

Fractured neck of femur in the mobile independent elderly patient: should we treat with total hip replacement?

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ABSTRACT

Purpose. To report the outcome of displaced sub-capital neck of femur fractures in the independent elderly (>70 years) managed with total hip arthroplasty through a modified Hardinge approach.

Methods. Between 1998 and 2000, a surgeon performed a cemented hip replacement using a modified lateral approach in 35 consecutive patients in the Hawke's Bay Regional Hospital, Hastings. Medical charts and out-patient follow-up clinic records were reviewed with respect to outcomes, with particular reference to complications. Independent review of functional outcome was completed at one year postsurgery using a questionnaire.

Results. At an average follow-up of 1.8 years (range, 1–3 years), no patient needed further surgery. One patient had died, giving a mortality rate at one year of 2.9%. All other medical complications were successfully treated. The overall prevalence of early medical complications was 43%. There were no dislocations, and 80% of patients had a good clinical outcome at their latest follow-up.

Conclusion. The modified lateral approach of Hardinge minimises the incidence of postoperative dislocation. However, there was a high incidence of medical complications and aggressive treatment of such complications was necessary, both preoperatively and postoperatively. The number of pre-existing medical conditions was a significant factor influencing patient morbidity.

Key words: femoral neck fractures; Hardinge approach; total hip replacement

INTRODUCTION

The choice of surgical treatment for a displaced intra-capsular fracture of the proximal femur in the previously independent elderly patient remains as controversial now as it was almost 50 years ago, and for this reason has been referred to as 'the unsolved fracture'. The goal of treatment of these fractures is the restoration of pre-injury function, without associated morbidity. The improved functional capacity and greater predictability of total joint

replacement prostheses have broadened the indications for joint replacement surgery in displaced femoral neck fractures over recent years.

The reported mortality rate associated with this fracture is between 14% and 36%.¹ A case fatality study in New Zealand reported a mortality rate of 8% within 35 days, and 24% within one year.² However, the population of elderly patients with hip fractures is, by nature, a diverse group. Patient subgroups based on age, ambulatory capability, home living environment, and pre-injury co-morbidities (including diabetes, heart disease, dementia, and visual impairment) all differ markedly. Different mortality rates are evident among these subgroups.

The purpose of this review was to evaluate the functional outcome of fractures of the hip in a group of previously mobile, independent, elderly patients following a total hip replacement. There is lack of agreement among New Zealand orthopaedic surgeons regarding the optimum treatment of fracture in this subgroup.³ The study by Beadel et al.⁴ suggests that a good outcome is likely in this patient group. In that study, specific emphasis was placed on the 1-year mortality and morbidity rates, and the ability to return to pre-injury level with regard to independence, walking, and performing activities of daily living.

The current study reports a consecutive series of 35 patients treated with total hip replacement through a modified lateral approach.

METHODS

Between January 1998 and October 2000, a surgeon (VSP) performed total hip replacements for 35 consecutive patients with a fractured neck of femur at the Hawke's Bay Regional Hospital, Hastings. Inclusion criteria for patient selection were: mobile independent elderly (>70 years) patient; mentally competent (mental test⁵ score >7), displaced fractured neck of femur, and surgery performed through a modified lateral approach. There were 30 women and 5 men. The patients had a mean age of 85 years (range, 70–92 years), with 14 patients aged over 85 years.

The mean delay between admission and surgery was 2.5 days (range, 1–7 days). At the time of admission effort was made to schedule all patients for surgical stabilisation of the fractured hip as soon as possible. The only patients who were intentionally delayed were those who had an active medical condition that was not well controlled, such as diabetes or congestive heart failure. Associated medical conditions were seen in the majority (68.5%; n=24) of patients preoperatively. These included

significant cardiovascular disease (34%; n=12); pulmonary disease (20%; n=7); metabolic conditions, including diabetes, alcoholism, chronic renal failure (30%; n=10); and neurological disorders including stroke, transient ischaemic attack, and Parkinson's disease (20%; n=7). The mean number of preoperative medical conditions was 1.7 per patient. 15 patients had no or minimal medical co-morbidities.

Each patient received 24 hours of prophylactic antibiotics beginning prior to the surgical incision. None of the patients received routine anticoagulant therapy. All of the procedures were performed using the Exeter hip system (Howmedica International Inc., Clare, Ireland) with a 28 mm modular head, and cemented acetabular and femoral components. The capsule-retaining modified lateral approach of Hardinge⁶ was used in all patients, under spinal anaesthesia, with or without general anaesthesia. This modified approach⁷ differed from the original approach described by Hardinge in several ways:

- (1) Only the anterior third of the gluteus medius was split in line with its muscle fibres;
- (2) The split in the gluteus medius and minimus was limited to 3 cm cephalad to the greater trochanter;
- (3) The hip was exposed through a T-shaped incision in the capsule;
- (4) The capsule was retained and repaired; and
- (5) A gluteus-vastus flap was sutured to the bone with number 5 Ethibond Excel sutures (Ethicon, Somerville, US).

Care was taken to orientate the acetabular component in a position of 30°–40° inclination in the coronal plane, and of 15° anteversion in the sagittal plane, whereas the femoral component was oriented at 10° of anteversion. Mean blood loss during surgery was 250 mL, and mean time taken for the procedure was 70 minutes.

Table 1
Co-morbidities and postoperative complications in independent elderly patients undergoing total hip replacement (n=35)

| | ASA* 1 (n=5) | ASA 2 (n=10) | ASA 3 (n=11) | ASA 4 (n=9) |
|-----------------------|-----------------|-----------------|-----------------|----------------|
| No complication | 4 | 9 | 9 | 4 |
| Death at one year | 1 | 0 | 0 | 0 |
| Medical complications | 0 | 1 | 2 | 5 |
| 1 complication | 0 | 1 | 0 | 0 |
| 2 complications | 0 | 0 | 2 | 1 |
| 3 complications | 0 | 0 | 0 | 2 |
| 4 complications | 0 | 0 | 0 | 2 |

* American Society of Anesthesiologists grading

Table 2
Clinical outcome assessed by patient questionnaire (n=24)

| | Prior to surgery | One year postsurgery |
|---|------------------|----------------------|
| 1. Living situation | | |
| Home | 86% | 70% |
| Rest home | 14% | 30% |
| 2. Amount of pain experienced from the hip | | |
| No/occasional pain | – | 79% |
| Pain after activity | – | 21% |
| Severe pain limiting activities of daily living | – | 0 |
| 3. Does pain interfere with sleep? | | |
| Yes | – | 13% |
| 4. Need for pain medication because of the hip | | |
| No/occasional pain relief | – | 91% |
| Regular pain relief | – | 9% |
| 5. Ability to walk | | |
| Unlimited | 64% | 32% |
| 30 minutes outdoors | 32% | 50% |
| Limited indoor walking | 5% | 18% |
| 6. Ability to climb stairs | | |
| Normal | 65% | 24% |
| Only with an aid | 35% | 67% |
| Unable to climb stairs | 0 | 9% |
| 7. Use of walking aid | | |
| None | 61% | 26% |
| Only for long distances | 4% | 22% |
| Dependent on crutch/walker | 34% | 52% |
| 8. Ability to put on shoes & socks | | |
| Without any difficulty | 87% | 52% |
| Only with difficulty | 9% | 30% |
| Unable to put on shoes and socks | 4% | 17% |
| 9. Ability to drive | | |
| Yes, able to drive | 41% | 14% |
| No, for reasons other than the hip | 59% | 68% |
| No, due to the hip | | 18% |
| 10. Ability to do housework | | |
| Yes | 65% | 22% |
| Only some housework | 26% | 57% |
| Unable to do housework | 9% | 22% |
| 11. Sport or hobbies | | |
| Unrestricted | 48% | 11% |
| Modified | 33% | 61% |
| Unable to pursue sport or hobbies | 19% | 28% |
| 12. Ability to get into and out of a chair | | |
| Normally | 88% | 54% |
| With some difficulty | 12% | 46% |
| 13. Limp: Yes | 5% | 25% |
| 14. Noticeable change in limb length | – | 10% |

Postoperatively, a knee splint was used to keep the knee straight, and a pillow was placed between the knees to prevent adduction for one to 2 days. High-risk patients, that is, those designated American Society of Anesthesiologists (ASA) grade 3 and 4 (Table 1), were transferred to a high-dependency unit for a period of one to 2 days, and were transferred to the ward only when their condition became stable. All

patients followed a specific occupational therapy and physiotherapy protocol that included avoidance of $>90^\circ$ hip flexion and adduction. These anti-dislocation precautions were maintained for 3 months post-operatively.

The patients were evaluated at 3-month and 1-year postsurgery follow-up sessions. Medical charts and out-patient follow-up clinic records were reviewed

(NW), with particular reference to complications. The 1-year follow-up evaluation was performed using a detailed patient questionnaire,⁷ or by telephone interview by an independent examiner (DA).

RESULTS

One patient died on postoperative day 3. All the remaining 34 patients were assessed for outcome and complications for a period of at least 12 months, or until the patient died. The mean duration of follow-up was 1.8 years (range, 1–3 years).

Follow-up

Of the 34 patients, 6 died after the 1-year follow-up due to causes unrelated to the surgery. These patients were doing well at their 1-year follow-up. 24 patients of the remaining 28 patients responded to the questionnaire, yielding a response rate of 86%. The 4 patients who declined to answer the questionnaire were further assessed by telephone interview, and all were doing well with regard to pain and mobility, although there was some deterioration in their activities of daily living. A summary of patient clinical outcomes is shown in Table 2. The majority had returned to close to their pre-injury status with respect to pain, walking, and activities of daily living.

Mortality

None of the patients died during surgery. One patient died from a massive stroke 3 days after the operation, and 6 died due to unrelated causes after the 1-year follow-up. The mortality rates were therefore 2.9% at one year, and 20% at 2 years.

Morbidity

The majority of patients had at least one significant medical co-morbid condition preoperatively. Surgery was performed after medically stabilising the patient, with the mean delay between admission and surgery 2.5 days. In total, 21 complications were seen in 8 patients—one in ASA grade 2, 2 in ASA 3, and 5 in ASA 4 (Table 1). Postoperative medical complications included cardiac complications in 6 patients (3 angina, 2 arrhythmia, and one congestive cardiac failure) transient ischaemic attack or mild stroke (n=2), urinary tract infection (n=5), chest infection (n=4), and gastrointestinal complications (n=4). Most of the

complications were minor and responded well to medical treatment. Significant complications included one death due to massive stroke and one partial stroke (right arm). One patient had mild myocardial infarction, and 2 had gastric bleeding. A total of 26 (74%) patients had a completely uneventful operative and postoperative course. There were no dislocations, or cases of deep vein thrombosis or pulmonary embolism. There was one case of wound infection, which responded well to wound care and antibiotic treatment.

Rehabilitation

The average stay in hospital was 11 days (range, 6–16 days). Of those patients who lived in their own homes prior to the fracture, 83% were able to return home. The remaining patients were discharged to rest homes.

DISCUSSION

In 1998, Scott et al.³ sent a questionnaire regarding the treatment of fractured neck of femur to all orthopaedic specialists in New Zealand. The only group in which there was disagreement about treatment was in previously independent elderly patients who were not cognitively impaired. The controversy was whether to treat this fracture with total hip replacement, hemiarthroplasty, or internal fixation. A high failure rate with internal fixation,^{8–10} and a high incidence of acetabular erosion¹¹ with hemiarthroplasty in patients with high activity levels have been reported. Presently, total hip replacement appears to be the best option.^{8–10,12–19} Total hip replacement is a major intervention, and it is logical to expect more complications with such treatment. However, 2 prospective studies^{9,10} have shown no differences in mortality and morbidity among the 3 different treatments, although total hip arthroplasty resulted in better relief of pain and better function.

Traditionally, the outcomes or results of treatment of femoral neck fractures in elderly patients have been measured by limited standards based on arthroplasty hip scores. The main drawback of the Harris scoring²⁰ is that it fails to consider other factors such as medical co-morbidities that contribute to decreased function. Wright and Young²¹ categorised and compared pre-injury and post-injury walking as an outcome measure. He emphasised the return of the patient to their pre-injury functional status as the true indicator of

successful treatment. When these criteria were used in this study, 79% of patients had minimal, or no pain and 82% could walk for at least 30 minutes. Of those from their own homes, 83% were able to return home (Table 2).

The current overall mortality in elderly patients one year after hip fracture ranges from 14% to 36%.^{1,2,22,23} Many investigators^{1,2} have found that advancing age is associated with increased mortality after fracture of the hip. However in our group, 14 patients were aged over 85 years, and were well at the 1-year follow-up. The 1-year mortality in this series was 2.9%. The preoperative vitality and mental competence of patients, rather than age *per se*, appeared to be 2 important determinants of low mortality.

Kenzora et al.²³ reported that the presence of 4 or more medical co-morbidities significantly increased the mortality rate. In this series, 70% of patients had co-morbidities. This may explain the increased incidence of postoperative medical complications (Table 1). These complications were detected early, and responded well to medical management.

A high incidence of prosthetic dislocation has been reported in fractured neck of femur treated with a total hip replacement.^{12,14,17} By contrast, there were no dislocations in this series of relatively fit patients. We believe that good stability of the joint can be achieved following total hip joint replacement with a capsule-retaining modified Hardinge approach.⁷

Previous studies^{9,10,12} have shown that, despite a high rate of early complications, the durability of a total hip replacement for the treatment of acute femoral neck fracture in the elderly is good. The revision rate in these studies was below 5% at 10 years. This is in contrast to the findings of Greenough and Jones,²⁴ who reported a 49% revision rate in 37 patients followed for a mean

of 56 months.

Our results are consistent with other reported series^{8-10,12-19} and indicate that total hip arthroplasty has a definite place in selected patients with acute femoral neck fractures. We believe this procedure is best reserved for active elderly patients who have fractures and thus standard internal fixation has a high potential for failure (for example, the high displaced subcapital fracture), or for patients who have significant pre-existing hip disease. Cost-benefit analysis of surgical treatment has shown that total hip replacement is the most cost-effective treatment when complication rate, mortality, re-operation rate, and function are evaluated over a 2-year postoperative period.²⁵

This study reports a relatively small patient series. If similar results were obtained in a larger, prospective, randomised trial, this would confirm our belief that the gold standard treatment for displaced subcapital fractures of the femur in previously independent, active elderly patients is primary total hip arthroplasty via the modified Hardinge approach.

ACKNOWLEDGMENTS

The authors are grateful to Mr G Curtis, Mr D Atkinson, Mr Elliott, Mr DA Lawson, and Mr S Bentall, consultant orthopaedic surgeons, Health Care Hawkes Bay, for allowing us to study their patients. We are also grateful to Dr Peter Lloyd for his help in preparing the manuscript, and to the medical records department, Health Care Hawkes Bay, for their assistance.

No benefit in any form have been received or will be received from any commercial party related directly or indirectly to the subject of this article.

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