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RECURRENCE OF ECTOPIC OSSIFICATION AFTER EXCISION IN CHARNLEY LOW FRICTION ARTHROPLASTY

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In 23 hips with a Charnley Low Friction Arthroplasty (L.F.A.), revised for mechanical reasons, a planimeter was used to study areas of ectopic ossification and their recurrence after excision. In two cases some bone resorption had taken place. In the remaining 21 hips the average area of recurrence was greater than the average area excised. There was no correlation between the time elapsed and the extent of ossification; once established, the ossification did not seem to progress. Revision of L.F.A. for excision of ectopic bone is not indicated.

Key words: ectopic ossification; excision; hip arthroplasty

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Ectopic ossification following total hip replacement has been the subject of many reports. Various suggestions have been made as to how to avoid this complication. In the cases reported so far radiotherapy (Nolan et al. 1975) and excision (Nolan et al. 1975, Williams et al. 1977) have been the treatments applied. Bonnin (1972) stated that re-operation for para-articular ossification was seldom required and generally unwise, as recurrence was likely. However, no evidence was offered to support this statement.

Nolan et al. (1975) reported that excision of the new bone in eleven hips gave relief from pain and improvement range of movement in five, and rapid recurrence in one. Ritter & Vaughan (1977) mentioned one case, and Williams et al. (1977) reported two cases that resulted in partial recurrence.

In this unit, over the past 19 years, only two hips have been explored following the Charnley Low Friction Arthroplasty (L.F.A.) specifically because of new bone formation.

In one case this was done in an attempt to correct a bony ankylosis which had occurred with the hip in gross flexion and abduction. Haematoma and severe sepsis resulted. In the second, the operation was performed to improve the range of movement, the underlying pathology being a neuromuscular disorder.

In order to establish the results of excision of ectopic bone following L.F.A. in a larger group of patients, a search was made for cases of revision where the removal of ectopic bone was secondary to the revision; it formed part of the exposure. Cases of sepsis were excluded.

PATIENTS AND METHODS

A review of 23 sets of radiographs (21 patients) was made for those cases where a significant amount of new bone was excised at revision. For each set four tracings were made (Figure 1). The first was made following the L.F.A., the second before revision, the third following revision and the fourth at review.

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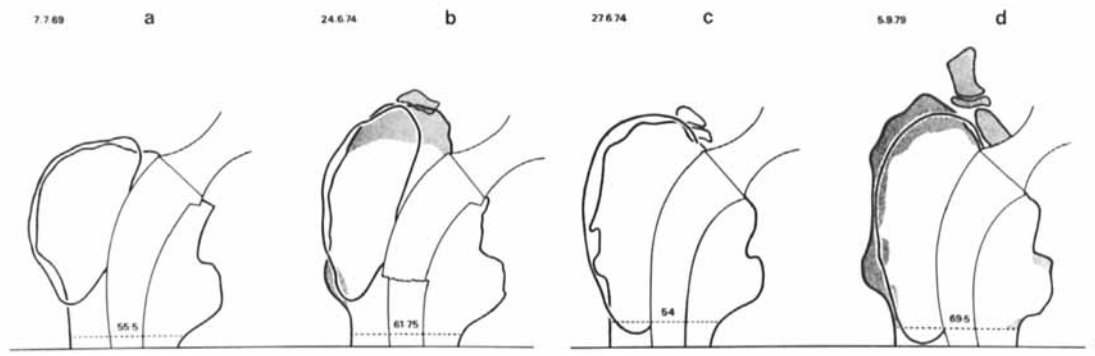

Figure 1. Tracings of areas of ectopic ossification (cm²). a) Following L.F.A. b) Before revision. c) Following revision. d) At review.

As the radiographs were routinely standardised, with the tube – plate distance set at 100 cm, direct comparison was possible between the radiographs in each set.

Alternatively, as the diameter of the head of the femoral component was 22.25 mm, this could have been used as a standard and an appropriate correction factor could have been worked out for each radiograph. This, however, did not prove to be necessary.

To define a point of reference on each tracing, a line was drawn at the base of the lesser trochanter, at right angles to the long axis of the femur. This line was at a constant level in each set of tracings. Using a commercial planimeter the area proximal to this line, including the lesser and the greater trochanter as well as the islands of ectopic bone, was measured and expressed in square centimetres. Thus, subtracting the area of the first tracing from the second gave the extent of ectopic ossification following L.F.A. (Figure 1 – second tracing, shaded area).

The difference in area between the second and third tracings was the area of ectopic bone excised, and that between the third and fourth was the area of ectopic bone recurrence following excision (Figure 1 – fourth tracing, shaded area). Figure 1 shows an example of one set of tracings, giving the date of each radiograph studied: at primary L.F.A., , at revision, post revision and at review. The number above the dotted reference line denotes the total bone area proximal to the line. The continuous line around the greater trochanter shows the outline of the trochanteric wires. The shaded areas denote areas of ectopic ossification following primary surgery, and recurrence following excision at revision surgery.

RESULTS

The findings for the group of patients under review are presented in Table 1. The correlation between time and the extent of ossification is shown in Figure 2.

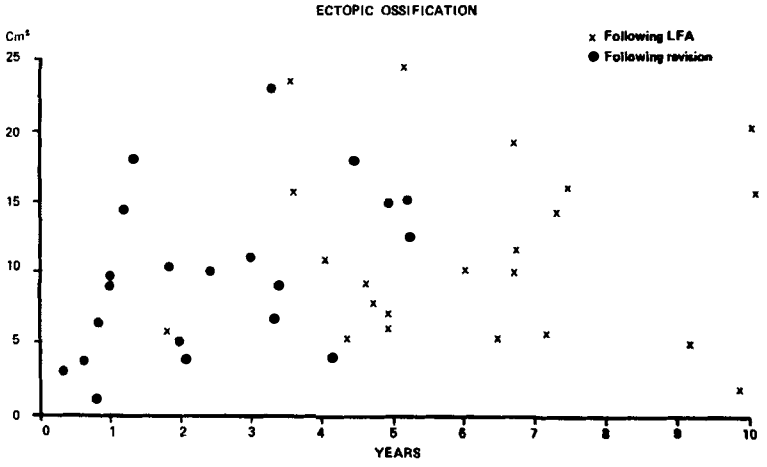

Figure 2. Correlation between time and extent of ossification.

Table 1. New bone formation after its excision during revision surgery following Low Friction Arthroplasty (L.F.A.)

Case no.	Age	Sex	Side	Diagnosis	Previous surgery	Revision for	Weight (kg)	Period between L.F.A. and revision		Post L.F.A. new bone formation (cm^2)	Bone excised at revision (cm^2)	Extent of new bone recurrence (cm^2)	Follow-up after revision	
								years	months				years	months
1	59	M	L	OA		Fractured stem	80.1	3	6	22.75	15.50	10.00	2	5
2	66	M	L	OA	Osteotomy	"	91.2	7		9.75	6.00	4.75	2	1
3	67	M	R	OA		Loose stem	63.5	9	7	1.75	7.00	5.50	2	
4	65	M	R	OA		Fractured stem	75.8	6	8	10.35	6.00	–1.00		4
5	61	M	R	OA		"	88.9	4	11	6.25	7.75	15.50	5	3
6			L			"	88.9	7	2	5.75	15.50	18.00	1	4
7	56	M	L	OA		"	91.2	4	10	7.75	13.50	13.00	5	3
8	62	M	L	OA	Fractured acetabulum	"	100.2	1	10	6.00	7.50	10.50	1	10
9			R											
10	66	M	L	OA		"	100.2	5	1	7.00	6.00	11.00	3	
11	62	M	L	OA		"	78.0	6	8	11.50	3.50	3.00		4
						"	104.8	4	1	12.00	2.00	4.00	4	2
12	47	M	L	Still's disease		"	80.1	10	1	20.50	10.00	9.50	1	
13	67	M	R	OA	Cup arthroplasty	"	90.3	4	7	9.00	7.00	–6.00	5	2
14	81	M	L	OA	Fluon socket	"	91.2	9	3	5.00	10.00	8.75	3	5
15	62	M	R	OA		"	103.4	3	9	16.50	14.50	18.00	4	6
16	67	M	R	OA	Fractured neck of femur	"	73.9	6	1	10.00	11.00	6.75	3	4
17	76	F	L	OA		"	73.0	10	2	16.25	19.00	6.50		10
18	64	F	L	OA	Osteotomy	"	66.2	4	5	5.75	12.50	1.25		10
19	34	M	R	Rh. A.		"	78.9	7	6	17.00	10.00	15.00	5	
20	64	M	L	OA		"	68.0	5	3	24.00	4.00	9.50	1	
21	63	M	L	Rh. A.		"	92.1	6	7	5.50	3.50	22.75	3	3
22	60	M	R	OA		"	94.3	7	4	14.75	13.50	3.75		7
23	67	M	R	OA		"	68.0	6	10	18.75	9.00	14.50	1	2
						Minimum	63.5	1	10	1.75	2.00	–6.00		4
						Maximum	104.8	10	2	24.00	19.00	22.75	5	3
						Average	83.5	6	2.5	11.47	9.30	8.89	2	5

DISCUSSION

The correlation between ectopic ossification and range of movement has already been reported (DeLee et al. 1976); the present study is concerned with the extent of its recurrence following excision. The method of measurement used is easily reproducible provided that the radiographs are standardised or a magnification factor is used, taking into account any variable between the radiographs, with the size of the head of the femoral component offering a convenient standard. Although a three-dimensional study would have been better, the presence of the metal prosthesis precludes this.

All hips, except one, were revised because of a fractured stem. Up to that moment the patient's function was normal and there was no indication that ectopic ossification had in any way adversely affected the clinical result.

Heavy males predominate. It is in this group that ectopic ossification is to be expected (Lazansky 1973).

A recurrence of ectopic ossification was present in all except two cases. In these two (cases 4 and 13) the negative reading suggested that some bone resorption had taken place. Excluding these two, the average area of ectopic bone recurrence (10.07 cm^2) was greater than the average area excised (9.57 cm^2). This suggests that in heavy males excision of ectopic bone leads to its recurrence in the majority of cases, and the results support Bonnin's statement (Bonnin 1972).

The correlation between the extent of ectopic ossification and the time elapsed was studied. This relatively small series can offer only tentative conclusions. There was no correlation between the area of new bone formation following primary L.F.A. and the length of the follow-up period. The correlation coefficient was a mere 0.0215, suggesting that the area of new bone formed after primary surgery does not increase with time. The correlation coefficient between the extent of new bone recurrence and the follow-up period after revision surgery was 0.414 with a t value of 2.03 and a P value close to 0.05, i.e. probably significant. It could, therefore, be suggested that revision surgery stimulates new bone formation in a manner different from primary surgery.

With a mean rate of 0.18 cm^2 per year after primary surgery and 0.43 cm^2 per year after revision, the P value would be less than 0.001 which would be highly significant. However, the difference is almost certainly due to the fact that the length of the follow-up period is 75 months after primary surgery and 32 months after revision surgery.

The present study and the clinical experience in this Unit over the past 19 years suggest that excision of ectopic bone, except to facilitate exposure, is not really indicated.

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