

Title: Neck of femur fractures in elderly trauma increase morbidity and mortality.

Report by: Sally Skilton

Clinical Scenario: A call comes into the Ambulance Control Centre concerning an 85-year-old female whom has been found by her carer laying on the floor at the side of her bed. On examination by paramedics, the lady is found to have shortening and rotation of her right leg, and is complaining of significant pain around her right hip area. There is a high index of suspicion that this lady has sustained a neck of femur fracture, which now deems her a possible surgical patient requiring timely and effective assessment, management and transportation.

Overview: Correct pre-hospital management of femoral neck fractures can dramatically decrease delays in hospital and increase the patient's chances of undergoing the surgery if necessary, within the recommended timeframe ensuring the best possible outcome. Good pre-hospital management can contribute to reducing morbidity and mortality. Unfortunately, the injury itself as well as the treatment required can determine the patient's ability to either recover or succumb to this particular traumatic insult.

As the longest and heaviest bone in the body, the femur can be anatomically divided into its relevant sections referred to as, the head, neck, main shaft, popliteal surface and condyles. The head and neck of the femur lie within the hip joint, rotation of the head within the acetabulum allows for leg movement. The neck of the femur is the thinnest part of the bone and attaches the head to the main shaft. Due to positioning and lack of overall density, the neck of the femur is most likely to fracture when exposed to trauma.

There are three main types of hip fracture and four different classifications, femoral neck fracture (subcapital and transcervical), intertrochanteric and subtrochanteric. Only **two** of these fractures present with external rotation and shortening of the affected leg.

Signs and symptoms include:

- Inability to weight-bear on affected leg
- Inability to straight-leg raise affected leg
- Immediate hip and thigh area pain post injury
- Deformity/swelling of hip joint
- Shortening and external rotation of affected leg **may** be present

PICO (Population – Intervention – Comparison – Outcome) Question: In elderly patients that have acquired a neck of femur fracture, does the risk of morbidity and mortality increase in the older population?

Search Strategy: The medical databases Medline Ovid and PubMed were utilised to locate literature published within the date range of 2015 – 2020. The MeSH headings and keywords used to specify particular search requirements included: neck of femur, NOF, fracture, trauma, elderly, morbidity and mortality and increase. A combination of the criteria when searching was required to enable more specified results, as well as additional limits being applied to the search once results began to formulate. Articles were read to gauge suitability for final inclusion, as were the reference lists of the selected articles. There are also some articles within the reference list that were located during a general perusal of Google Scholar after the main search which were found to also meet the chosen criteria.

Search Outcome: Relevant Papers 4
Study Results/Analysis:

Author, Year	Study Type	Study Size	Outcomes	Results	Limitations, Strengths
Forni et al, 2016	Retrospective Observational Study. 3-year period.	23,973 patients within one geographical area of Tuscany inclusive of 31 hospitals. Mean age = 83.5 years.	Surgical delays are not considered significant factors of higher mortality rate. Associated comorbidities influence patient recovery.	23% male, 77% female patients. Pre-existing comorbidities CHF=32% COPD=7% Diabetes=9% Dementia=5% AMI=4% Anticoagulation therapy=40% Surgery within 48hrs = 67%. Early surgery regularly performed in usual care hospitals. 944 patients died within 30 days. Multidisciplinary care indicated significant lower rates of mortality.	A retrospective cohort study depends on quality administrative data. Justifying early surgery, pain management, other complications, length of hospital stay and economic status were not investigated. Focuses on both multidisciplinary and usual care models post hip surgery. 30-day mortality rate only. Elements of one health care system that may not exist in other regions or countries.
Lewis et al, 2019	Systematic Review & Meta-Analysis 52-year period.	1,364 patients within 17 studies. Mean age >50 years.	Management of hip fractures and predictive outcomes are based on 2 variables: individual patient factors -ASA	Overall mortality data was analysed of all-cause mortality from all 1,364 patients. There was no significant difference in	Use of the Garden classification to categorise intracapsular fractures of the femoral neck. Use of the Harris Hip

			score, age, preinjury ambulatory status, cognitive function and comorbidities ; and fracture factors – location, type and degree of displacement	<p>overall mortality. 44.6% HA group. 44.2% THA group.</p> <p>Data pooled from 519 interventions recorded in four studies found no significant difference between HA and THA mortality from any cause within 30-day postoperative period.</p> <p>Data examined from 947 interventions from eight studies found no significant difference between HA and THA mortality from any cause within the first postoperative year.</p>	<p>Score as a clinician based outcome measure for the evaluation of patients post total hip replacement.</p> <p>Data examined includes both THA & HA patients.</p> <p>Inconsistencies of included trials.</p> <p>A large temporal inclusion period. There have been significant changes to practice and improved prosthetic options since the beginning of the inclusion period to present day.</p>
Iglesias et al, 2017	Retrospective, Observational and Descriptive Study. 5-year period.	107 patients Mean age = 77.8 years.	All patients had comorbidities associated with hypertension, cardiac disease, diabetes, renal	88 females, 19 male patients. 44 patients underwent HA, 63 THA. ASA II = 62 patients. III = 42. IV = 3.	A clear demonstration of comorbidities diminishing the likelihood of survival.

			<p>insufficiency and smoking.</p> <p>.</p>	<p>Average time to surgery = 1.5 days.</p> <p>Mean hospital stay = 6 days.</p> <p>Average survival rate for THA = 33.9 months. HA = 19.7 months.</p> <p>19% of patients were deceased by final follow up.</p> <p>Risk of mortality increases by 25% with increased age.</p> <p>Risk of mortality was seven times greater in HA patients.</p>	
Jennison & Yarlagadda, 2020	Journal Article. 120-day period.		<p>Independent predictors of mortality at 30 days include: age (>85 years), sex (male), number of comorbidities (>1), mini mental test score (<7/10), admission haemoglobin concentration (< 11gdl), living in an</p>	<p>The most recent NHFD report suggests a 30-day mortality rate of 6.9%, reduced from 8.5% in 2011.</p> <p>50% of patients can expect to lose one level of mobility following fracture.</p>	<p>Recommendations taken from the NHFD database as best practice.</p>

			<p>institution, presence of a malignant disease.</p> <p>Advocates Orthogeriatric involvement.</p> <p>All correctable comorbidities should be rectified to avoid delay to surgery, addressing, anaemia, volume depletion, coagulopathies, electrolyte imbalance, uncontrolled diabetes and heart failure, correctable cardiac arrhythmia, acute chest infection and exacerbation of chronic chest condition.</p> <p>Complications include infection, pulmonary embolism, deep vein thrombosis, acute kidney injury and myocardial infarction.</p>		
--	--	--	--	--	--

Abbreviations: *ASA* (American Society of Anaesthesiologists), *HA* (Hemiarthroplasty), *THA* (Total Hip Arthroplasty), *NHFD* (National Hip Fracture Database)

Comments: The majority of hip fractures occur because of a fall. Risk factors include decreased bone mineral density, prolonged intake of medications for chronic conditions and reduced activity levels. Medication associated with an increased risk of falls include selective serotonin reuptake inhibitors, inhaled and oral steroids and benzodiazepines. Long-term usage of proton pump inhibitors are associated with an increased risk of fracture due to decreased calcium absorption. The questionable association between long-term use of Levothyroxine and bone density requires further study.

Osteoporosis decreases bone mass and density as a progressive bone disease whereby bone resorption exceeds bone formation, and therefore is more common amongst the elderly. Research recommends that the option of a total hip arthroplasty is favourable for patients with a predicted life expectancy of more than four years or in those under the age of 80 years old. Hemiarthroplasty is a reasonable intervention for elderly patients (>80 years) and those with a predicted life expectancy of less than four years.

Consideration for Practice: Studies indicate that total hip arthroplasty have shown to provide better functional outcomes than a hemiarthroplasty, but are associated with higher rates of complications including the requirement of reoperation for washout or debridement and dislocation.

Current evidence advocates for a multidisciplinary approach supporting an elderly patient following a hip fracture and subsequent surgery. Lengths of stay in hospital and rehabilitation facilities shorten as do rates of pneumonia as one of the many possible post-operative complications.

The detrimental effects of hip fractures are well documented and these patients often have pre-existing comorbidities that augment the risk of morbidity and mortality, not the specific fracture itself.

An aspect that is limited in present literature is a formal evaluation of preoperative factors that influence the choice of surgical treatment between total hip arthroplasty and hemiarthroplasty.

Clinical Points: 80% of hip fractures occur in females with an average age of 80 years. The prevalence of sustaining a hip fracture in one's lifetime is 20% for women and 10% for men. To ensure effective recovery, neck of femur fractures require surgery. Conservative treatment is only reserved for patients considered too frail to withstand surgical procedures.

References

Forni, S., Pieralli, F., Sergi, A., Lorini, C., Bonaccorsi, G., & Vannucci, A. (2016). Mortality after hip fracture in the elderly: The role of a multidisciplinary approach and time to surgery in a retrospective observational study on 23,973 patients. *Archives of*

- Gerontology and Geriatrics*, 66, 13–17.
<https://doi.org/https://doi.org/10.1016/j.archger.2016.04.014>
- Iglesias, S. L., Gentile, L., Fern, Vanoli, O., Mangupli, M. M., Pioli, I., EK, Nomides, R., & Allende, B. L. (2017). Femoral neck fractures in the elderly: from risk factors to prognostic features for survival. *Journal of Trauma and Critical Care*.
- Jennison, T., & Yarlagaadda, R. (2020). Hip fractures. In *Surgery (United Kingdom)*.
<https://doi.org/10.1016/j.mpsur.2019.12.006>
- Lewis, D. P., Wæver, D., Thorninger, R., & Donnelly, W. J. (2019). Hemiarthroplasty vs Total Hip Arthroplasty for the Management of Displaced Neck of Femur Fractures: A Systematic Review and Meta-Analysis. *Journal of Arthroplasty*.
<https://doi.org/10.1016/j.arth.2019.03.070>
- Rajeev, A., & Anto, J. (2019). The role of edmonton frailty scale and asa grade in the assessment of morbidity and mortality after fracture neck of femur in elderly. *Acta Orthop Belg*, 85, 346–351.
- The Royal College of Physicians. (2019). *The National Hip Fracture Database - Annual Report 2019*. nhfd.co.uk/files/2019ReportFiles/NHFD_2019_Annual_Report_v101.pdf