

Osteoporotic hip fractures – Three-year follow-up mortality rate in Malta

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Abstract

Introduction: Primary osteoporosis is a major factor in fragility hip fractures. The index fracture is loaded with morbidity and increased mortality in these very fragile patients. The aim of the study was to evaluate the mortality rate after 3 months, 1 year and 3 years post hip fracture with possible identification of any relationship between different hip fracture types and mortality.

Method: A retrospective analysis of all hip fracture patients admitted to Mater Dei Hospital, from January to December 2011 was performed. Data was gathered from the operating theatre notes, the patient archiving and communication system and the electronic case summary software. The mortality data was achieved from the National Mortality Registry. Statistical analysis was performed.

Results: Out of 281 patients with a hip fracture, 47% died (mortality group) within 3 years with a female predominance (68.9%). Within the mortality group, sustaining an intertrochanteric fracture exhibited a statistical difference between the females and males.

Within 90 days of a hip fracture, the mortality rate was of 12.8% with the majority of the patients sustaining an intertrochanteric. The median survival period following hip fractures was 190 days for subcapital, 297 days for intertrochanteric and 427 days for subtrochanteric fractures.

Conclusion: The mortality rate in our study compares well with the published results of similar studies. A team effort aimed at giving the best possible care and minimize the morbidity and mortality should be endeavored. This should encompass the whole pathway, starting with prevention and finishing with appropriate community care after hospital discharge.

Keywords

Mortality; Osteoporosis; Femoral fractures; Osteoporotic fractures

Introduction

The elderly population stands a higher risk of sustaining hip fractures. The main factor is the establishment of osteoporosis, resulting in weaker bones.^{1,2} Hip fractures have been directly linked to an increased risk for premature mortality rates, lasting over a long period of time following the actual fracture.³ This increase in mortality rate has been found to be related to various complications directly related to the fracture itself or the result of the surgery and period of relative immobility. These include pulmonary embolism, pulmonary complications, urinary tract infections and heart failure.^{2,4-5} The excess mortality can also be attributed to the various risk factors that predispose to frequent falls and sustaining hip fractures.^{1,6}

The reported one-year mortality rate after sustaining a hip fracture is 14% to 58%; with a relative risk of 4% increase per year.⁷⁻⁹ The first year following a hip fracture appears to be the most critical period regarding mortality. In the first 3 months post surgery, the death rate increases 8 fold for males and 5 fold for female patients, when compared to age and sex-matched controls.¹⁰ The length of stay in hospital has also been associated with increased mortality. A hospital stay of between eleven and fourteen days was found to have an odd's of 32% for a patient to die within 30 days of the operation. The length of stay in hospital is directly proportional to the odd's increase.¹¹

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The aim of this study was to investigate the mortality rates at 3 months, 1 year and 3 years after sustaining an osteoporotic hip fracture. We also investigated any possible associations between the different fracture types and the mortality.

Method

An observational retrospective study was performed analyzing all emergency hip fractures requiring surgery, presenting to Mater Dei Hospital, Malta, between January to December 2011. With the permission of the Chairman of the Department of Trauma and Orthopaedics as well as the Central Performance Unit (CPU), the operated traumatic hip fractures list was obtained.

The inclusion criteria for our study were patients over 60 years of age suffering a hip fracture following a low energy injury. A low energy hip fracture was defined as a fracture suffered after minimal or no trauma. For the purpose of this study, these were considered to be osteoporotic in nature.¹² The mechanism of injury was determined by going over the admission notes from the A&E department. The exclusion criteria were those patients that were on long-term steroids, patients who consume large amounts of alcohol (over 3 units daily in males, over 2 units daily in females), had a history of malignancy, hyperthyroidism or were on warfarin as well as those sustaining a high-energy trauma.

Each osteoporotic patient was investigated with regards to the length of stay by using the 'Electronic case summary' software at Mater Dei Hospital. The picture archiving and communication system (PACS) was used to investigate whether each patient re-presented to a state health care institution with another osteoporotic fracture (defined as distal radius or vertebral fracture for the purpose of this study) over a period of 3 years following the primary hip fracture. Permissions from the hospital data protection office were obtained.

The survival rate from date of operation up till December 2014, was obtained from Malta National Mortality Registry, Directorate of the Health and Information and Research. Unfortunately the cause of death for these patients was not available. Therefore only the mortality rate could be established. The mortality rate in the first 90 days post-osteoporotic hip fracture was investigated as well as that after the first and third year post-surgery.

Data was stored in a spreadsheet and statistical analyses were performed using SPSS IBM v.11. The data was divided into 3 groups according to the 3 different types of osteoporotic hip fractures (subtrochanteric, subcapital, intertrochanteric) requiring different operative procedures. Each subgroup was subdivided according to the gender and the mean age and mean hospital stay for each subgroup.

Patients who passed away in the 3 year period post HIP FRACTURE, were labeled as "Mortality group" for easy referral in this paper. An independent t-test was performed to evaluate the mean gender age within the mortality group. Pearson chi-squared was used to evaluate the significance between gender and type of osteoporotic fractures while ANOVA was used for the mean hospital stay post-surgery. Kaplan-Meier survival analysis for the three different hip fractures was performed. A p -value of ≤ 0.05 was considered significant.

Results

In a three-year follow up of osteoporotic patients presenting to Mater Dei Hospital, Malta in 2011 with hip fractures patients ($n=281$), there were 131 who died by 2014 (the 'mortality group').

The mean age in the mortality group was 84.3 +/- 7.8 (2SD). The mean age in females was of 85.20 +/- 7 (2SD) and male mean age of 82.3 +/- 9 (2SD). A significant age difference between females and males was found ($p=0.047$) within the 'mortality group'. There was a significant difference in the mortality rate between males and females suffering an intertrochanteric fracture (Table 1)

There was no difference in the length of hospital stay ($p=0.149$) for the 'mortality group' between females and males (respectively 10 +/- 8.6 (2SD) days and 10 +/- 10.3 (2SD)). Table 2. Shows the length of stay in hospital following different fractures, by gender.

Within 90 days of sustaining the osteoporotic hip fracture and undergoing the appropriate surgery, the mortality rate was of 12.8% ($n=36$). The majority of these patients ($n=23$) had sustained an intertrochanteric hip fracture and required a dynamic hip screw and plate. Figure 1 shows the different types of fractures and the percentage population death at 90 days.

Table 1: Represents types of osteoporotic hip fracture frequency according to gender and mean age within the 'mortality group'

Type of fracture	Gender	Number of people (%)	Mean age in years (SD)	p- value*
Intertrochanteric	Females	58 (44.3)	87.10 (5.6)	0.014
	Males	25 (19.1)	82.84 (9.8)	
Subcapital	Females	24 (18.3)	81.46 (8.6)	0.937
	Males	13 (9.9)	81.23 (7.8)	
Subtrochanteric	Females	9 (6.9)	82.89 (6.8)	0.878
	Males	2 (1.5)	82 (9.9)	

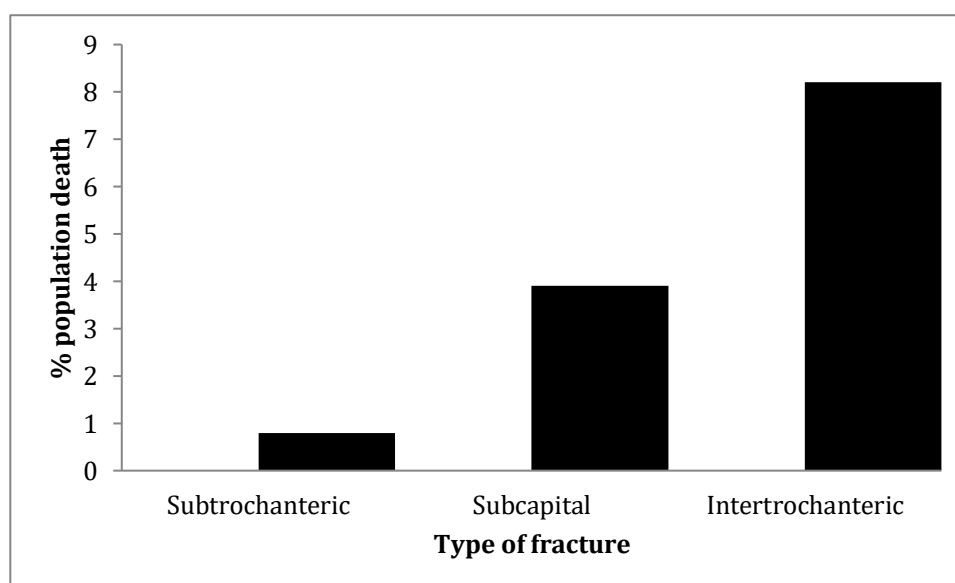
* Shows the significance between mean age and gender according to different types of fractures

Table 2: Illustrate the length of stay in hospital following different fractures, by gender

Type of fracture	Gender (N ^o)	Mean length of stay (SD)	p- value*
Intertrochanteric	Females (58)	9.71 (7.1)	0.078
	Males (25)	10.20 (9.9)	
Subcapital	Females (24)	9.75 (9.2)	0.284
	Males (13)	10.00 (12)	
Subtrochanteric	Females (9)	12.44 (15.3)	0.446
	Males (2)	11.00 (2.8)	

* Shows the significance between mean hospital stay and gender according to different types of fractures

Figure 1: Mortality rate sustained within 90 days according to different osteoporotic hip fracture



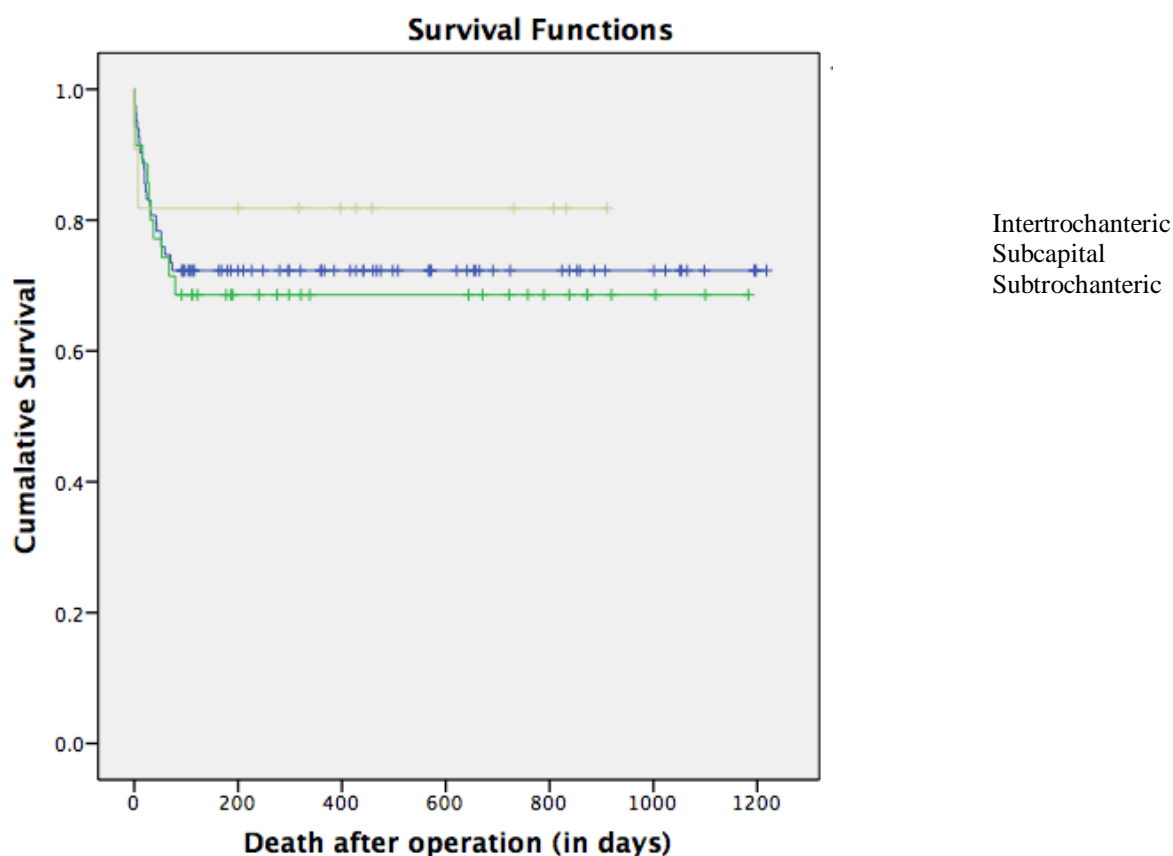
There was no significant difference between the different types of fractures and mortality rate in the first 3 months post osteoporotic fracture ($p=0.775$), nor was significance found between gender and a previous diagnosis of diabetes mellitus and mortality rate after 90 days of osteoporotic hip fracture ($p=0.377$; $p=0.195$ respectively). On evaluating further this 3-months mortality group and taking in consideration that the mean hospital stay for hip fractures in Malta is of 11 days, the mortality of hospital in-patient rate was established.¹⁵ An in-hospital mortality rate of 4.6% ($n=13$) was established with a female predominance ($n=9$) and a mean age of 85.7 (7.8 SD), with no

statistical significance between the type of fracture and age ($p=0.509$).

The mortality rate in the first year after the osteoporotic hip fracture was 25.6% ($n=72$) out of which 2 patients sustained another fracture and died within year one. During the first year after the index hip fracture, there were 8 patients who sustained another fragility fracture. The majority of patients suffering a second or more fragility fracture were females.

The median survival after an intertrochanteric hip fracture was of 297 days; subcapital fracture of 190 days and subtrochanteric fracture of 427 days. (Figure 2)

Figure 2: Kaplan-Meier survival analysis of the three different hip fractures



After three years follow-up the majority of patients who died had undergone a dynamic hip screw surgery due to an intratrochanteric fracture ($n=83$) with the majority being female ($n=58$). Within this subgroup, there were 4 patients who sustained a re-fracture before dying with one patient sustaining a second fracture and dying within 1 month. A single patient passed away 3 months after suffering the second fracture.

Females sustaining a hemiarthroplasty due to a subcapital fracture showed the highest mortality rate within this group ($n=24$). Out of all the subcapital fracture mortality population ($n=37$), there were 4 patients who sustained a re-fracture prior to dying. Two of these died within a month after the second fracture.

Those sustaining a subtrochanteric fracture had the lowest mortality rate ($n=11$) and from this sub-

population there were no re-fractures prior to their death.

Discussion

Hip fractures can be subdivided into 3 (intertrochanteric, subtrochanteric and subcapital), depending on the location of the fracture within the proximal femur. Intertrochanteric fractures lie along a line between the greater and the lesser trochanter on the femur.¹³ These are extra capsular fractures where the blood supply to the femur is usually preserved, making them amenable to osteosynthesis using a dynamic hip screw and plate construct. Subcapital fractures are intracapsular fractures. The blood supply is usually interrupted leading to a very high risk of avascular necrosis of the femoral head, which is why replacing the proximal femur is usually indicated. Subtrochanteric fractures lie below the level of the trochanters, blood supply is usually sufficient to allow osteosynthesis. The majority of the study's population had an intertrochanteric fracture. In fact significance was found between the mortality population under study and this type of fracture. The mean survival for the intertrochanteric fracture was of 297 days even though the majority of the population dying after 3 years had sustained an initial intertrochanteric fracture.

It has been well established that the most critical period for those with an osteoporotic hip fracture to die is the first 3 months of the injury.¹⁰ In Malta, when compared to other countries, there appears to be a low mortality rate for this critical period of 12.8%.¹⁴ Interestingly to notice is that the majority of these had sustained an intertrochanteric fracture although no statistical significance was found for this observation at 3 months following the injury.

The one-year all cause mortality was of 25.6% for the osteoporotic hip fractures study population, which is in keeping with other studies 24.5% 1-year mortality rates.¹⁶⁻¹⁷ When considering our mortality rate with the total deaths of the Maltese residents in 2011, the hip fracture mortality rate made up 2.2% of the total Maltese mortality rate for the same year.¹⁸ On comparing the 2011 total Maltese Islands population mortality age groups to the study's one-year mortality group mean age (84 years), it was noticed, that it formed part of the largest mortality age group for the year.

The three-year all cause mortality rate of

patients sustaining hip fractures in 2011 was of 46.6%, showing a significant difference between genders. The mean age for this "mortality" population was of 84 years, which is in keeping with other studies.¹⁻²

Once a hip fracture has been sustained, the patient is at risk not only of undergoing a metabolic complication, which potentially results in death, but also a further fracture. These fractures are a common occurrence and these continue to hinder the morbidity and increase the mortality of the patient.¹⁵ Within the 1-year mortality group, 11% of these had a second or more osteoporotic fractures before dying.

The mortality burden following hip fractures is as expected within elderly population especially due to higher risks of re-fractures and complications. This burden can be improved with bisphosphonates being prescribed to all osteoporotic hip fracture patients to try to reduce the risk of re-fractures.¹⁵ Also, with the introduction of the orthogeriatric services in Malta, and therefore better structures care for the elderly with fragile fracture, the mortality rate should be improved. This service already appears to have improved the mortality rates when compared to other European countries even though Maltese patients tend to be frailer.¹⁹

Study limitations

Although the study takes into account the total hip fractures presenting to Mater Dei Hospital in a year, the number analyzed is still relatively small. Further research with possible larger patient cohort and longer observation period is suggested.

Conclusion

The mortality rate following an osteoporotic hip fractures mostly affect the Maltese female population. Those sustained an intertrochanteric fracture appears to be mostly at risk to die even though a subcapital fracture has the lowest median survival rates. Overall, the Maltese one-year all cause mortality appears to be better than other countries. With further mortality improvements with prevention of re-fractures and specialized care for these frail elderly, the mortality rate due to hip fractures is expected to improve.

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