Treatment of failed arthroscopic acetabular labral debridement by femoral chondro-osteoplasty

A CASE SERIES OF FIVE PATIENTS

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Femoroacetabular impingement is recognised as being a cause of labral tears and chondral damage. We report a series of five patients who presented with persistent pain in the hip after arthroscopy for isolated labral debridement. All five had a bony abnormality consistent with cam-type femoroacetabular impingement. They had a further operation to correct the abnormality by chondro-osteoplasty of the femoral head-neck junction. At a mean follow-up of 16.3 months (12 to 24) all had symptomatic improvement.

Labral tears cause pain in the hip. In the last decade, our understanding of such tears and the pain they can cause has improved. Lage, Patel and Villar¹ described four types of labral tear based on its aetiology: degenerative, traumatic, congenital and idiopathic. This classification has since been modified as a result of studies on femoroacetabular impingement^{2,3} and its association with chondral damage and labral tears.⁴⁻⁶ Thus, an impinging category has been defined and has replaced, for the most part, the idiopathic group. Two recent reports by Peelle et al⁵ and Wenger et al⁶ have shown that labral tears are commonly associated with bony abnormalities, such as a lack of anterior head-neck offset, an aspherical femoral head, or a retroverted acetabulum. In addition, most hips with labral tears have associated chondral damage of the acetabulum,^{4,7} which may explain the mixed results of isolated arthroscopic debridement.⁸⁻¹¹ There is also mounting evidence that this chondral damage is not secondary to the labral tear but is associated with femoroacetabular impingement.^{4,12,13} Although the initial clinical results on the treatment of impingement have been encouraging,¹³⁻¹⁵ there is still some controversy as to which aspect of the treatment (correction of the bony abnormality, labral debridement or both), provides the best clinical outcome.

We report a series of five patients who presented with persistent pain in the hip after arthroscopic labral debridement and who subsequently underwent correction of the bony abnormality associated with femoroacetabular impingement.

Patients and Methods

There were three women and two men with a mean age of 40 years (27 to 48). The operative reports of the arthroscopy confirmed the presence of labral tears which had been treated by isolated labral debridement. No cartilage delamination was noted in any of the reports. The mean time to consultation with the senior author (PEB) after arthroscopy was 13.6 months (6 to 18). All the patients had a positive impingement sign on physical examination.¹⁶ The University of California Los Angeles (UCLA) hip score^{17,18} was used to assess pain, walking, function and activity.

Radiological evaluation consisted of anteroposterior (AP) pelvic and cross-table lateral radiographs (Fig. 1).¹⁹ Although the AP radiographs had not been standardised to meet the criteria of Siebenrock, Kalbermatten and Ganz,²⁰ acetabular retroversion was not seen in any case. All the patients had further MRI with gadolinium arthrography.²¹ In four, a persistent labral tear was seen. The fifth patient had complete labral excision in the anterosuperior quadrant. On the radial reformations of MRI, the α angle of Notzli et al²² was a mean of 80.8° (66° to 95°). On the cross-table lateral radiograph, the offset ratio of Eijer et al²³ was a mean of 0.10 (0.08 to 0.14) (Table I).

All five patients had further surgery when the MRI findings were confirmed (Fig. 2). All had associated acetabular chondral damage of type 4 as described by Beck et al.¹³ Each underwent chondro-osteoplasty of the femoral head-neck junction and repeat debridement of the torn labrum. The classic surgical dislocation

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Fig. 1

Pre-operative anteroposterior pelvic and (inset) cross-table lateral radiographs of a 38-year-old man. The femoral head appears spherical in the coronal plane illustrating the importance of determining the lack of anterior concavity in the sagittal plane.

approach of Ganz et al²⁴ (Fig. 3) was used in three cases. The other two had a combination of arthroscopy of the hip and labral debridement with anterior arthrotomy, through which the chondro-osteoplasty was performed under direct visualisation.^{25,26} This was done to avoid a more extensive soft-tissue dissection. None of the patients required labral re-fixation with rim trimming because of the absence of acetabular retroversion. Weight-bearing was restricted for four to six weeks.

Statistical analysis. The difference between the pre-operative and follow-up hip scores was analysed using Student's *t*-test. Statistical significance was determined as a *p*-value < 0.05.

Results

There were no post-operative complications. One patient required the removal of screws because of painful internal fixation, after which the symptoms resolved. At a mean follow-up of 16.3 months (12 to 24), all the patients had symptomatic improvement (Table II). The mean UCLA hip score improved as follows: pain, from 3 (1 to 6) to 7 (6 to 9) (*p* = 0.01); walking, from 8 to 9.2 (8 to 10) (*p* = 0.07); function, from 5.8 (1 to 8) to 8 (4 to 10) (*p* = 0.00); and activity, from 6 (2 to 10) to 7 (4 to 10) (*p* = 0.03).

Discussion

Before the description of femoroacetabular impingement, isolated labral tears, diagnosed by means of hip arthroscopy²⁷ and/or MRI with arthrography,^{21,28} had been identified as a primary cause of pain in the hip.^{9,29} These tears were usually categorised as idiopathic^{1,29} or secondary to minor trauma. The reason for this was in part due to the fact that assessment of hip morphology was performed only in the coronal plane, while very often the major deformity in femoroacetabular impingement was in the sagittal plane.^{23,30} The anterolateral head-neck junction was also not systematically examined in the peripheral compartment. Because the initial results of treatment of isolated labral tears were encouraging, this left some uncertainty as to the need for correcting a co-existing bony abnormality.^{10,31,32} Our data support the added clinical benefit in correcting pre-existing bony dysmorphism in the presence of labral pathology and provides additional clinical evidence that an uncorrected bony abnormality consistent with femoroacetabular impingement can lead to the failure of isolated labral debridement. Although in the initial early experience of the treatment of femoroacetabular impingement, there were good to excellent results in only 65% to 68% of patients,^{13,14} more recent series in which the labrum has not been resected, have had a better

Table I. Clinical details and radiological findings in the five patients

Case	Gender	Age (yrs)	Side	Time after hip arthroscopy (mths)	Impingement sign	Offset ratio	α angle (°)
1	Male	27	Right	14	Positive	0.10	90
2	Male	38	Right	18	Positive	0.08	66
3	Female	43	Right	6	Positive	0.08	80
4	Female	48	Right	12	Positive	0.12	95
5	Female	44	Right	18	Positive	0.14	73

Table II. Individual University of California Los Angeles hip scores in the five patients before and after operation

Case	Pain		Walking		Function		Activity	
	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative	Pre-operative	Post-operative
1	6	9	8	10	8	10	8	9
2	1	6	8	8	1	4	2	4
3	2	6	8	10	6	8	7	8
4	2	8	8	10	6	8	3	4
5	4	6	8	8	8	10	10	10

Fig. 2a

Fig. 2b

Intra-operative views of a) the insufficient concavity of the femoral head-neck junction and b) after treatment by chondro-osteoplasty.

Fig. 3a

Fig. 3b

Intra-operative views showing a) the partially excised labrum (dotted line) and b) associated cartilage flap of the acetabulum.

outcome, with over 80% of patients showing significant improvement in their hip function.^{15,33} However, despite an improvement in function, three of our five patients still had pain with activity which required the occasional use of anti-inflammatory agents. It is difficult to speculate why these three patients had more pain than the other two, but this may be related to the amount of remaining labrum after the initial labral debridement as well as the extent of chondral damage. When Espinosa et al¹⁵ compared the outcome of patients treated for femoroacetabular impingement by open surgery, those who had labral refixation did significantly better than those with resection. None of the patients in our series underwent labral refixation nor did they undergo further labral resection. Currently, we perform labral refixation in the presence of acetabular retroversion and/or with a delamination flap extending beyond 5 mm. A study by Ferguson et al³⁴ suggested that the labrum may act

more as a seal, ensuring a more constant fluid film for lubrication and limiting the rate of expression of fluid from the articular cartilage. This occurs by preventing fluid flow, tangential to the cartilage surfaces, through the interarticular gap and by increasing the length of the fluid flow path through the labrum. Based on this model, complete or partial excision of the labrum is likely to disrupt the sealing effect, thus putting the cartilage surfaces at risk of premature wear. In addition, even in the presence of a partial tear with femoroacetabular impingement, recent work by Ito, Leunig and Ganz³⁵ has shown that the tip of the labrum remains intact, thus potentially maintaining its function as a fluid sealant.

There remains the unresolved issue as to how much bony abnormality is acceptable in the presence of a damaged labral-chondral complex.³⁶ This is especially true for dysplasia or femoroacetabular impingement in which osteo-

tomy of the pelvis³⁷ or surgical dislocation and chondro-osteoplasty²⁴ are the standard procedures. In addition, although it is now well known that most labral tears are associated with a structural bony abnormality,^{5,6} there is little information on how correcting a bony abnormality can improve outcome. We believe that our report provides evidence to support re-operation after failed isolated labral debridement in the presence of femoroacetabular impingement, and stresses the importance of assessing hip morphology in both the coronal and sagittal planes. As less invasive surgical techniques such as hip arthroscopy are perfected, the question of correcting a bony abnormality associated with femoroacetabular impingement³⁸ may become less of an issue.

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