



International Journal of Critical Care and Emergency Medicine

REVIEW ARTICLE

The Outcome of Undisplaced Femoral Neck Fracture in Elderly

Adnan A Faraj, FRCS^{1,2,3*}, Parvez Hussain, MRCS⁴ and Karthika Velusamy, MBBS⁵

¹Consultant Orthopaedic Surgeon, Department of Orthopaedic, Scarborough Teaching Hospital, United Kingdom

²Department of Orthopaedic, Bridlington Hospital, United Kingdom

³Associate Professor, Kirkuk Medical School, University of Kirkuk, Iraq

⁴Core Training Doctor, Department of Orthopaedic, Scarborough Teaching Hospital, United Kingdom

⁵Foundation Year 1 Doctor, Department of Orthopaedic, Scarborough Teaching Hospital, United Kingdom

*Corresponding author: Adnan A Faraj, FRCS, Consultant Orthopaedic Surgeon, Department of Orthopaedic, Scarborough Teaching Hospital, Scarborough; Bridlington Hospital, Bessingby Road, Bridlington, YO16 4QP, United Kingdom; Associate Professor, Kirkuk Medical School, University of Kirkuk, Iraq, Tel: 00441262-606666



Abstract

The management of Garden type 1 and 2 undisplaced proximal femoral intracapsular fracture in elderly patients is controversial. Many options including arthroplasty and fixation have been suggested based on patient's age and cognitive function.

We have retrospectively reviewed 85 elderly patients with undisplaced femoral neck fracture. The mean age of the cohort was 81 years. 52 patients were treated with cemented hemi-arthroplasty, 19 with dynamic hip screw fixation, 10 had cannulated screw fixation, total hip replacement in 3, and conservative management for one patient. We reviewed the cohort for a mean period of 3 years and we looked into their general complications, local complications related to the hip and mortality.

Findings: 86% of patients treated with hemiarthroplasty and 44% of patients treated with fixation (of which 40% were treated with cannulated screws and 32% with Dynamic Hip screw), had good outcome. All the patients treated using total hip replacement, the patient treated conservatively, also had good outcome and 56% of the fixation group had poor outcome.

The good results of hemiarthroplasty were predictable for patients with ASA III (27), and ASA IV (11). Patients chosen to have THR had better ASA grade than the remaining. In general the outcome in arthroplasty group was superior to the DHS and cannulated screws.

Conclusion: From the study it is clearly evident that arthroplasty provides better outcome for elderly patients with undisplaced femoral neck fracture especially with poor cognitive function.

Keywords

Undisplaced, Fracture, Neck, Femur, Replacement, Fixation, Outcome

Introduction

The management of displaced intracapsular femoral neck fracture in elderly is often with hip arthroplasty (partial or total) [1,2]. In the undisplaced group, internal fixation using dynamic hip screw or cannulated screws becomes the first option. The outcome of fixation is reported to be better than arthroplasty in some literature. In a systematic review and despite a rate of complications using cannulated screws [1-9], the results were satisfactory and the option remains a valid one. However, there also are reports of a good outcome using hemiarthroplasty of the hip [6].

The current paper reports on the outcome of fixation, replacement of the hip for undisplaced femoral neck fracture.

Material and Methods

This study was conducted in the orthopaedic department, Scarborough York teaching Hospital- North Yorkshire in-between Jan 2015-Jan 2016. One patient was not fit for anesthetics and had to be treated conservatively.

All patients captured in the study, sustained undisplaced femoral neck intracapsular fracture requiring surgery. Displaced, pathological intracapsular fracture of the neck of femur and extra-capsular fractures and patients with lack of medical record and younger patients than 77 were excluded. The procedure was performed within 36 hours of the injury and admission to

hospital. The patients were treated as an emergency procedure by the on call team. Seven orthopaedic consultants and their team were involved.

The data obtained was via computerized patient's records, the medical file, and radiographs were reviewed. Included in the assessment, were comorbidities, mental score (out of 10), the American scoring for anaesthesiologist (ASA) of the patients, the procedure performed, and the outcome including complications. Patients with mental score of less than 7 are considered to be demented.

The procedures performed were cemented hemiarthroplasty (52), dynamic hip screw with cannulated screw fixation (19), cannulated screw fixation (10), total cement hip replacement (3), conservative (1).

The criteria for using a procedure are decided upon after considering several factors:

- Independent, active patients with ASA II or III are usually given the option of total hip replacement (NICE). The patient should be able to shop and walk independently or with a stick prior to surgery.
- Patients over the age of 75, with dementia and High ASA are offered hemiarthroplasty. This is because there is a high chance of failure of internal fixation because of the coexisting osteoporosis
- Patients who are likely to dislocate arthroplasty because of neurological problems, those with good bone quality and younger patients who may outlive arthroplasty are offered internal fixation. DHS is used to supplement the screw fixation to encourage weight bearing.

The follow-up was monitored through the computerised medical file review at the time of latest follow-up in 2018.

Eighty five patients were included, mean age of these patients were 81 (77-97), female to male ratio was 61/24. Radiographs were checked by foundation and core training doctors and when in doubt the consultant was consulted.

Plain X-ray included anteroposterior radiograph of pelvis centred on pubis.

Garden classification was used, 69 were Garden 2 and the remaining was Garden 1.

ASA scoring were, The ASA score, hemi (ASA II (11), ASA I (3), ASA III (27), ASA IV (11). ASA score for the THR group was ASA III (2), ASA II (1).

ASA score for the DHS group: ASA I (1), ASAII (4), ASAIII (11), ASA- IV (3).

Cannulated screw group, ASA score (4), ASA II (2), ASAIII (2) and ASA IV (2).

Unfortunately the mental score was not recorded in the first 14 patients; it was however documented

in the remaining one patient with ASA IV, was treated conservatively.

The procedures performed at the discretion of the surgeon was cannulated screw fixation of the fracture (7), dynamic hip screw (19).

The results were analysed following discharge of the patient from the hospital.

Results

85 patients were included. The results were rated well when was mobilized within 3-5 days of injury without immediate postoperative complications and discharged safely.

Poor outcome indicated when there were generalised or localised complications, with chronic pain. Early death was in this category too.

The incidence of dementia is the group (mental score of less than 7), cannulated screw (2), hemiarthroplasty (18/52), DHS group (6/19). The THR group's mental score were normal (3). One patient with dementia was treated for medical and anaesthetics risks, conservatively.

Accordingly, the percentage of good results in each category was as follows: Hemiarthroplasty, 45/52 good (86%) results. DHS; 13 good results (19) 68%, cannulated screw: 6 good results 60%, THR 100%.

Complications

Prominent screws and pain in one case of the cannulated screw group, 1/10.

Infection: One patient who has had hemiarthroplasty. One hemiarthroplasty had dislocation and another one had periprosthetic intraoperative fracture treated by circumferential wires around the hemiarthroplasty. A DHS cutout for which THR was performed. In another case, 2 years after the DHS avascular necrosis.

Death

Thirty six patients passed away at the latest review of medical notes. The medical notes put the following causes of death on the death certificate, gastrointestinal tract (GIT) causes (bowel perforation 9 early), volvulus (early), GIT bleeding (early), and peritonitis (early). Cardiovascular system: Heart failure and myocardial infarction early stroke. Respiratory: Two cases of pneumonia and aspiration pneumonia. Frailty (and unknown) causes were considered to be other causes of death. The death occurred mainly in the first month of the injury, in one patient, the death occurred after a month and in one; a year after surgery. In one, the cause of death was gastrointestinal bleed 2 years after surgery.

The correlation between mortality and ASA, procedure and mental score. The cause of death in patients who have had in cemented hemiarthroplasty was due to myocardial infarction, pneumonia. In the dynamic hip fixation group, GIT tract complications were the main

cause of death, but also failed DHS in a case and further surgery.

The mortality rate in general was higher in the ASA III & IV regardless of the mental score.

Discussion

In a comparative study of elderly patients with impacted femoral neck fracture treated by multiple cannulated screws or by hemiarthroplasty, there were no statistical significant differences in the functional outcome. The results were rated as excellent and good on the midterm with good hip joint function in hemiarthroplasty group as compared to the screw fixation group (P value less than 0.05) [6], the early follow-up was however, similar, comparing multiple screw/DHS with hemiarthroplasty. Patients who had fixation in this study were allowed full weight bearing. It was worth noting though that the 30 day mortality was higher in the hemiarthroplasty group and late mortality rate was higher in the DHS group.

In a retrospective study on 13772 patients with undisplaced femoral neck fracture treated either by fixation or hemiarthroplasty; the short-term overall mortality and medical complication rate of fixation for undisplaced fracture were slightly lower than those of hemiarthroplasty for displaced fracture [2]. However, the short-term cumulative incidence of first reoperation after fixation was significantly higher than that for hemiarthroplasty. In the current paper, the incidence of reoperation was higher in the hemiarthroplasty group mainly for dislocation, and periprosthetic fracture. The short-term overall mortality and medical complication rate of fixation for undisplaced fracture were slightly lower than those of hemiarthroplasty for undisplaced fracture in this series too.

Internal fixation with cannulated screws for undisplaced intracapsular femoral neck fracture in the elderly is a valuable option [4]. In a study, the incidence of avascular necrosis was higher in the conservative group 10.3% (39/380), while it was 7.7% (159/2074) in the surgically treated group ($p = 0.09$) [7].

There seem to be a trend for the increased use of hemiarthroplasty for undisplaced femoral neck fracture, seen in the Norwegian hip fracture data base, the proportion increased from 2.1% in the first period (2005-2006) to 9.7% in the last period (2013-2014), the remaining underwent screw fixation [7]. In the current paper, the incidence of hemiarthroplasty to the other modalities of treatment was 61%. We believe that the trend has changed as the results of hemiarthroplasty are reproducible more than the other modalities of treatment [7,8]. In patients other than the extreme elderly, medically infirm, neurologically impaired, or with little or no ambulatory capacity, the evidence to support hemiarthroplasty/total arthroplasty is however lacking. Comparing hemiarthroplasty results to total hip repla-

cement, in a meta-analysis of 14 studies showed a lower risk of reoperation after total hip arthroplasty compared with hemiarthroplasty (relative risk 0.57, 95% confidence interval 0.34 to 0.96, risk difference 4.4%, 95% confidence interval 0.2% to 8.5%), although this effect was mainly driven by investigations without concealed treatment allocation (3). In functionally independent patients without cognitive impairment, total hip is favoured on hemiarthroplasty [5].

The factors attributed to the failure of fixation, has been blamed on the bone quality; this however has been debated. In a study on 83 patient with impacted femoral neck fracture treated with cannulated screws, significant femoral neck shortening was not found to be related to poor bone quality measured by DEXA scan. In multivariate analysis, old age (odds ratio [OR], 1.10; 95% confidence interval [CI], 1.03-1.21) and screw non-parallelism (OR, 2.95; 95% CI, 1.44-6.59) were significant risk factors for SFNS (Significant Femoral Neck Shortening). The incidence of SFNS was significantly higher in the complication group ($p = 0.027$) [8]. Garden 1 fractures collapse in a study, was found to be less frequently than Garden 2 fractures, but both have high rates of fracture collapse when treated to union with *in situ* percutaneous pin fixation [9]. We did not notice this in our study.

Conclusion

The outcome of femoral neck fracture treated with hemiarthroplasty is better than internal fixation. Internal fixation should be spared for those with good bone quality.

References

1. Dolatowski FC, Randsborg PH, Utvåg SE, Jakobsen RB (2017) Comment on the article: Hemiarthroplasty versus internal fixation in super-aged patients with undisplaced femoral neck fractures: A 5-year follow-up of randomized controlled trial. *Arch Orthop Trauma Surg* 137: 1269-1270.
2. Lin JC, Liang WM (2015) Outcomes after fixation for undisplaced femoral neck fracture compared to hemiarthroplasty for displaced femoral neck fracture among the elderly. *BMC Musculoskelet Disord* 16: 199.
3. Cronin PK, Freccero DM, Kain MS, Marcantonio AJ, Horwitz DS, et al. (2019) Garden 1 and 2 femoral neck fractures collapse more than expected after closed reduction and percutaneous pinning. *J Orthop Trauma* 33: 116-119.
4. Hopley C, Stengel D, Ekkernkamp A, Wich M (2010) Primary total hip arthroplasty versus hemiarthroplasty for displaced intracapsular hip fractures in older patients: Systematic review. *BMJ* 340: 2332.
5. Hoskins W, Webb D, Bingham R, Pirpiris M, Griffin XL (2017) Evidence based management of intracapsular neck of femur fractures. *Hip Int* 27: 415-424.
6. Lu Q, Tang G, Zhao X, Guo S, Cai B, et al. (2017) Hemiarthroplasty versus internal fixation in super-aged patients with undisplaced femoral neck fractures: A 5-year follow-up of randomized controlled trial. *Arch Orthop Trauma Surg* 137: 27-35.

7. Jan-Erik Gjertsen, Eva Dybvik, Ove Furnes, Jonas M Fevang, Leif I Havelin, et al. (2017) Improved outcome after hip fracture surgery in Norway. 10-year results from the Norwegian hip fracture register. *Acta Orthop* 88: 505-511.
8. Oñativia IJ, Slulittel PAI, Diaz Dilernia F, Gonzales Vieczcas JM, Vietto V, et al. (2018) Outcomes of nondisplaced intra-capsular femoral neck fractures with internal screw fixation in elderly patients: A systematic review. *Hip Int* 28: 18-28.
9. Sung YB, Jung EY, Kim KI, Kim SY (2017) Risk factors for neck shortening in patients with valgus impacted femoral neck fractures treated with three parallel screws: Is bone density an affecting factor? *Hip Pelvis* 29: 277-285.