

INSTRUMENTS AND APPLIANCES*

The hip cast-brace for hip prosthesis instability

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Summary

The use of a hip cast-brace in the treatment of unstable hips following prosthetic replacement is described. A retrospective study of 21 patients with 22 hip prostheses treated with the cast-brace is reported. Seventeen Charnley low friction arthroplasties (LFA) were treated—four cast-braces were used for prophylaxis, five for single dislocations and eight for recurrent dislocations. To date, only four hips have required an operation to achieve stability.

Five patients with Thompson hemi-arthroplasties were treated following dislocation with only one requiring surgery to achieve stability. A hip cast-brace is recommended as a useful alternative to surgical management of prosthetic instability.

Introduction

Dislocation following hip arthroplasty is rare, but when it occurs the management commonly involves a period of initial immobilization and revision surgery may be required later. Patients are usually in the older age group, often obese and frail, and they tolerate immobilization poorly. The recommended period of initial immobilization ranges from 3 to 8 weeks (1, 2, 3). The use of a cast-brace which restricts hip movements while allowing early mobilization is an attractive alternative to hip spica immobilization, and was started in Derby in 1979.

Method

A retrospective study of patients treated by cast-bracing for unstable prosthetic hip replacement has been carried out at the Derbyshire Royal Infirmary. Patients were either treated following reduction of a dislocated joint replacement, or when the hip replacement appeared unstable at the time of initial operation. The earliest hip replacement to be subsequently treated by this method was performed in June 1976, from then until May 1981 1243 Charnley LFAs were performed. The period of this review extended from February 1979 until May 1981. Twenty two unstable replacements in 21 patients, (one bilateral) were treated. All the LFA operations had been carried out through a lateral approach by detaching the greater trochanter.

The indications for cast-bracing were as initial treatment following Charnley LFA dislocation in 12 cases, as initial treatment following dislocated Thompson Prosthesis in five cases, as prophylaxis following Charnley LFA in four cases, and after failure of a hip spica following Charnley LFA dislocation in one case. The cast-brace was used prophylactically following revisions of unstable LFAs in two cases and following LFAs with increased muscle tone in two cases;

one of these was due to multiple sclerosis and one to spastic diplegia. There were 15 females and six males. The age range of the patients was from 27 to 84 years with a mean of 71 years. The periods of assessment ranged from 5 to 20 months following the dislocation. Seven cases were reviewed personally and details were obtained from the hospital records of 14 patients of whom three had died. Hip dislocations were placed into three groups: (1) Early, up to five weeks postoperatively, (2) Late, (3) Single or recurrent.

The cast-brace

The cast-brace consisted of an orthoplast thigh brace attached to an orthoplast waistband by a metal hinge. The



FIG. 1 The brace in maximum flexion. The hinge is constructed to prevent 90 degrees of flexion.

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FIG. 2 The brace from the front. Adduction is abolished.

construction restricts flexion and abolishes adduction. Generally up to 80 degrees of hip flexion could be obtained by the patients, and no adduction. The degree of restraint imposed on the patient by the brace is shown in Figures 1 and 2. The treatment period in the brace was three months.

Results

All dislocations were successfully reduced by closed methods.

LOW FRICTION ARTHROPLASTY

The types of dislocation and results of cast-brace treatment are shown in Table I. The results show a failure rate of

TABLE II Predisposing factors in LFAs which dislocated

Patient Number	None	Detachment of trochanter	High siting of pilot hole	Vertical/Horizontal Acetabular component (Angle with Horiz)	Ante/Retro version of components	Previous surgery
1		Yes	1 cm	Vertical 52°	Femoral 30°	
2		Yes		Horiz 20°	Femoral 30°	
3		Yes			Acetabulum	
4		Yes			Ante-verted at revision	
5	+					
6		Yes				
7		Yes				
8						THR
9		Yes		Horiz 30°		
10				Vertical 55°	Femoral 30°	
11			More than 1 cm			LFA
12		Yes				
13		Yes		Horiz 30°		
Total	1	8	2	3 Horiz 2 Vertical	4	2

No patient had instability noted during operation, or subsequent leg length discrepancy

TABLE I Results of cast-brace treatment for LFAs

Type of dislocation	Number Cases	Dislocation during cast-brace period	Dislocation after cast-brace period	Total failures
Early single	3	0	0	0
Early recurrent	6	1	2	3*
Late single	2	0	0	0
Late recurrent	2	1	1	2†
Prophylactic	4	0	1	1‡

* All three cases were later treated surgically by distal re-attachment of the greater trochanter.

† One case was treated by revision, the other developed vascular complications and required amputation

‡ Treated with a hip spica for six weeks—stable at 16 months

nought out of five cases for single dislocations, and five out of eight for recurrent dislocations.

The causes of the dislocations were sought using the predisposing factors indicated by Charnley (2,4) and Khan (5). These are shown in Table II. The measurement of anteversion and retroversion of the components was made on unstandardised radiographs by the relationship of the axis of the cup wire-marker and the line of the femoral neck.

THOMPSON HEMI-ARTHROPLASTY

Four of the five hemi-arthroplasties were inserted through a 'Southern' approach, the fifth through a lateral (Charnley) approach. Analysis of the cases is shown in Table III.

Discussion

Charnley's advice (2) on the treatment of dislocated LFAs is wide abduction for three weeks to allow soft tissue healing, as this is thought to help prevent further dislocation. Etienne, Cupic and Charnley (6), in a review of 56 dislocations at the Wrightington Hip Centre found only 15 became recurrent, with 7 of these requiring re-operation, two for trochanteric reattachment and four for excision and plication of long, lax capsules. Khan, Brakenbury and Reynolds (5) confirmed in a multicentre study of 6774 operations that the recurrently dislocating hip replacement gave the most problems in management. Sixty-five of 142 dislocations (46%) were recurrent, and only 15 of these remained stable after closed reduction. Altogether 59 of the dislocations required an operation to achieve stability, and a further 12 had Girdlestone pseudarthroses as the final result, making a reoperation rate of 50%.

TABLE III *Analysis of dislocations following Thompson hemi-arthroplasty*

<i>Patient No.</i>	<i>Reason for dislocation</i>	<i>Type</i>	<i>Outcome</i>	<i>Follow-up</i>
1	Very shallow Acetabulum	Early, single	Immediate dislocation converted to total replacement at 1 month	
2	Non-identifiable	Early, single	Success. Brace on 3 months	5 months
3	Head diameter $\frac{1}{4}$ " less than opposite on x-ray	Late, recurrent	Success. Had dislocated twice before brace, and once in the brace. Brace on indefinitely	6 months
4	Non-identifiable	Early, recurrent	Dislocated in a loose brace which was adjusted. On 3 months. No more trouble	7 months
5	Detachment of Trochanter (Charnley approach)	Early, recurrent	Success. Brace on 4 months	18 months

To date only 4 out of 13 of our dislocated LFAs have required further surgery to achieve stability, three trochanteric reattachments and only one revision. While this method of management does not solve the problem of a grossly unstable hip replacement, it is put forward as a safe alternative treatment to other conservative methods in first time dislocations, and as a possible alternative treatment to other conservative methods or early open exploration with revision or trochanteric reattachment reserved for the recurrently unstable case.

Although only five hemi-arthroplasties have been treated with the cast-brace, it is encouraging that they have all achieved a satisfactory outcome so far. The one case which later dislocated was unsuitable for hemi-arthroplasty because of a very shallow acetabulum. In addition case number three in Table III shows it is possible to manage a clearly unstable hip replacement without operative interference, allowing independent walking with the brace still in place.

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