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Shahryar Noordin

*Aga Khan University, shahryar.noordin@aku.edu*

Shahbano I

*Aga Khan University*

Tashfeen Ahmad

*Aga Khan University, tashfeen.ahmad@aku.edu*

Idrees Shah

*Ziauddin University Hospital, Karachi.*

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## Intertrochanteric hip fractures in octogenarian patients: Do we need to rethink fixation strategy?

Shahryar Noordin,<sup>1</sup> Shahbano,<sup>2</sup> Tashfeen Ahmad,<sup>3</sup> Idrees Shah<sup>4</sup>

### Abstract

**Objective:** To compare outcomes in octogenarians with younger patients up to 1 year after undergoing dynamic hip screw fixation for intertrochanteric fractures to see the effectiveness of the implant.

**Methods:** The retrospective case-control study was conducted at The Aga Khan University and comprised records of patients who underwent dynamic hip screw surgery between January 1, 2010, and December 31, 2012. They were divided into two groups based on their age: Group A <80 years; and Group B >80 years. All patients had a one-year follow-up. Data including mortality, morbidity, radiological healing time, postoperative ambulatory status and Harris hip score were recorded.

**Results:** Of the 150 patients, 114(76%) were in Group A and 36(24%) were in Group B. Up to 25(70%) of octogenarians dropped their ambulatory ability by one or two levels, whereas 107(94%) of Group A patients were able to either maintain their pre-injury ambulatory ability or dropped their ambulation by one level only (p=0.02). Postoperative complications were higher in Group B 9(25%) compared to Group A 4(4%). One-year mortality was also significantly higher in Group B 8(22%) compared to Group A 9(8%) (p=0.03).

**Conclusion:** Octogenarians undergoing internal fixation with dynamic hip screw had higher frequency of complications and death compared to younger patients.

**Keywords:** Octogenarian, Inter-trochanteric fracture, Internal fixation, Hip arthroplasty, Mortality. (JPMA 65: S-59 (Suppl. 3); 2015)

### Introduction

Fractures of the hip, particularly those occurring in the elderly, are medical, social and economic challenges throughout world. The number of hip fractures occurring each year in an older and fragile population is increasing. It is estimated that the incidence of hip fracture worldwide will rise from 1.66 million in 1990 to 6.26 million by 2050.<sup>1,2</sup> About 20% patients with hip fracture die within a year after hip fracture, and many of the remaining experience significant functional loss. Its incidence is highly variable among different population groups around the globe. Exact incidence in Asian population is not known. In one study from India the crude rate of hip fracture was found to be 159 and 105 per 100,000, respectively, in women and men above the age of 50 years.<sup>3</sup>

Intertrochanteric fractures comprise a major portion of hip fractures, usually resulting from low-energy trauma (such as fall from standing position or walking) in the elderly population. Women who sustain intertrochanteric fractures are more likely to be slightly older, more dependent in activities of daily living, and typically are

limited to home ambulant status before their fracture compared to women who sustained femoral-neck fractures.<sup>1,4</sup> The reported female-male ratio for this injury ranges from 2:1 to 8:1. Mortality rates for patients with intertrochanteric fractures are comparable with those reported for femoral-neck fractures, ranging from 14% to 50% within the first year of injury.<sup>5</sup>

Operative management is the treatment of choice for both undisplaced and displaced intertrochanteric hip fractures. The surgical goal is to achieve and maintain a stable fracture reduction, to allow early mobilisation postoperatively. Since non-weight-bearing or partial weight-bearing ambulation is difficult for the elderly patients, any fracture fixation technique chosen should allow ambulation with weight-bearing as tolerated. Achieving this goal is dependent on a number of factors, including the fracture pattern, the stability of the reduction, and the method of fixation chosen. A number of implants have been used for the stabilisation of intertrochanteric hip fractures, including extra-medullary sliding hip screws, intra-medullary proximal femoral nails and recently even arthroplasty, but the ideal treatment is not yet defined. However, the dynamic hip screw (DHS) is the device most commonly used for fixation of intertrochanteric hip fractures but it is not free from the risk of cutout, instability, and delayed/impaired ambulation,

<sup>1</sup>Consultant Orthopaedic Surgeon, <sup>2</sup>Medical Student, <sup>3</sup>Orthopedics, Aga Khan University Hospital, <sup>4</sup>Ziauddin University Hospital, Karachi.

**Correspondence:** Shahryar Noordin. Email: shahryar.noordin@aku.edu

especially those with unstable fracture patterns.

The current study was planned to compare outcomes in octogenarians up to 1 year after undergoing DHS fixation for intertrochanteric fractures with younger patients to see the effectiveness of this implant for the elderly.

## Patients and Methods

The retrospective case-control study was conducted at the Aga Khan University and comprised records of patients who underwent DHS surgery between January 1, 2010, and December 31, 2012. They were divided into two groups based on their age: Group A <80 years; and Group B >80 years. All patients underwent internal fixation with DHS by different orthopaedic surgeons of the unit with the aim of restoring pre-injury ambulatory status. All patients were managed with similar postoperative course.

**Table-2:** Ambulatory Status.

	Ambulation before injury		p-value	Ambulation six month after DHS		p-value
	Group A (age < 80 years) N=114	Group B (age ≥ 80 years) N=36		Group A (age < 80 years) N=114	Group B (age ≥ 80 years) N=36	
Non ambulant	0	0	NS	9 (8%)	6 (17%)	<0.05
Household ambulant	26 (23%)	13 (36%)		46 (40%)	17 (47%)	
Community ambulant with support	35 (31%)	13 (36%)		40 (35%)	13 (36%)	
Independently ambulant	53 (46%)	10 (28%)		19 (17%)	0	

DHS: Dynamic hip screw.

Patients with pathological hip fractures, history of previous hip fracture, associated long-bone fracture and bed-bound patients were excluded. Medical charts were used to retrieve data. Both groups were followed for up to one year for morbidity, mortality, radiological healing and functional status.

## Results

Of the 150 patients, 114(76%) were in Group A and 36(24%) were in Group B. Overall there were 81 females and 69 males with a mean age of  $73 \pm 7.3$  years. The two groups were comparable in terms of demographics (Table-1).

Most common reason for injury was ground-level fall 117(78%), other mechanisms included fall from height 16(11%), road traffic accident 15(10%) and firearm injury 2(0.6%). Hypertension was most common associated co-morbid 82(55%) followed by diabetes 46(31%), ischemic heart disease 33(22%), chronic obstructive pulmonary disease 19(13%), chronic renal failure 10(7%) and dementia 1(0.6%). Nineteen (13%) patients had two or more co-morbid.

**Table-1:** Demographics and Co-morbid.

	Group A (age < 80 years) N=114	Group B (age ≥ 80 years) N=36
Mean age (years)	68 ± 9.3(33-79)	89 ± 3.7(82-96)
Male	57 (50%)	12 (33%)
Female	57 (50%)	24 (67%)
Diabetes	39 (34%)	08 (22%)
Hypertension	61 (54%)	21 (58%)
COPD	12 (11%)	08 (22%)
Ischemic heart disease	31 (27%)	02 (6%)
Chronic renal failure	07 (6%)	04 (11%)
Dementia	0	02 (6%)
≥ 2 comorbid	14 (12%)	05 (14%)

COPD: Chronic obstructive pulmonary disease.

**Table-3:** Change in ambulatory status.

	Status at one year follow up		p-value
	Alive N=133	Dead N=17	
No change in ambulation	59 (44%)	04 (24%)	
Ambulation dropped by one level	67 (50%)	09 (52%)	0.015
Ambulation dropped by two levels	07 (6%)	04 (24%)	

**Table-4:** Morbidity and Mortality.

	Group A (age < 80 years) N=114	Group B (age ≥ 80 years) N=36
Wound infection	4 (3.5%)	3 (8.3%)
Chest infection	06 (5.3%)	03 (8.3%)
UTI	8 (7%)	11 (31%)
Bed sores	2 (1.7%)	03 (8.3%)
MI	0	03 (8.3%)
Mortality at one year	9 (7.8%)	08 (22%)

UTI: Urinary tract infection

MI: Myocardial infarction.

**Table-5:** Outcome.

	Group A (age < 80 years) N=114	Group B (age ≥ 80 years) N=36
Mean Harris Hip Score at six months	70 ± 6.5	55 ± 5.3
Mean radiological healing time (weeks)	10 ± 1.6	11 ± 1.7
DHS cutout	02 (2%)	03 (8%)

DHS: Dynamic hip screw.

More unstable fracture pattern was observed in Group B 20(56%) than Group A 21(18%). Pre-injury ambulatory status was comparable in the two groups, while postoperative ambulation was significantly different statistically (Table-2).

Less than half of patients were able to regain their pre-injury ambulatory status at six month after surgery. Seventeen (11%) patients were dead at one-year follow-up. Among those who expired, 13(76%) had dropped their ambulation by one or two levels at six-month follow-up ( $p=0.015$ ) (Table-3).

Mortality rate was significantly higher in group B 8(22%) compared to Group A 9(7.8%). Similarly, other complications were also higher in Group B, including wound infection, chest infection, urinary tract infection (UTI) and bed sores. Cardiovascular complications occurred in 3 (8%) patients in Group B compared to none in Group A (Table-4).

Regarding outcome parameters, mean Harris hip score was  $70\pm 6.5$  in Group A, while it was  $55\pm 5.3$  in Group B at six months postoperatively. Mean radiological healing time was comparable in both groups, but DHS lag screw cutout rate was significantly higher in Group B {3(8%) Vs 2(2%)} (Table-5).

## Discussion

Operative management is the treatment of choice for both undisplaced and displaced intertrochanteric hip fractures, but the ideal treatment has not been well defined yet. The surgical goal is to achieve and maintain a stable fracture reduction to allow early patient mobilisation.

Today, the sliding hip screw is the device most commonly used for fixation of intertrochanteric hip fractures.(6-8). The most important aspect of its insertion is secure placement within the femoral head. Although the sliding hip screw allows postoperative fracture impaction, it is essential to obtain an impacted reduction at the time of surgery.

Intramedullary hip screws have recently been introduced for the treatment of intertrochanteric fractures. These devices combine the features of a sliding hip screw and an intramedullary nail and have theoretically technical and mechanical advantages. Theoretically, they can be inserted in a closed manner with limited fracture exposure, resulting in less blood loss and less tissue damage than with sliding hip screw. In addition, these devices are subjected to a lower bending moment than the sliding hip screw due to their intramedullary location. However, recent studies have found no clinical advantage with the intramedullary hip screw compared with the sliding hip screw.<sup>9</sup> Although intramedullary hip screws have not been shown to be superior to the sliding hip screw, but they may have selected indications.<sup>5</sup>

Surgical complications are dependent in part on the method of fixation chosen. Varus displacement following internal fixation is usually associated with unstable fractures and results from lack of posteromedial support. Varus displacement is usually followed by cutting out of the screw through the antero-superior portion of the femoral head. Achieving a stable reduction with proper insertion of the sliding hip screw remains the best way of preventing postoperative loss of fixation. When complications occur, management choices include acceptance of the deformity; a second attempt at open reduction and internal fixation (ORIF), which may require methyl methacrylate; and conversion to hemiarthroplasty or total hip replacement (THR).

Elderly patients with osteopenia have a high prevalence of unsatisfactory functional results, with unacceptable shortening and external rotation deformity of the limb, following treatment of an unstable intertrochanteric fracture with a sliding screw. Unstable intertrochanteric fractures are associated with high rates of morbidity and mortality.<sup>10,11</sup> Comminution, osteoporosis, and instability often preclude the early resumption of full weight-bearing in spite of internal fixation.<sup>11</sup> Overall failure rate with internal fixation in intertrochanteric fractures has been reported to be 3-16.5%.<sup>12</sup> To allow immediate postoperative weight-bearing without excessive collapse at the fracture site, some surgeons have advocated the use of prosthetic arthroplasty.<sup>13,14</sup>

Looking carefully at both groups collectively, it was observed that 76% patients who were dead at one year after surgery had already dropped their ambulation one or two levels at six months after surgery. Therefore, both mortality and morbidity, including bed sores, chest infection, UTI etc. can be attributed to lower ambulatory ability of patients. Hence, morbidity and mortality may be

decreased by improving ambulatory ability of patients by other means of intertrochanteric fracture management such as hip arthroplasty, especially in octogenarians.

The limitation of our study is its retrospective design. Further prospective studies comparing different fixation strategies such as hip arthroplasty for intertrochanteric fractures may be helpful in delineating the best way of managing these fractures.

### Conclusion

Octogenarians undergoing internal fixation with DHS have higher frequency of complications and death compared to younger patients. These complications may be attributed to compromised ambulation and other treatment methods such as bipolar hemiarthroplasty or total hip arthroplasty may result in improved outcomes in this age group.

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