

Is early mortality related to timing of surgery after fracture femur in the elderly?

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ABSTRACT

Objective: The purpose of this study is to review the outcome of fracture femur in elderly patients (>65 years), and to identify cause or causes of mortality.

Method: Between January 1996 and December 2002, 115 patients over 65 years were admitted and operated at King Fahd University Hospital, Al-Khobar. Fifty-six of patients suffered with femoral fractures. Demographic data collected included age, gender, site of fracture, co-morbidities, delay in surgery, duration of surgery, implant used and Anesthesia Society of America scoring (ASA). A minimum follow up of 12 months was considered important for inclusion in the study. Patients remained alive were assessed for their functional independence.

Results: The data of 48 patients were gathered for analysis. There were 31 males and 17 females with a mean age of

76.5 years (age range 65-101 years). The mean follow up was 32.8 months (12-84 months \pm SD 17.81). There were 32 fractures of the trochanteric area. The average delay in surgery was 112 hours (24-280 hours). At the end of 24 months: 13 (27%) were dead and 28 (80%) were functionally independent similar to pre-injury status. There was statistical significance between the ASA score and the mortality ($p < 0.005$). However, mortality significantly higher in patients who underwent surgery under general anesthesia $p < 0.05$.

Conclusions: Our data indicate that the mortality in the elderly is not related to the delay in surgery. The significant factors to early demise of patients were high ASA score, and the type of anesthesia used during surgery.

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Morbidity and mortality after trauma in elderly are usually higher as patients over 65 years of age fare badly when compared with the young.¹⁻⁴ It is attributed that high mortality is due to co-morbidities, existing chronic diseases, and a delayed response of the body to the trauma itself.⁵⁻⁷ It is estimated that each year 250,000 persons under 65 years of age suffers from the hip fractures,⁸ and 13-44% of patients died within 6 months of the injury⁹⁻¹² and 29% succumb within a year.¹³ There is a contentious issue regarding the timing of reparative surgery to the mortality of the injured. It was reported that to reduce mortality, early fixation (within 8 hours) of the fracture was essential.¹⁴⁻¹⁸ Contrary to Tornetta et al¹⁹ study, found

no statistical difference between the mortality and the timing of the surgery, which is similar to other studies.²⁰⁻²¹ Review of literature did not show any study on mortality in the elderly after fracture of the femur in Saudi Arabia and in the coming years the elderly population is bound to increase, hence, early planning for the future could help in the proper management of the elderly. The objective of this retrospective review is to assess the prevalence of fracture femur in the elderly and the mortality rate in relation to the timing of the operative intervention, and to identify the cause or causes which influences mortality among the elderly.

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Methods. The medical records of all patients >65 years of age admitted and operated from January 1996 through December 2002, at King Fahd University Hospital, Al-Khobar, Saudi Arabia, were retrospectively reviewed. Mortality was defined as death due to any cause within 24 hours postoperative. There were 115 patients admitted after trauma. Fifty-six patients suffered femoral fractures. We assess the mortality related to age type of fracture, cause of trauma, co-morbidities, timing of surgery, type of anesthesia, anesthetist's evaluation, duration of surgery, pre and postoperative ambulation. The outcome variables measured were as follows: immediate cause of death, intra-operative complications, cause of death after discharge, and post-trauma level of ambulation. These variables were predetermined to complete the data sheet. Patients were called for follow up to assess the functional independence measurement based on 3 parameters: returned to pre-injury status, better than pre-injury status and worse than pre-injury status.

Data were coded and analyzed using the Statistical Package for Social Sciences. Student's 't' test was used for univariate comparison between the patients who were alive and those who died. We used Pearson's χ^2 to compare categorical variables such as delay in surgery, ASA score and so forth. Probabilities of less than 0.05 was considered significant.

Results. Of the 56 patients, 48 met the admission criteria. Eight patients were excluded due to no follow up (minimum 12 months). There was no mortality within 24 hours postoperative. Among the 48, 31 were males and 17 females with a mean age of 76.5 years (age range 65-101 years). The mean follow up was 32.8 months with a range of 12-84 months \pm SD 17.81 (Table 1). The majority of the fractures sustained were in the trochanteric region (30) and fractures (18) on the neck of the femur. The most common implant used was Dynamic hip screw in 44 patients. From the anesthetists point of view, patients were made stable

Table 1 - Demographic data of elderly patients with fracture femur.

Demographic	Minimum	Maximum	Mean
Age (years)	66	101	81.9
Delay in surgery (hours)	24	280	112
ASA	1	4	3.31
Follow up (months)	12	84	32.77
ASA - Anesthesia Society of American Scoring			

before surgery was contemplated. Twenty-two patients had general anesthesia and the rest had epidural and spinal. The mean delay in surgery was 112 hours (24-280 hours). Twenty-eight (80%) regained their functional independence to the pre-trauma status, and 20% became worse after the surgery with regard to preoperative ambulatory status. Two patients died in the hospital on the third and ninth day postoperatively by the end of 12 months, 5 died and 8 more died by the end of the second year due to various causes. There was statistical significance between the ASA score and the mortality ($p < 0.005$). More patients died after general anesthesia as compared to epidural and spinal anesthesia ($p < 0.001$). Others factors such as age, gender, and delay in surgery was non-significant between the surviving and the dead (Table 2).

Discussion. An estimated 1.66 million hip fractures occurred worldwide in 1990, by 2050 the rate is expected to rise to 6.26 million yearly. It is reported that 30% of the people suffered hip fracture died within one year and those who survive, suffer loss of independence due to reduced mobility. Delay in surgery was long blamed to be the sole cause of increased of mortality among patients. The Saudi Arabian population is fast changing and in the next decades it is expected that the population of the elderly will constitute a big portion in the population. In Saudi Arabia, the reported prevalence of fractures in the elderly range from 3.9/1000 to 6/1000.²²⁻²³ With the increase in number of elderly population in the coming years one can presume the economic burden on the healthcare will be enormous and efficient plans should be put in practice. Hence, early plans are needed to counter this high mortality. It is well known that the mortality in the elderly after fractures are generally higher than any other age group.²⁴⁻²⁶ Perdue et al²⁷ found that the preexisting disease such

Table 2 - Mortality of elderly patients related to ASA and type of anesthesia.

Parameters	Alive (n=35)	Dead (n=13)	P value
Age (years)	81.88	81.9	<0.005
Delay in surgery (hours)	134	134	<0.05
ASA	2.73	3.31	
Anesthesia			<0.0001
General	4	11	
Other	31	3	
ASA - Anesthesia Society of American Scoring			

as cardiovascular disease and diabetes mellitus was probably the major cause of post-surgical mortality. Our analysis supports this view, the mortality was higher in patients who had existed disease. The treatment of choice is early surgical internal fixation for early mobilization so that the morbidity and mortality could be reduced. There is no general consensus regarding the timing of surgery as proponents and opponents both disagree to agree. Other studies blamed the high mortality in the elderly on the delay of internal fixation.²⁸⁻³¹ The mortality rate did not increase if the delay of surgery was only >6 hours.^{28,32,33} Recently, Moran et al³⁴ reported that delayed surgery for >4 days contribute low mortality rates (30-day mortality [9%]). In this study, our results did not conform with their findings, other factors were also to be considered. In our study, the 30-day mortality was 4% with a minimum delay of surgery of 5 days. The mortality of the elderly patients with femoral fractures is reported to increase with the time postoperatively. Roberts and Goldacre³⁵ after reviewing the British data found that 20-30% of patients died within the first year of undergoing surgery for hip fracture. In this study, the deaths recorded during the first year were less than 10%, and this incidence was similar with Roder et al³⁶ study (11.7%.) Tomak et al³⁸ believed that specifying the type of implant and early postoperative mobilization in patients with femoral fractures could help in decreasing early mortality. In addition, other factor that reduces the mortality in elderly patients is the postoperative rehabilitation. Holmberg et al³⁸ initially pointed out that patients will benefit in home rehabilitation after hip fracture. Kusima³⁹ showed that rehabilitation at home is better than conventional institution-based rehabilitation. This is probably one of the factor that reduces mortality in our patients, as people in Saudi Arabia believe that it is religiously condemnable for the children to bring their elderly parents in the nursing homes instead of taking care of themselves at home (Aba Al-Kheil⁴⁰). Marottoli et al⁴¹ observed that there is a decline in physical function following hip fracture, which results to high risk of institutionalization and early death. The degree of functional recovery after hip fractures are single most important concern for the patient and family alike. One is afraid of the decline in the mobility with more complications of prolonged decubitus. In our patients, we found that 87.5% of the patients returned to their pre-trauma activity, which made them mobile and perform the routine of life.

In summary, the early mortality of fracture femur in elderly were found to be lower than that reported in the literature. We believe that surgical delay had no significant effect on the mortality rate in the elderly

population. There are multiple factors that need to be considered such as ASA, type of anesthesia and postoperative rehabilitation.

References

1. DeMaria EJ, Kenney PR, Merriam MA, Casanova LA, Gann DS. Survival after trauma in geriatric patients. *Ann Surg* 1987; 206: 738-743.
2. Lonner JH, Koval KJ. Polytrauma in the elderly. *Clin Orthop Rel Res* 1995; 318: 136-143.
3. Van der Sluis CK, Klasen HJ, Eisma WH, Ten Duis HJ. Major trauma in the young and old: what is the difference. *J Trauma* 1996; 40: 78-82.
4. Smith D, Enderson BL, Maull KI. Trauma in elderly: determinants of outcome. *South Med J* 1990; 83: 171-177.
5. McMahon DJ, Schwab CW, Kauder D. Comorbidity and the elderly trauma patient. *World J Surg* 1996; 20: 1113-1120.
6. Schwab CW, Kauder DR. Trauma in the geriatric patient. *Arch Surg* 1992; 127: 701-706.
7. Morris JA, MacKenzie EJ, Edelstein SL. The effect of preexisting conditions on mortality in trauma patients. *JAMA* 1990; 263: 1942-1946.
8. Richmond J, Aharonoff GB, Zuckerman JD, Koval KJ. Mortality risk after hip fracture. *J Orthop Trauma* 2003; 17 (8 Suppl): S2-S5.
9. Dahl F. Mortality and life expectancy after hip fractures. *Acta Orthop Scand* 1980; 51: 163-170.
10. Holmberg S, Conradi P, Kalen R, Thorngren KG. Mortality after cervical hip fracture. 3002 patients followed for 6 years. *Acta Orthop Scand* 1986; 57: 8-11.
11. Magaziner J, Simonsick EM, Kashner TM, Hebel JR, Kenzora JE. Survival experience of aged hip fracture patients. *Am J Public Health* 1989; 79: 274-278.
12. Miller CW. Survival and ambulation following hip fracture. *J Bone and Joint Surg [Am]* 1978; 60A: 930-934.
13. Kamel HK, Bida A, Hoffman RG. Mortality among male veterans with hip fractures. *The Internet J Geriatrics and Gerontology* 2004; 1: 1-7.
14. Perez JV, Warwick DJ, Case CP, Bannister GC. Death after proximal femoral fracture: an autopsy study. *Injury* 1995; 26: 237-240.
15. Bredahl C, Nyholm B, Hindsholm KB, Mortensen JS, Olesen AS. Mortality after hip fracture: results of operation within 12 hours of admission. *Injury* 1992; 23: 83-86.
16. Rogers FB, Shackford SR, Keller MS. Early fixation reduces morbidity and mortality in elderly patients with hip fractures from low-impact falls. *J Trauma* 1995; 39: 261-265.
17. Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *J Bone Joint Surg* 1995; 77: 1551-1556.
18. Kenzora JE, McCarthy RE, Lowell JD, Sledge CB. Hip fracture mortality. Relation to age, treatment, preoperative illness, time of surgery and complications. *Clin Orthop* 1984; 186: 45-56.
19. Tornetta P 3rd, Mostafavi H, Riina J, Turen C, Reimer B, Levine R, et al. Morbidity and mortality in elderly trauma patients. *J Trauma* 1999; 46:702-706.
20. Harries DJ, Eastwood H. Proximal femoral fractures in the elderly: Does operative delay for medical reasons affect short-term outcome. *Age Ageing* 1991; 20: 41-44.
21. Zagrodnick J, Kaufner HK. Decreasing risk by the individual timing of surgery of para-articular femoral fractures of the hip in the elderly. *Unfallchirurgie* 1990; 16: 139-143.

22. Al-Nuaim AR, Kremli M, Al-Nuaim M, Sandkji S. Incidence of proximal femur fracture in an urbanized community in Saudi Arabia. *Calcif Tissue Int* 1995; 56: 536-538.
23. Sadat-Ali M. Osteoporosis and femoral fractures. (Personal Communication), 2003.
24. Pellicane J, Byrne K, DeMaria E. Preventable complications and death from multiple organ failure among geriatric trauma victims. *J Trauma* 1992; 23: 440-444.
25. Lonner JH, Koval KJ. Polytrauma in the elderly. *Clin Orthop Rel Res* 1995; 318: 136-143.
26. Champion H, Copes WS, Buyer D, Flanagan ME, Bain L, Sacco WJ. Major trauma in geriatric patients. *Am J Public Health* 1989; 79: 1278-1282.
27. Perdue PW, Watts DD, Kaufmann CR, Trask AL. Differences in the mortality between elderly and younger adult trauma patients: geriatric status increases risk of delayed death. *J Trauma* 1998; 45: 805-810.
28. Ali SM, Chukwonyerenwa C, Knight D, Lynch A. Is the mortality rate after hip fracture surgery being over estimated? EORS meeting held at Amsterdam, The Netherlands, 2004. p. 25-27.
29. Orosz GM, Magaziner J, Hannan EL, Morrison RS, Koval K, Gilbert M, et al. Association of timing of surgery for hip fracture and patients outcomes. *JAMA* 2004, 291: 1738-1743.
30. Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *J Bone Joint Surg (Am)* 1995; 77: 1551-1556.
31. Sexson SB, Lehner JT. Factors affecting hip fracture mortality. *J Orthop Trauma* 1987; 1: 298-305.
32. Hoinig H, Rubenstein IV, Sloane R, Horner R, Kahn K. What is the role of timing in the surgical and rehabilitative care of community-dwelling older persons with acute hip fracture. *Arch Intern Med* 1997; 157: 513-520.
33. Davis TR, Sher JL, Porter BB, Checketts RG. The timing of surgery for intertrochanteric femoral fractures. *Injury* 1988; 19: 244-246.
34. Moran CG, Wenn RT, Sikand M, Taylor AM. Early mortality after hip fracture: Is delay before surgery important? *J Bone Joint Surgery [Am]* 2005; 87A: 483-489.
35. Roberts SE, Goldacre MJ. Time trends and demography of mortality after fractured neck of femur in an English population, 1968-98: database study. *BMJ* 2003; 327: 771-775.
36. Roder F, Schwab M, Aleker T, Morike K, Thon KP, Klotz U. Proximal femur fracture in older patient rehabilitation and clinical outcome. *Age Ageing* 2003; 32: 74-80.
37. Tomak Y, Kocaoglu M, Piskin A, Yildiz C, Gulman B, Tomak L. Treatment of intertrochanteric fractures in geriatric patients with a modified external fixator. *Injury* 2005; 36: 635-643.
38. Holmberg S, Agger E, Ersmark H. Rehabilitation at home after hip fracture. *Acta Orthop Scan* 1989; 60: 73-76.
39. Kuisma R. A randomized, controlled comparison of home versus institutional rehabilitation of patients with hip fracture. *Clin Rehabil* 2002; 16: 553-561.
40. Abo Al-Kheil R. The development of a model for a socio-medical facility for elderly people of Saudi Arabia (Dissertation), Boston University, Massachusetts, Boston, 1988.
41. Marottoli RA, Berkman LF, Cooney LM Jr. Decline in physical function following hip fracture. *J Am Geriatr Soc* 1992; 40: 861-866.