6%)	0.004†
Change iHOT-12 at 12 mths‡	+ 28.7 (26.4 to 30.9); n = 648 (39.1%); p < 0.001§	+ 24.7 (22.5 to 27.0); n = 590 (29.1%); p < 0.001§	+ 26.8 (25.2 to 28.4); n = 1,238 (33.6%); p < 0.001§	0.015†
% Achieving MCID iHOT-12 at 12 mths	Yes = 440 of 648 (67.9%); No = 208 of 648 (32.1%)	Yes = 371 of 590 (62.9%); No = 219 of 590 (37.1%)	Yes = 811 of 1,238 (65.5%); No = 427 of 1,238 (34.5%)	0.063¶
% Achieving SCB iHOT-12 at 12 mths	Yes = 332 of 648 (51.2%); No = 316 of 648 (48.8%)	Yes = 259 of 590 (43.9%); No = 331 of 590 (56.1%)	Yes = 591 of 1,238 (47.7%); No = 647 of 1,238 (52.3%)	0.010¶
EQ-5D Index				
Preop EQ-5D Index*	0.522 (0.510 to 0.534); n = 1,469 (88.5%)	0.518 (0.506 to 0.530); n = 1,602 (79.1%)	0.520 (0.512 to 0.528); n = 3,071 (83.4%)	0.671†
6-month EQ-5D Index*	0.674 (0.658 to 0.690); n = 811 (48.9%)	0.660 (0.645 to 0.675); n = 903 (44.6%)	0.667 (0.656 to 0.678); n = 1,714 (46.5%)	0.226†
12-month EQ-5D Index*	0.691 (0.673 to 0.708); n = 753 (45.4%)	0.676 (0.658 to 0.693); n = 795 (39.3%)	0.683 (0.671 to 0.695); n = 1,548 (42.0%)	0.246†
Change EQ-5D Index - 6 mths‡	+ 0.152 (0.134 to 0.169); n = 722 (43.5%); p < 0.001§	+ 0.137 (0.120 to 0.155); n = 749 (37.0%); p < 0.001§	+ 0.144 (0.132 to 0.157); n = 1,471 (39.9%); p < 0.001§	0.260†
Change EQ-5D Index - 12 mths‡	+ 0.159 (0.140 to 0.178); n = 690 (41.6%); p < 0.001§	+ 0.139 (0.120 to 0.158); n = 676 (33.4%); p < 0.001§	+ 0.149 (0.136 to 0.163); n = 1,366 (37.1%); p < 0.001§	0.158†

*Values are given as the mean score (95% confidence interval); number (%) of cases available for follow-up,
†Independent-samples *t*-test.
‡For cases with pre- and postoperative follow-up data, the values are given as the mean score improvement (95% confidence interval); number (%) of cases available for follow-up.
§Paired *t*-test.
¶Chi-squared test.
EQ-5D, EuroQol five-dimension questionnaire; iHOT-12, International Hip Outcome Tool 12 questionnaire.

debridement group. For labral repair and debridement, both age groups saw significant improvement in baseline scores maintained up to 12 months (p < 0.001, paired *t*-test). Considering repair and debridement separately, although the younger patients achieved larger iHOT-12 gains, this was not statistically significant.

Impact of sex. Significant improvement in preoperative iHOT-12 score was seen in both sexes at six- and 12-month follow-up (Figure 5). Male patients recorded higher raw iHOT-12 scores at each stage of follow-up compared to women. Women saw greater iHOT-12 gain relative to men at 12 months. Direct comparison of outcomes between sexes is limited due to significant differences encountered in baseline characteristics, including age, BMI, and FAI pathologies.

Multivariable analysis. Given that a substantial proportion of patients were lost to follow-up at one year (Table III), and the substantial differences in follow-up rates between labral repair and debridement groups, we attempted to adjust for biases that may arise from the fact that patient characteristics (including age) were different between those who returned questionnaires (mean age 37 years) and those who did not (mean age 36 years) using a combination of random sampling, propensity score matching, and pooled multivariable regression (Supplementary Material). The pooled multivariable model demonstrated a higher preoperative iHOT-12 score (coefficient -0.5, 95% CI -0.6 to -0.4) and pincer FAI pathology (coefficient -13.1, 95% CI -23.8 to -2.4 (cam reference group)) were associated with significantly poorer iHOT-12 improvement versus preoperative scores at 12 months' follow-up (Table IV).

There was no statistically significant difference in iHOT-12 improvement observed between labral repair or

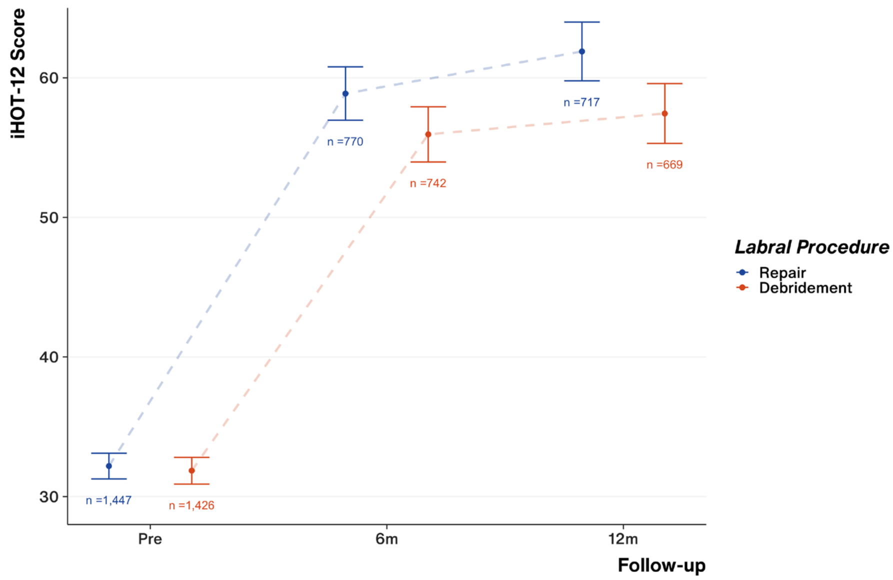

Fig. 2

Raw International Hip Outcome Tool 12 (iHOT-12) scores at each stage of follow-up for labral repair and debridement groups. Means and 95% confidence intervals are shown.

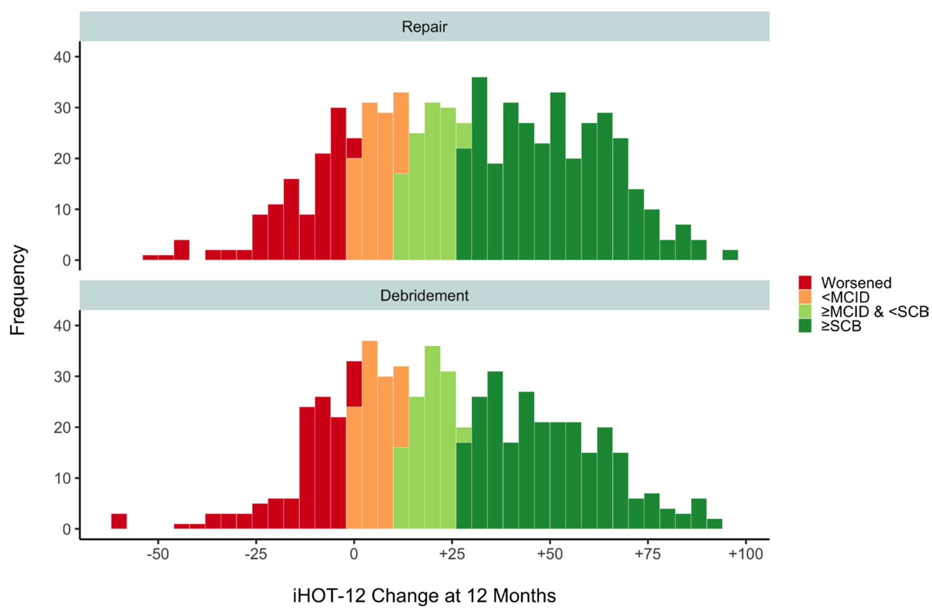

Fig. 3

Histogram of International Hip Outcome Tool 12 (iHOT-12) score gain versus preoperative scores at 12 months' follow-up by labral procedure. Bin width = four points. The proportion of cases achieving greater than or equal to the minimum clinically important difference (MCID) and substantial clinical benefit (SCB) are highlighted.

debridement procedures. This was contrary to the results of a simple multivariable model (Supplementary Table v), which implies that the observed superiority of labral repair over debridement in univariable and conventional multivariable comparisons may be at least partly attributable to confounding, due to differences in patient questionnaire response rates between groups. This has implications for all studies comparing outcomes with low follow-up rates, and where follow-up rates may differ between treatment arms, and we describe a novel statistical approach for attempting to account for this.

Discussion

This study found that patients who underwent arthroscopic acetabular labral repair or debridement procedures experienced significantly improved

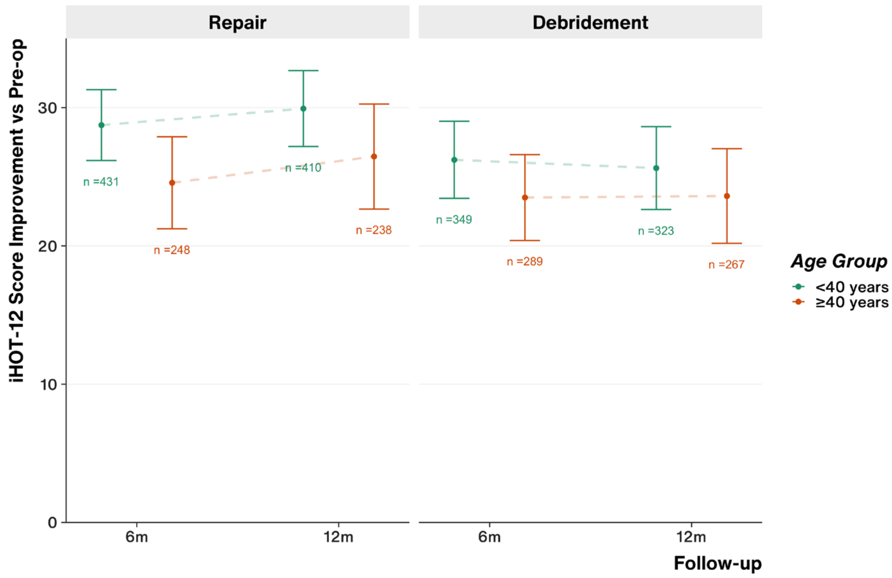

Fig. 4

International Hip Outcome Tool 12 (iHOT-12 improvement at 12 months versus preoperative baseline by age group and labral procedure. Means and 95% confidence intervals are shown.

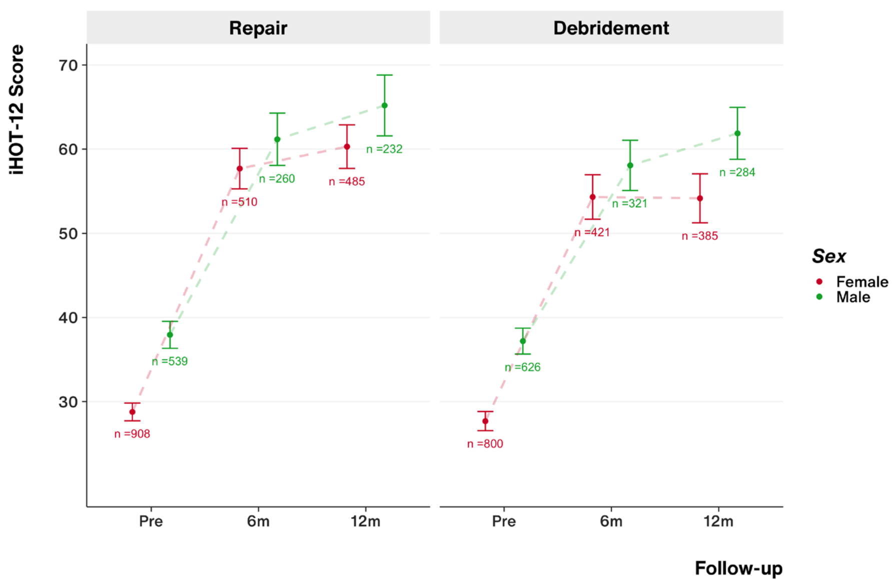

Fig. 5

Raw International Hip Outcome Tool 12 (iHOT-12) scores at each stage of follow-up by patient sex and labral procedure. Means and 95% confidence intervals are shown.

functional outcome scores at six months, which were maintained up to 12 months postoperatively with almost half of patients achieving substantial clinical benefit. These improvements were achieved in both sexes and in younger (< 40 years) and older (> 40 years) patients. This study included a novel multivariable analysis, the results of which suggest that the observed superiority of labral repair on direct comparison of cohorts may be, in part, down to demographic differences which arise between those who respond to postoperative questionnaires and those who do not, which manifest due to differences in follow-up rates. Thus, there is need for an adequately powered randomised controlled trial to answer the study question definitively.

Labral function. The crucial role of the acetabular labrum in terms of hip function has been well described.[2]

Table IV. Results of pooled multivariable linear regression model predicting International Hip Outcome Tool 12 score improvement at 12 months versus preoperative baseline (methodology described in Supplementary Material).

Variable	Coefficient	95% CI	p-value
Labral procedure			
Debridement	Reference		
Repair	3.1	-2.6 to 8.8	0.283
Age	-0.1	-0.2 to -0.01	0.358
Sex			
Female	Reference		
Male	-0.7	-6.5 to 5.1	0.814
BMI group			
< 25 kg/m^2	Reference		
25 to 30 kg/m^2	2.9	-5.5 to 11.4	0.495
≥ 30 kg/m^2	-1.5	-12.4 to 9.4	0.784
Missing	2.6	-4.0 to 9.2	0.439
FAI type			
Cam	Reference		
Pincer	-13.1	-23.8 to -2.4	0.017
Mixed	-1.6	-9.0 to 5.7	0.661
None (no FAI procedure recorded)	-4.6	-11.3 to 2.2	0.184
Preoperative iHOT-12 score	-0.5	-0.6 to -0.4	< 0.001

CI, confidence interval; FAI, femoroacetabular impingement; iHOT-12, International Hip Outcome Tool 12 questionnaire.

Cadaveric and finite element analysis studies have shown that the labrum produces a seal around the femoral head, allowing the formation of a pressurised layer of synovial fluid which disseminates compressive loads, resulting in reduced cartilage stress and consolidation.[1,5,26] Loss of this seal leads to increased articular friction during movement in addition to increased and prolonged contact stresses, which may lead to early cartilage wear and secondary OA. The labral seal (along with the capsule) is also critical in maintaining hip stability due to mechanically resisting rotation and translation, and also through enhancement of the 'suction effect' created between the acetabulum and femoral head; a labral tear disrupts this effect but can be restored by subsequent repair.[4,9,10] Loss of joint stability is a recognised contributor towards cartilage destruction and ultimately OA,[27] and labral repair has been shown to mitigate loss of constraint caused by a labral tear.[28] Additionally, the labrum acts to increase the contact surface area of the hip joint, leading to reduced articular cartilage contact pressures. Lee et al[8] showed that following labral resection, under physiological loads, hip contact pressures may increase more than 100%.

Clinical studies. The above evidence provides the biomechanical basis of the rationale towards the retention and repair of the hip labrum where possible during hip preservation surgery. This is also supported biologically by the healing potential of the labrum, which is greatest peripherally where it receives blood supply from the hip capsule, and vascularity is often preserved even in the presence of a labral tear.[29-31] The decision to repair a labrum is variable among surgeons, but is influenced by the location and type of the tear and the nature of the labrum, with consideration for any concomitant OA which is known to compromise clinical outcome.[32-36]

There is a lack of adequately powered randomised controlled studies comparing labral debridement and labral repair. Krych et al[19] performed a randomised controlled trial of 36 female patients with pincer or mixed type FAI randomizing to labral repair or selective labral debridement. Postoperative outcomes (using the 'Hip Outcome Score'),[37] along with patient subjective outcomes were significantly better in the repair group compared to debridement after an average follow-up time of 32 months. While the results of this study are encouraging, the sample size was small and the findings may not be generalisable to the wider population of patients undergoing hip arthroscopy where 'pincer' and 'mixed' FAI pathologies represent the smallest subgroups – approximately 25% of the overall cohort in our study.

In a systematic review, Haddad et al[16] reviewed the literature to compare results of labral repair and debridement. Considering labral debridement, in 506 patients across 12 studies, the mean rate of good or excellent outcome was 82% (67% to 100%) in the absence of OA with a mean follow-up of 3.5 years. Good long-term results have been reported by two small studies (comprising 50 and 26 hips) in just over 80% of patients beyond ten years.[38,39] There were five studies comparing debridement versus re-attachment with four favouring labral repair. Espinosa et al[40] reported good or excellent outcomes in 94% vs 67% in labral reattachment (n = 35) versus debridement (n = 25) groups, respectively. In a multivariate analysis of 122 patients, Philippon et al[32] reported significantly better postoperative outcome scores in association with labral repair. Schilders et al[33] reported higher mean PROMs gain in patients undergoing labral repair versus reattachment in a study of 101 patients using a modified Harris Hip Score. Larson et al[41] report good outcomes in 92% of patients who underwent labral repair (n = 50) versus 68% who underwent labral debridement (n = 44). By contrast, in a study of 100 hips, Laude et al[42] reported similar outcomes between the two procedures with no significant difference in mean Non-Arthritic Hip Score (debridement = 82, reattachment = 86).

Progression of arthritis and conversion to arthroplasty represent important outcomes following hip preservation surgery. In a non-randomised, study Anwander et al[20] reported outcomes in 52 patients who underwent labral debridement or repair through an open approach. At ten-year follow-up, hips which underwent labral repair showed significantly better survival rate compared to labral resection in terms of a threshold deterioration in functional scores (Merle d'Aubigné-Postel score < 15), however, no significant difference was seen in terms of progression to THA or progression of arthritis. While the findings may not be generalisable to arthroscopic techniques, or to cases employing less radical labral debridement, they further support the repair and reattachment of the labrum where possible.

Our study found that both younger and older patients benefited significantly from labral repair and debridement techniques; these findings are supported by Horner et al[43] in a systematic review. We noted significantly higher preoperative iHOT-12 scores in patients over 40 years versus under 40 years; we suspect it is likely that with increasing age a surgeon's threshold for performing a labral repair is likely to increase thus the repair cohort are likely to represent older 'winners' who already have better than average function.

Limitations. Limitations of the NAHR dataset have been discussed previously:[44] most importantly, missing data, and the fact that longer term follow-up beyond 12 months has poor compliance in the registry. The NAHR committee are working to address this, including contacting and re-engaging those patients who have given consent. The proportion of cases with missing data, including PROMs and BMI, was lower in the repair cohort compared to debridement – possibly a result of clinicians' closer follow-up and engagement in this group who have undergone a more 'complex' procedure, which may affect outcomes. In order to address this, our novel sensitivity analysis created synthetic cohorts of PROMs respondents that were reflective of the overall demographic characteristics of the registered patients, and then reanalysed.

At present, there are limited diagnostic data available from the NAHR. Thus, patient FAI pathology ('cam', 'pincer', 'mixed' and 'none') was derived from surgical data regarding a concurrent surgical procedure having been employed to address the target lesion. While we believe that any FAI lesion encountered is likely to be surgically addressed for the majority of patients, it should be stressed that absence of a surgical procedure to address a lesion does not necessarily equate to absence of FAI pathology, and so the 'none' cohort is likely to represent a heterogenous group of patients and pathologies (including traumatic or degenerative labral tears, capsular laxity and dysplasia).

Given the retrospective nature of our analysis, selection bias limits the extent to which we can determine the superiority of repair over debridement. We also acknowledge the potential impact of changing eligibility criteria over time, both in terms of hip arthroscopy and labral procedure performed. Both repair and debridement groups are likely to represent a diverse range of procedures ranging from a simple labral shrinkage to a sub-total labrectomy, or a complex multi-anchor reattachment in the case of repair. These procedures may have very different functional effects on the labrum and impact patient outcomes.

In conclusion, both labral repair and debridement techniques were associated with significantly improved early functional outcome following hip arthroscopy regardless of age or sex, with two-thirds of patients achieving MCID and almost half achieving SCB. Our study found that labral repair was associated with superior outcomes in comparison to debridement when directly comparing cohorts, however adjustment for differences in patient characteristics and accounting for difference in PROMs follow-up rates between groups showed no statistically significant differences in degree of improvement. The present study represents the largest cohort to date comparing these procedures, and demonstrates that good are outcomes achievable across specialist and non-specialist practice settings. While patient selection is crucial, biomechanical and existing clinical studies support the repair of an injured labrum where possible. Where repair of the labrum is not possible (e.g. a small and stable tear, a degenerative tear, or a thin irreparable labrum), labral debridement may offer equivalent early functional outcomes. A multicentre randomised controlled trial would be the most appropriate next step to overcome bias inherent in the existing literature.

Take home message

- Both acetabular labral repair and debridement techniques were associated with significantly improved early patient-reported outcome scores following hip arthroscopy regardless of age or sex, with two-thirds of patients achieving minimal clinically important difference and almost half achieving substantial clinical benefit.
- Labral repair was associated with superior outcomes in comparison to debridement when directly comparing cohorts, however adjustment for differences in patient characteristics and accounting for difference in follow-up rates between groups showed no statistically significant differences in degree of improvement.
- While patient selection is crucial, biomechanical and existing clinical studies support the repair of an injured labrum where possible.

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Supplementary material

Supplementary tables, figures, and a detailed description of the multivariable modelling methods.

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