

# MOORE'S ARTHROPLASTY FOR DISPLACED FEMORAL NECK FRACTURES

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## SYNOPSIS

A review of 62 cases of Moore's arthroplasty was done. Detailed assessment of function after Moore's arthroplasty was possible in only 25 cases. Results show that Moore's arthroplasty as a primary prosthetic replacement particularly in displaced femoral neck fractures is not entirely free of complications and excellent to good results are obtained in barely two-thirds of the cases. Whether arthroplasty has any distinct advantage over pin-plate fixation is discussed.

Indications for primary femoral head replacement and criteria unfavourable to excellent or good result are outlined.

## INTRODUCTION

Since the first description by Austin Moore in 1957,<sup>6</sup> the use of Moore's femoral head prosthesis especially for displaced fractures of the femoral neck continues to arouse interest because of the unpredictability of the post-operative results and the consequences of failure. The object of the present study is to review retrospectively the function after Moore's arthroplasty and outline the indications for Moore's femoral head prosthesis.

## MATERIAL AND METHOD

All the cases recorded were patients seen at the Department of Orthopaedic Surgery, University of Singapore. Patients who had surgery from the period 1967-1972 are reviewed. The majority of the operations were done by either consultants or registrars. The patients were recalled for an examination for this survey. Those who presented were interviewed and a clinical assessment conducted by one of the authors (C.K.C.). A radiograph of the hip was taken for radiological assessment. In case of those who did not report as much data as possible was obtained from the case notes.

The assessment of hip function was done by the method described by Margaret Shepherd.<sup>5</sup>

(1) The patient was interviewed regarding pain after the operation. (2) The mobility index was calculated using Gade's multiplication factors. (3) This was followed by an assessment of the functional activity and points were added for any decrease in functional activity. (4) Lastly the patients' own assessment was taken into account. The results were classified into excellent, good, fair and poor. (Fig. 1).

## RESULTS

A total of 62 cases of Moore's arthroplasty were done from the period 1967-1972 (6 years). The number of patients who were available for the examination for this survey was 25 (41.9%).

(62 Cases)	
Female	43
Male	19

Fig. 2. Sex distribution.

## Sex

The number of operations on women greatly outnumbered that for men and this is in keeping with the observed fact that the incidence of femoral neck fractures in elderly women is much higher than in men.<sup>1</sup>

## Age

The age of the patients ranged from 50 to 88 years (Fig. 3). However the average age for the whole series was 69.5 years which is slightly higher compared to the series reported by Anderson *et al*<sup>1</sup> in which the average age was 65.7 years.

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	Pain	Mobility index	Function by performance	Patient's assessment
Excellent	"None" or "ignores"	50 or over	5 or under and decreased post-operatively by 3 or more or 6-10 and decreased by 5 or more	Enthusiastic "yes" or "Yes, but . . ."
Good	"None" or "ignores" or less than before operation	49-20	3 or under and decreased or 4-13 and decreased by 3 or more	Enthusiastic "yes" or "Yes, but . . ."
Fair	less than, or the same as before operation, but not "disabling" or "crippling"	19-10	4 or over and decreased only by 2 or 1 or as pre-operatively or increased by 1 see note	Doubtful
Poor	"Makes concessions" and worse than before operation or "disabling" or "crippling"	Under 10	Increased by 2 or more	Not worth while

Fig. 1. Assessment Table.

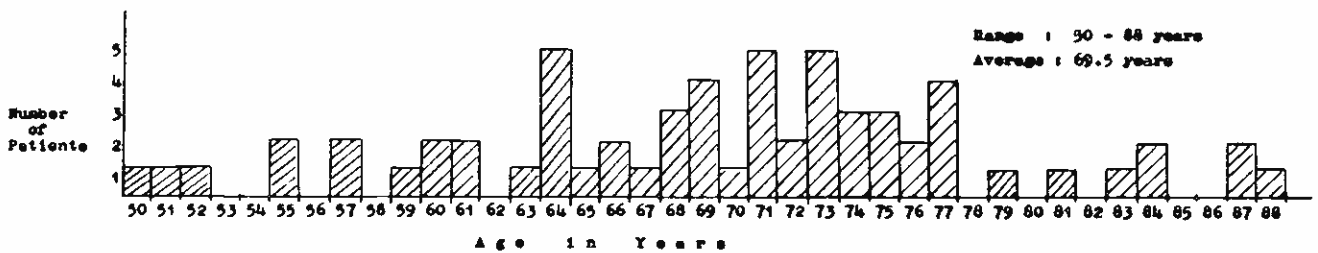


FIGURE 3: HISTOGRAM OF AGE DISTRIBUTION

**Activity Before Fall**

(62 Cases)	
Ambulant before fall	61
Not ambulant before fall	1

Fig. 4. Activity before operation.

Of the 62 cases reviewed, 61 of the patients were walking before the fall and only one patient was not ambulant before the-fall.

**Indications**

Recent, Garden Grade III or IV femoral neck fractures under 1 month	56
Non Union after femoral neck fracture over three months	6
<b>TOTAL</b>	<b>62</b>

Fig. 5. Indications.

The most common indication for Moore's femoral head prosthesis was for a displaced fracture of the femoral neck of less than one month duration (56 cases). There was one case in whom an incomplete fracture of the femoral neck became completely displaced following a second fall. The next common indication was non-union after a femoral neck fracture (6 cases) more than three months after the injury. Among these six cases, two cases had non-union of the fracture after pin and plate fixation and in one case non-union of the fracture was associated with avascular necrosis of the femoral head.

**Surgical Approach**

Anterior approach	1
Lateral approach	6
Posterior approach	55
<b>TOTAL</b>	<b>62</b>

Fig. 6. Surgical Approach.

The majority of the operations were done through the posterior (Southern)<sup>7</sup> approach (55 cases). Six cases were done by the modified posterolateral (Gibson) approach. These were done mainly in the earlier years. One case was done by the anterior (Smith-Peterson) iliofemoral approach. None of the patients had any hip flexion contracture and therefore the posterior approach was the operation of choice.

**Post-Operative Regime**

Traction	32	Antibiotics	50
Left Free	30	No antibiotics	12
<b>TOTAL</b>	<b>62</b>	<b>TOTAL</b>	<b>62</b>

Fig. 7. Post-Operative Regime.

Post-operatively 32 of the patients had Russell's skin traction for an average of two weeks while the rest were left free in bed. Those left free were mobilized as soon as possible. 50 of the patients (79.1%) were given antibiotics post-operatively for an average of two weeks.

**Follow-up**

The average follow-up of the whole series was 13.3 months. Follow-up period for the 25

cases who reported for this survey varies from 6 to 55 months, with an average of 21.4 months. The follow-up period for the rest of the 37 cases ranged from 1 to 32 months (average 7.9 months) as shown from the case records.

**Functional Assessment**

	(25 Cases)	
Excellent	15	60%
Good	1	4%
Fair	6	24%
Poor	3	12%
<b>TOTAL</b>	<b>25</b>	<b>100%</b>

Fig. 8. Functional Assessment.

Complete functional assessment following the method described by Margaret Shepherd<sup>5</sup> could only be done in 25 cases who presented for the survey. Of these 15 cases (60%) had excellent and one case (4%) had good result. Of the rest, 6 cases (24%) were fair and three (12%) poor. The percentage of excellent or good results was low (64%) compared with 87.5% reported by Anderson *et al.*<sup>1</sup> However the criteria used by Anderson *et al.*<sup>1</sup> for the functional assessment were less stringent than those used in this series.

Of the remaining 37 cases, three were not seen again or their whereabouts were not traceable after their transfer to old-folks' homes. In the rest of the 34 cases only the functional activity of walking was consistently recorded in the follow-up notes. These results are shown in Fig. 9. Only 9 cases (26.4%) could walk unaided, 12 (35.2%) required the aid of one or two sticks or crutches and 13 (38.4%) could not walk at all.

Walking unaided	9	26.4%
Walking with 1 stick	3	35.2%
Walking with 2 sticks	1	
Walking with 2 crutches	8	
Not walking at all	13	38.4%
<b>TOTAL</b>	<b>34</b>	<b>100.0%</b>

Fig. 9. Walking Activity.

**Mortality**

(11 Cases)	
Infection	5
Myocardial Infarct	3
Cerebrovascular Accident	2
Others	1
<b>TOTAL</b>	<b>11</b>

Fig. 10. Mortality.

There was a total of 11 deaths among the 62 cases giving a mortality rate of 17.7%. Deaths occurred from the sixth post-operative day up to two years and eight months. The most frequent cause of death was infection which included pneumonia, urinary tract infection and sacral sores in various combinations. Three cases died from myocardial infarction and two cases from cerebrovascular accident. In one case death occurred in the surgical ward following complications after surgery for a bladder stone. The mortality rate of 17.7% compares favourably with 33% and 31% respectively reported in the recent series by Raine<sup>8</sup> and Lunt<sup>4</sup>.

**Morbidity**

Urinary tract infection	1
Thrombophlebitis	1
Superficial wound infection	1
Deep wound infection with removal of prosthesis	1
Dislocation with removal of prosthesis	1
<b>TOTAL</b>	<b>5</b>

Fig. 11. Early Complications (6 weeks).

The early post-operative complications within six weeks were few. Four cases had infection as shown in Fig. 11. There was one case of deep infection within the first six weeks after operation which required removal of the prosthesis. In one case dislocation of the prosthesis occurred one week after operation and required removal.

Loosening in the shaft	1
Migration distally	17
Erosion of the acetabulum	3
Deep infection	1
<b>TOTAL</b>	<b>22</b>

Fig. 12. Later complications (6 weeks).

The late complications were mainly recorded from the follow-up notes and radio-graphs which were available in only 50 cases and includes the eleven cases who died. In contrast to the early complications, late complications occurring six weeks after operation were many. Migration of the prosthesis distally occurred in 17 cases, erosion of the acetabulum occurred in three cases and in one case the stem loosened in the femoral shaft. One deep infection of the wound came to light 32 weeks after the operation and this required removal of the prosthesis. Only 28 cases had no late complications.

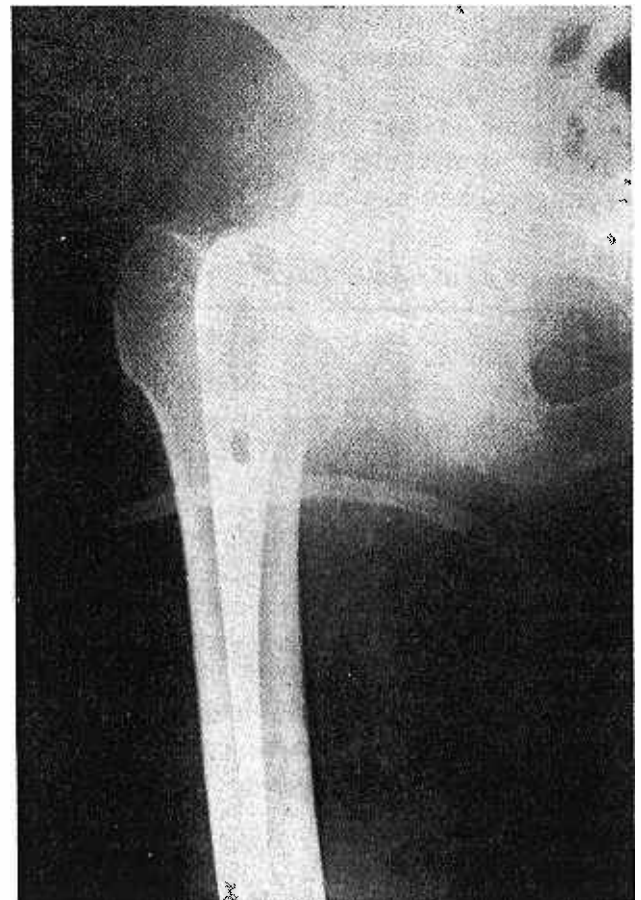


Fig. 13a. X-rays of Y.M.K., first post-operative day.



Fig. 13b. Distal migration of Moore's prosthesis occurring 19 months after operation.



Fig. 14b. Erosion of the acetabulum 30 months after operation.



Fig. 14a. X-rays of L.Y.P., first post-operative day.

## DISCUSSION

Moore's arthroplasty as a primary prosthetic replacement is done most frequently for displaced femoral neck fractures. It is sometimes offered for non-union of femoral neck fractures, osteoarthritis, rheumatoid arthritis and other conditions like avascular necrosis of the femoral head. It tends to be regarded as a quick, easy operation. The risk of failure of internal fixation and the need for a secondary arthroplasty have been the arguments to favour primary arthroplasty. Many authors Boyd (1964)<sup>2</sup>, Hunter (1969)<sup>3</sup>, and Raine (1973)<sup>8</sup> have shown that the results of using Moore's femoral head prosthesis especially for displaced femoral neck fractures are not any better compared to internal fixation with a trifin nail. Boyd and Salvatore<sup>2</sup> had reported that 56% of patients with displaced fractures treated with internal fixation obtained union without avascular necrosis. They also showed that avascular necrosis is not any more frequent in the elderly patients. Anderson *et al*<sup>1</sup> in their review of 356 femoral head prosthesis also agreed with Boyd's views that for infirm patients nailing achieves the desired objectives with less blood loss than does the insertion of a prosthesis. Raine<sup>8</sup> recently reported 60%

satisfactory results using nail fixation as compared to 30% using Moore's prosthesis.

The results of this survey have shown that majority of the patients were elderly (69.5 years) and that Moore's arthroplasty had been done most frequently for displaced fractures of the femoral neck. The assessment of function has shown a low percentage (64%) of excellent or good results. However the stringent criteria of Margaret Shepherd used for the evaluation of hip function in this series are more applicable to arthroplasty performed for osteoarthritis and rheumatoid arthritis rather than for the femoral neck fractures of the elderly. There are also no comparative figures available in Singapore of nail-plate fixation for displaced femoral neck fractures.

The mortality in this series has been from causes similar to those recorded in other series. However the mortality rate has been remarkably low.

The late complications are more frequent than realized. Three cases required removal of the prosthesis; two within the first six weeks and one after six weeks. Thus the necessity for a second operation remained in 4.8% of cases. Anderson *et al*<sup>1</sup> reported superficial infection in 2.1% of cases and deep infection in 0.7% of cases; only one prosthesis required removal for a deep infection. In their series of 163 cases, two prosthesis dislocated. Raine<sup>8</sup> reported an infection rate of 3.9% separately for both deep and superficial infections, and four dislocations of prosthesis in 52 cases. An increase of the late complications in these two series tended to lower the percentage of excellent or good results. This bears out with our observations.

In view of the results reported by Raine<sup>8</sup> and those in this series with fairly high late complication rate, it may perhaps be worth considering carefully whether it is better to try and reduce the fracture however gross the displacement may be and insert a pin and plate.

Patients should therefore be selected and given individual consideration before surgery. Anderson *et al*<sup>1</sup> had outlined that a prosthesis is indicated when,

1. The femoral neck fractures are very high, or are badly comminuted.
2. Closed reduction is impossible to obtain.

3. The femoral neck fracture is associated with a dislocation of the femoral head.
4. The fracture is pathological.
5. The patient is elderly with a short life expectancy and who before sustaining the fracture could walk only to meals and to the bathroom, or has mental illness making it difficult to prevent early weight bearing.

However they need not be considered as criteria which will give an excellent or good functional result. We feel that excellent or good results can be expected in less than two thirds of the cases and perhaps it should be avoided as a primary procedure in:

1. Elderly patients who have not been ambulant prior to the fracture.
2. Those who have had cerebrovascular accident previously with residual paresis.
3. The presence of bed sores.

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