Revision of failed hemiarthroplasty for fractures at the hip

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Summary. *The records of 56 patients in whom a hemiarthroplasty, carried out for a femoral neck fracture, had been revised to a total hip replacement, were reviewed. The mode of failure was femoral loosening in 21, acetabular erosion in 26 and both in 5. Loosening tended to occur earlier than acetabular erosion. The median time to the onset of symptoms was 12 months and to revision 33 months. There were 38 major operative or postoperative complications at revision in 27 of the patients (48%).*

Résumé. *Présentation d'une série de 56 patients chez qui une hémiarthroplastie après fracture du col fémoral a été révisée par prothèse totale. La cause de l'échec était un descellement fémoral dans 21 cas, une altération acétabulaire dans 26 cas et les 2 causes dans 5 cas. Les descellements apparaissent plus tôt que l'érosion acétabulaire. Le temps moyen de survenue des symptômes fut de 12 mois et la révision chirurgicale à 33 mois. Il y a eu 38 complications per et post-opératoires chez 27 patients (48%).*

Introduction

Hemiarthroplasty has been widely used for the treatment of displaced intracapsular fractures of the femoral neck because of the high incidence of nonunion and avascular necrosis associated with reduction and internal fixation [2, 12]. Inevitably, some hemiarthroplasties fail and require revision.

This paper describes the causes of failure and the complications of revision operations.

Patients and methods

The theatre records from 1980 to 1994 at a specialised orthopaedic hospital were reviewed to find cases of revision of hemiarthroplasty to a total hip replacement. The notes were retrieved and three categories of data were recorded:

- The original operation: the patient's age, sex, the surgeon's grade, the implant and the failure of closed reduction.
- Failure: the cause of failure, time of onset of symptoms, and the time of the revision operation.
- The second operation: the age, the surgeon's grade, operation time, intraoperative bleeding and transfusion, intraoperative complications, early and late postoperative complications.

Results

One hundred and seven cases were identified, and complete data were available on 56 patients.

The original operation

There were five males and 51 females with a median age of 72 (mean 72 years, SD 7.7, range 46 to 87 years). Eleven uncemented Austin Moore prostheses and 45 cemented Thompson prostheses had been implanted. The surgeon's grade was a consultant in 9, a trainee in 42, a staff grade in 3 and a senior house officer in 2. Closed reduction had been tried unsuccessfully in 3 patients before hemiarthroplasty.

Failure

The causes are shown in Table 1. The mean time to onset of symptoms was 27 months (median 12 months, range 0 to 156 months) (Fig. 1). The mean time to the onset of symptoms of femoral loosening

Table 1. Mode of failure

Number	Mode	Thompson (n=45)	Austin Moore (n=11)
1	Infection	1	
1	Fracture	1	
2	Unexplained pain	2	
5	Femoral loosening and acetabular erosion	4	1
21	Femoral loosening	15	6
26	Acetabular erosion	22	4
56		45	11

Fig. 1. Time of onset of symptoms

was 15 months (median 7 months, range 0 to 150 months) and of erosion 39 months (median 25.5 months, range 0 to 150 months) (Mann-Whitney U-test $P=0.01$). The mean time to revision in these cases was 47 months (median 33 months, range 0 to 240 months) (Fig. 2). The mean time to revision for femoral loosening was 36 months (median 20 months, range 5 to 182 months), and for acetabular erosion 64 months (median 40 months, range 10 to 144 months). There was no correlation between age at the time of the primary hemiarthroplasty and either the onset of symptoms (Fig. 2) or the time to revision.

Fig. 2. Correlation between age and onset of symptoms

Revision surgery

The median age at revision was 75 years (mean 74 years, range 45 to 90 years). Operation was performed by consultants in 37 patients, trainees in 19 and staff grade in 1. The mean operating time was 160 min (SD 49 min, range 60 to 300 min). The mean intraoperative blood loss was 1000 ml (range 350 ml to 2500 ml) and the median transfusion needed was 3 units (range 0 to 7 units).

There were 38 major intraoperative or postoperative complications at revision in 27 of the patients (Table 2). Eight had a total of 9 major intraoperative complications. Nineteen patients had 22 major early postoperative complications and 7 had 7 major late problems. One patient died after a third postoperative dislocation.

Discussion

This was a retrospective study and the denominator, the total number of hemiarthroplasties from which the failures were drawn, was unknown. Therefore, the hemiarthroplasty survivorship cannot be calculated, nor can comments be made on the risk factors for failure. However, this study does provide useful information on the mode of failure in those who required revision, and the magnitude and complications of this procedure.

Results of hemiarthroplasty

The one-year mortality after hemiarthroplasty is 20–35% and the 5-year mortality about 50% [15]. The dislocation rate is 2% to 11% [7, 9, 16]. The patients requiring revision in our series usually had symptoms relatively soon after the operation (median 12 months) (Fig. 1). Others agree that the need for revision is usually apparent within three years [7, 9, 16, 17]. Thirty to 50% of younger or active patients who survive for three years will need revision [4, 7, 9, 12, 16, 17, 18].

Table 2. Complications and relation to implant and the surgeon's grade

Intraoperative Number of cases		Thompson <i>n</i> =45	Austin Moore <i>n</i> =11	Consultant <i>n</i> =37	Trainee <i>n</i> =20
1	Arrhythmia	1		–	–
1	Abductor detachment	1		1	
2	Sciatic nerve damage	1	1	1	1
3	Femoral penetration	3		2	1
2	Femoral fracture	2			2
Early postoperative					
1	Retention	1	–	–	
1	Haematoma (surgical evacuation)	1		1	
1	Deep infection	1			1
3	Deep vein thrombosis	3		–	–
3	Major wound infection	2	1	3	
4	Weak abductors/trochanteric detachment	4		2	2
4	Dislocation	3	1	4	
5	Chest infection	4	1	–	–
Late postoperative					
1	Acetabular loosening	1		1	
3	Femoral shaft fracture	2		2	
1	Femoral loosening	1			1
2	Dislocation	1	1	1	1
38	Total	29	7		

Acetabular erosion

This was present in 26/45 cemented stems and 5/11 uncemented stems. Erosion has been the predominant cause of failure of hemiarthroplasty [4, 12, 18, 21]. The problem might be reduced by using a bipolar prosthesis [6, 23], although there is a need for large randomised studies to confirm this. Total hip replacement would also obviate the problem of acetabular erosion, and some authors report better results than with hemiarthroplasty [5, 9, 20] although there is concern about the high dislocation rate [11] and failure in younger or more active patients [10].

Femoral loosening

This was the cause of failure in 19/45 cemented stems and 7/11 uncemented stems (Table 1) and occurred relatively sooner than erosion (Fig. 3) [3]. Erosion and loosening were present together in 5/56. Gebhard reported the revision rate at 6 years for uncemented hemiarthroplasties to be twice that of cemented [9], and Emery found less pain and greater mobility at 17 months in those randomised to receive a cemented rather than uncemented stem [8]. Osteoporotic bone may contribute to the early loosening of uncemented stems. Both these authors concluded that the use of cement reduced femoral loosening. We believe that most cemented stems in our study were implanted by simple digital pressurisation, without a cement gun. The advent of better stem designs and im-

proved cementing techniques may potentially reduce the incidence of stem loosening.

Complications of revision surgery

In this series, 64% of patients had major intraoperative or postoperative complications when the hemiarthroplasty was revised (Table 2). This agrees with the incidence of 39% to 57% reported by others [1, 818, 22], and reflects complicated surgery in an elderly population. There appears to be a higher rate of early loosening after revision for failed hemiarthroplasty than after primary THR [1, 14].

Failure of hemiarthroplasty for femoral neck fracture usually occurs relatively soon after implantation. Loosening and acetabular erosion are the principle causes, with loosening tending to occur earlier. Revision surgery carries a very high complication rate. Improvements in implant design or cement technique may reduce the number of failures. Alternatively, consideration should be given in individual patients to reduction and internal fixation rather than prosthetic replacement. Prospective randomised studies are required to determine the best primary treatment for femoral neck fracture.

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