

Early results of prosthetic hip replacement for femoral neck fracture in active elderly patients

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ABSTRACT

Purpose. To evaluate the short-term clinical and functional outcomes of total hip arthroplasty performed for physiologically active elderly patients with Garden type-3 or -4 femoral neck fracture.

Methods. Records of 47 consecutive patients (40 female, 7 male) with type-3 or -4 femoral neck fracture (Garden classification) who underwent cemented total hip arthroplasty at our hospital during January 1999 to December 2002 were reviewed. Radiological and clinical (Harris functional hip score and Oxford hip score) assessments of 38 patients were measured with a mean follow-up period of 21 months (range, 4–48 months).

Results. The mean age of the 47 patients was 75 years (range, 62–89 years). Records of 9 patients were excluded because of death, lost to follow-up, and development of deep infection that necessitated implant removal and excision arthroplasty. The mean Harris hip score of the 38 patients was 83 (range, 59–97), whereas the mean Oxford hip score was 25.2 (range, 14–33). Pain in the hips was absent in 30

patients, 6 had slight pain occasionally, and 2 patients had mild-to-moderate hip discomfort. No signs of aseptic loosening or change in implant position were noted on radiographic assessment. Two cases of dislocation were reduced by closed reduction. Two patients had deep wound infection and were treated with debridement, implant removal, and conversion to girdle stone.

Conclusion. This short-term study showed that total hip arthroplasty for femoral neck fracture had good postoperative results in functional hip and pain scores. More attention should be paid to coexisting medical illness (e.g. diabetes mellitus, hypertension, and ischaemic heart disease) and prevention of infection.

Key words: aged; arthroplasty, replacement, hip; femoral neck fractures; prostheses and implants

INTRODUCTION

It has been estimated that 1.3 million hip fractures occurred in 1990 worldwide, a figure that is expected

to double by 2025 and increase to 4.5 million by 2050.¹ Approximately half of these fractures will be intracapsular, and occur in patients aged approximately 80 years, of whom 75% affected will be female.² The management of displaced intracapsular femoral neck fracture in physiologically active patients remains a matter of hot debate, and thus is called 'unresolved fracture'.

A femoral neck fracture should be fixed surgically, unless the patient is very ill. The type of surgical procedure used depends on the type of fracture according to Garden's classification³: internal fixation is recommended for an undisplaced fracture, hemiarthroplasty (HA) or total hip arthroplasty (THA) is recommended for elderly patients with displaced fracture, and open reduction and internal fixation is preferred for younger patients. Approximately 64% of patients with femoral neck fractures undergo hip arthroplasty (90% HA, 10% THA).⁴ Arthroplasty is associated with a better outcome than internal fixation, although the superiority of one treatment over the other has not been clearly documented.⁵ One outcome study reported that mobility, institutionalisation, perceived health, hospital readmission, and risk of death were similar for patients receiving either treatment. Another study reported a trend in favour of arthroplasty, although the postoperative outcome at one year was less favourable.⁶

The use of THA over HA for displaced intracapsular fractures of the proximal femur in active elderly patients remains a matter of hot debate. Some studies have shown that such patients treated with a bipolar or unipolar HA are at increased risk of developing an acetabular erosion that may require revision.⁷ Others recommend avoiding THA in active elderly patients without pre-existing acetabular disease (e.g. osteoarthritis, rheumatoid arthritis, or Paget's disease). Although the current trend is to perform THA for intracapsular hip fracture in active elderly patients with a good life expectancy, it has been suggested that THA be reserved for patients with pre-existing symptomatic acetabular disease.⁸

In this preliminary retrospective study of 47 active elderly patients with no pre-existing acetabular disease, better results were achieved with cemented THA than HA. HA resulted in a higher incidence of groin and thigh pain secondary to acetabular erosion and stem loosening that required revision THA—a procedure that was associated with more complications secondary to poor bone stock, increasing age, and poor health.⁹ The improved functional capacity and predictability of THA prostheses over recent years have broadened the indications for THA in displaced femoral neck fractures.¹⁰ Although

THA patients were associated with higher rate of long-term complications than HA patients, THA provides good clinical results and is associated with long-term survival of the prosthesis.¹¹

The aim of the current study was to evaluate the short-term clinical and functional outcomes of THA in physiologically active elderly patients with Garden type-3 or -4 femoral neck fractures.

METHODS

47 (40 female, 7 male) consecutive physiologically active elderly patients with femoral neck fracture treated with THA at the University Malaya Medical Center from January 1999 to December 2002 were retrospectively studied.

Patients were recruited if they had a displaced intracapsular fracture of the proximal femur (Garden type-3 or -4), no pre-existing hip/acetabular disease, were independent and ambulant before injury, mentally competent, alert and oriented to time and space, and fit for surgery.

Three experienced surgeons performed all procedures using a modified Harding's lateral approach with cemented acetabular and femoral components. No antibiotic cement was used; prophylactic antibiotics and prophylaxis for deep vein thrombosis were given to all patients. Patients were allowed to mobilise on the third postoperative day. Rehabilitation and physiotherapy was performed for 2 months followed by physiotherapy at home. An abduction pillow was used during sleep to avoid dislocation. Patients were discharged on day 5 to 10 depending on the ambulatory status and wound condition (mean hospital stay, 6 days; range, 5–10 days). Sutures were removed on day 14. Clinical and radiographic examinations were performed at 1, 3, and 6 months, then yearly. Harris hip score and Oxford hip score were assessed at the most recent follow-up.

RESULTS

The mean age of the 47 patients was 75 years (range, 62–89 years), and the mean operating time was 155 minutes (range, 90–240 minutes) with a mean blood loss of 230 ml. Hip fracture occurred on the left side in 23 patients and on the right in 24. The different implant systems used are shown in Table 1. The mean follow-up period was 21 months (range, 4–48 months). Four patients were followed up for less than one year.

Table 1
Total hip arthroplasty systems

Implant system (manufacturer)	No. of patients, n=47
Exeter (Howmedica)	17
C-Stem (Johnson & Johnson)	15
Protek (Sulzer)	11
Link	2
Stanmore	2

Hip scores were assessed in 38 of the 47 patients. Three died from other medical problems (diabetes, hypertension, and ischaemic heart disease) unrelated to surgery, 2 refused to participate but were interviewed by telephone, 2 were lost to follow-up because of change of address, and 2 developed deep infection that necessitated implant removal and excision arthroplasty. No patients died within the first postoperative 6 months. Complications included bed sores (n=3), dislocation (n=2), superficial wound infection (n=3), and unstable angina (n=1).

The mean Harris hip score of the 38 patients was 83 (range, 59–97), whereas the mean Oxford hip score was 25.2 (range, 14–33) [Table 2]. 30 patients had no pain, 6 had slight pain, and 2 had mild-to-moderate pain. No signs of aseptic loosening or change in implant position were noted on radiographic assessment.

DISCUSSION

The ageing population in Malaysia continues to increase because of an improved health-care system and longer life expectancy. Hip fractures caused by primary osteoporosis are most common among Chinese women. Elderly patients with coexisting medical problems that result in a poor immune status should be prescribed antibiotics for a longer period of time. Soft-tissue contusion/bruising caused by trauma makes surrounding tissues more susceptible to bacterial infection that leads to further tethering and poor tension of soft tissues for THA. The size of the replaced head is also a contributing factor to dislocation, and causes a high dislocation rate among these patients.

Anatomic reduction followed by stable fixation while preserving the femoral head has been the treatment of choice for intracapsular femoral neck fractures among younger and more active patients.^{12–14} Although 80% of patients retain satisfactory osteosynthesis, a high incidence of nonunion, failure of osteosynthesis, and avascular

Table 2
Harris hip scores and Oxford hip scores

Hip scores	No. of patients, n=38
Harris hip score	
≥91	10
81–90	15
71–80	9
61–70	3
≤60	1
Oxford hip score	
≤20	15
21–30	17
≥31	6

necrosis of the femoral head has been reported.^{4,5,15} This has led others to consider replacement of the femoral head as an alternative.^{2,16,17} Avascular necrosis is reported to occur in a mean of 16% (range, 4–40%) of HA patients; nonunion is reported to occur in a mean of 33% of displaced fracture patients; 28% of patients with failed internal fixation require re-operation.⁹

HA and THA are commonly used for treatment of displaced intracapsular femoral neck fractures in older patients with low functional demands. Although hemiprotheses eliminate concerns about fixation failure, nonunion, and avascular necrosis, they are associated with prosthetic loosening, acetabular erosion, late groin and thigh pain, and infection. Thompson HA was initially used for cases where osteosynthesis had failed and later became the treatment of choice for intracapsular hip fractures.¹⁸ Thompson prostheses have the advantage of avoiding a prolonged period of non- or partial-weight bearing and remove the need for a second surgical procedure. Thompson HA nonetheless often produces pain and acetabular erosion with medial displacement of the femoral head leading to *protrusio acetabuli*. A bipolar HA has been designed to avoid such an acetabular erosion.¹⁹

In view of the complications and need for re-operation due to failed osteosynthesis with use of the HA, we concur that THA be performed for physiologically active elderly patients.²⁰ THA is indicated for patients with associated disease of the articular cartilage of the ipsilateral hip (rheumatoid arthritis, osteoarthritis, Paget's disease, avascular necrosis of the femoral head) or narrow proximal femur (among Asian population). The candidates for HA are patients with previous ipsilateral hip disease; active patients older than 70 years with a stress fracture attributable to osteopenia; elderly patients who have a life expectancy of not more than 15 years and want to maintain a healthy and active lifestyle; and patients with a fracture associated with metastatic disease

at the homolateral acetabulum. Revision surgery for Thompson HA complicated by acetabular erosion is very complex because removal of a well-cemented femoral component requires the removal of good bone stock. Morcelised cancellous bone graft is also required for the involved acetabulum, making the surgical procedure even more difficult. This increases the risk of surgical complications and results in a more inferior repair than a primary procedure.²¹

It is generally accepted that primary THA should be performed for patients with displaced intracapsular femoral neck fracture who have pre-existing symptomatic acetabular disease (e.g. osteoarthritis, rheumatoid arthritis, or Paget's disease). The current study nonetheless reveals that patients without pre-existing acetabular disease have comparable results with those who undergo elective THA, and better than those who undergo HA. We recommend a once-and-for-all surgical procedure—THA—that will

last for the rest of the patient's natural life and is associated with fewer complications. The long-term outcome and more detailed indications for THA as the primary treatment for displaced intracapsular hip fractures should be further investigated.

CONCLUSION

THA is recommended for active elderly patients with intracapsular femoral neck fractures because it gives consistent clinical results of excellent-to-good hip scores and better pain relief. In addition, it may last for the rest of the patient's natural life (no further re-operation is required in patients' lifetime). Co-existing medical illness with associated compromised immunity and consequent high risk of infection are factors that must be borne in mind and should be addressed accordingly.

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