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ORIGINAL RESEARCH

Characteristics of Elderly Hip Fracture Patients in Jordan: A Multicenter Epidemiological Study

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Background: Elderly hip fractures represent a global health care burden. Several reports expected a massive increase in the incidence of hip fractures by the next few decades. Knowing the epidemiology of hip fractures is crucial for planning health care policies. The purpose of this study is to provide a nationwide epidemiological overview of hip fractures in Jordan and to report the perioperative outcomes that may help to improve the delivered healthcare. .

Methods: We conducted a retrospective study at 2 university hospitals and 2 major governmental hospitals in Jordan. We reviewed the records for all patients (age >55 years) who were diagnosed with hip fractures over a 3 years duration (2019–2021). We documented the patient's characteristics and the perioperative data (including preoperative, intraoperative, and postoperative details including the 1-year mortality).

Results: The total number of included patients was 1268; more than half (53.7%) were females. The mean age is 75 years (SD 9.7). The most common fracture type was trochanteric (66.2%). 7% of patients had a prior contralateral hip fracture. The average time from admission to surgery was 2.96 days (SD 2.63). The surgery was done within 48 hours for 56.7% of patients. Approximately, one-third of all patients (34.5%) received a blood transfusion. The average length of hospital stay is 7.44 days (SD 5). The overall rate of postoperative thromboembolic events, readmission within 1 month, and revision for the same surgery are 2.4%, 10.7%, and 3% respectively. The 1-month, 6-month, and 12-month mortality rates are 4.5%, 9.1%, and 12.8% respectively.

Conclusion: The annual incidence of elderly hip fractures in Jordan is approximately 96 per 100,000 individuals. The 1-year mortality rate of hip fractures in Jordan is 12.8%. Both findings are in the lower range of nearby Arab countries.

Keywords: hip fracture, elderly, epidemiology, incidence, mortality, Jordan

Introduction

Hip fractures are among the most common fractures seen by orthopedic trauma teams. They represent a major public health issue in most countries. Life expectancy among the global population is increasing, and an increasing number of people are reaching older age. As a result, the health burden shifts toward diseases that manifest later in life. Osteoporosis is one of the most significant manifestations of the aging process. Hence, more osteoporotic hip fractures are expected to happen in more comorbid individuals.[1] The global prevalence of hip fractures is expected to increase from 1.26 million in 1990 to 4.5 million by the year 2050.[2]

Several studies have been conducted over the last few decades; they discovered geographic variation in hip fracture incidence across continents and within regions. Hip fractures are most common in Sweden and North America, with rates

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nearly seven times lower in Southern European countries. The worldwide geographic variation of hip fracture incidence indicates that environmental and genetic factors may play a role in the etiology.[3,4]

Few studies discussed the epidemiology of elderly hip fractures within the region of the Middle East/ Arab populations.[5–8] To the best of our knowledge, there is no previous nation-based study that discussed the epidemiology of elderly hip fracture in Jordan. There were only two single-center studies from Jordan that discussed hip fracture-related issues.[9,10]

Hip fractures can lead to significant morbidity and mortality in elderly patients. The 30-day and 1-year mortality can reach up to 10% and 30% respectively.[11–13] Accordingly, knowing the details of perioperative care is paramount to exploring interventions that can lead to improving the outcomes and reducing the associated high mortality rate.

The purpose of this study is to provide a nationwide epidemiological overview of elderly hip fractures in Jordan and to report the perioperative outcomes that may help to improve the delivered healthcare.

Materials and Methods

This study is a retrospective cohort study, conducted at the only 2 university hospitals and the 2 major governmental hospitals in Jordan.

After taking approval from the related research committees, we retrospectively reviewed the hospital records for all patients who were diagnosed with hip fractures over a 3 years duration (January 2019 - December 2021). The inclusion criteria include age > 55 years, diagnosis with hip fracture "femoral neck or trochanteric area", and treatment by surgical procedure. The exclusion criteria include pathological fractures, motor vehicle accidents, and non-surgical treatment.

The collected data is categorized into patient characteristics, preoperative, intraoperative, and postoperative data. The patient's characteristics include age at the time of injury, gender, smoking status, comorbidities, prior osteoporotic contralateral hip fracture, and medications (Aspirin, Clopidogrel, Warfarin). The preoperative details include the time of surgery after the hospital admission and hemoglobin (Hb) level. The intraoperative details include mode of anesthesia (general versus spinal), type of fracture (femoral neck or trochanteric), surgical procedure (dynamic hip screw (DHS), intramedullary nail (IMN), hemiarthroplasty, or total hip arthroplasty), cement and polarity status in arthroplasty cases (cemented versus cementless/ unipolar versus bipolar), and the operator (resident versus specialist). The postoperative details include blood transfusion, Hb level, thromboembolic events (deep vein thrombosis or pulmonary embolism), length of hospital stay, mortality (in-hospital, within 1, 3, 6, 12 months of surgery), readmission within 1 month of operation, and revision for the same surgery.

Statistical Analysis

The data were entered using MS Excel and analyzed using PASW statistics 18 (IBM, USA) software. Descriptive analysis was done to identify frequencies (percentage), average/mean, and standard deviation.

Results

The total number of included patients was 1268 distributed as 469, 373, and 426 patients over the years 2019, 2020, and 2021 respectively. More than half (53.7%) of the included patients were females.

The mean age for all included patients is 75 years (SD 9.7). More than half of patients (56.7%) are 75-year-old or older. Less than one-third of patients (28.1%) were smokers. The most common associated comorbidities were hypertension (65.7%), diabetes mellites (49.4%), cardiovascular disease (29.5%), cerebrovascular disease (18%), and chronic kidney disease (8.2%). More than half of the patients (58.6%) have 2 or more comorbidities. Eighty-eight patients (7%) had a prior contralateral hip fracture. Before the injury, 562 (44.3%) patients were taking aspirin; while 102 (8%) and 55 (4.3%) were taking clopidogrel and warfarin respectively. Table 1 demonstrates the details of patient's characteristics.

The most common fracture type was trochanteric (66.2%) followed by femoral neck (33.8%). The average time from admission to surgery was 2.96 days (SD 2.63). The surgery was done within 48 hours for 56.7% of patients. Table 2 illustrates the details of fracture types, surgical procedures, mode of anesthesia, and the operator.

Table 1 Demonstrates the Details of Patient's Characteristics

Patient's Characteristics		Count	Percent
Gender	Male	588	46.3%
	Female	680	53.7%
Smoking		357	28.1%
Diabetes mellites		627	49.4%
Hypertension		833	65.7%
Cardiovascular disease		375	29.5%
Cerebrovascular disease		228	18%
Chronic kidney disease		104	8.2%
Pulmonary diseases		52	4.1%
Thyroid diseases		55	4.3%
Parkinson disease		38	3%
Alzheimer disease		29	2.2%
Prior contralateral hip fracture		88	7%
Medications	Aspirin	562	44.3%
	Clopidogrel	102	8%
	Warfarin	55	4.3%

The mean preoperative hemoglobin level was 12 g/dl (SD 1.87), while the mean postoperative hemoglobin level was 10.47 g/dl (SD 1.66). Approximately, one-third of all patients (34.5%) received a blood transfusion. The mean postoperative hemoglobin level for those who received blood was 9.55 g/dl (SD 1.58). The postoperative hemoglobin level was more than 8 g/dl in 84.4% of patients who received blood.

The average length of hospital stay is 7.44 days (SD 5). The overall rate of postoperative thromboembolic events, readmission within 1 month, and revision for the same surgery are 2.4%, 10.7%, and 3% respectively. Of note, only 28% of patients who were readmitted within 1 month of surgery were readmitted due to surgery-related issues such as (wound complications, metal failure, dislocation, and periprosthetic infection). The rest were readmitted due to medical-related complications. Table 3 demonstrates the details of postoperative outcomes for all patients.

The overall mortality rate within 1 year of surgery is 12.8%. Table 3 demonstrates the details of mortality rates (in-hospital and within 1, 3, 6, 12 months of surgery).

Discussion

Osteoporotic hip fractures are very common among elderly population. The annual incidence in the Middle East Arab region is ranging from 60 to 150 per 100,000 individuals.[5–8] It is estimated that the number of hip fractures is projected to double and even quadruple in Middle East countries, according to the Middle East and Africa International Osteoporosis Foundation's audit.[14] Knowing the present and projected epidemiology of this major healthcare issue is paramount for healthcare policymakers. Unfortunately, there is no national database to know the true hip fracture incidence in Jordan. This study provides a rough estimate of the epidemiology of hip fractures in Jordan.

Table 2 Illustrates the Details of Fracture Types, Surgical Procedures, Mode of Anesthesia, and the Operator for All Patients

		Count	Percent
Fracture Type	Femoral neck	428	33.8%
	Trochanteric	840	66.2%
Surgical procedure	DHS	83	6.5%
	IMN	790	62.3%
	Hemiarthroplasty	370	29.1%
	THR	3	0.2%
	Cannulated screws	22	1.7%
Surgery within 48 hours		719	56.7%
Cement status	Cementless	105	28.1%
	Cemented	268	71.9%
Polarity	Unipolar	48	13%
	Bipolar	322	87%
Mode of anesthesia	Spinal	764	60.2%
	General	504	39.8%
Operator	Resident	714	56.3%
	Specialist	554	43.7%

Table 3 Demonstrates the Postoperative Outcomes and Mortality for All Patients

		Count	Percent
Thromboembolic event		31	2.4%
Readmission within 1 month		136	10.7%
Revision for same surgery		39	3%
Mortality	In-hospital	29	2.3%
	Within 1 month	28	2.2%
	Within 3 months	16	1.3%
	Within 6 months	42	3.3%
	Within 12 months	47	3.7%
	Total	162	12.8%

In Jordan, hip fracture care is provided by 4 main categories: the governmental, university, military, and private hospitals. This study included patients from the only 2 university hospitals and the 2 major governmental hospitals. According to the national report of population estimates for the end of 2021 provided by The Population Statistics Division in Jordan, the approximate number of people aged above 55 years is 885,000.[15]

Given that this study included patients from nearly 50% of hip fracture care-providing institutions, we can expect that the annual incidence of hip fractures (in individuals aged 55 years and more) in 2021 is approximately 96 cases per 100,000 individuals.

Our study showed that 7% of included patients had a prior contralateral hip fracture. Saad et al[16] reported a rate of 20% previous contralateral hip fracture in a single-center study from Lebanon. This ratio may indirectly reflect that the incidence of hip fracture in Jordan is at the lower limit of the Middle East Arab countries. A further large long-term national-based study is recommended to identify the accurate incidence of hip fractures in Jordan.

Barake et al[17] reported that the mean age for hip fracture patients from Arab countries is 74.2 years with more than 50% of patients being female. Our results were consistent with these trends; as the mean age for our population was 75 years and 53.7% were females.

Regarding the most prevalent type of osteoporotic hip fracture, there is a disparity between Arab countries. The largest study from Lebanon reported dominancy of femoral neck fractures (74%),[18] while in Saudi Arabia the trochanteric fractures are in favor (47% trochanteric Vs 43% femoral neck).[5,19] In our study, the trochanteric fractures are double the femoral neck fractures. Several previous reports emphasized that trochanteric fractures are present in older people compared with femoral neck fractures; thus, associated with higher mortality rates.[20,21] Additionally, more than half of patients included in this study were aged ≥ 75 years and had 2 or more comorbid diseases. We believe that clinicians in Jordan should know that most of their patients are at higher risk of mortality.

The length of hospital stay for hip fracture care is different across the world. Lawrence et al[22] and Piscitelli et al[23] reported an average of 23 and 15 days in the UK and Italy respectively. Our findings showed a lower average hospital stay of 7.44 days. Indeed, this is close to the finding reported by Saad et al from Lebanon.[16] We expect that the great social support provided by the family may have a role in reducing the days of hospitalization for elderly people in Arab countries. In western countries, elderly patients may wait a considerable time to get formal social support or to have a place in a nursing home facility. Additionally, in western countries, the transfer of hip fracture patients to geriatric care after the surgical intervention may play a role in lengthening the hospital stay. This service is not available in Jordan, thus, explaining the notable difference in average hospital stay between Jordan and western countries.

Internationally, the 1-year mortality rate of hip fracture patients may reach up to 33%.[12,24] Recent studies documented the 1-year mortality rate of hip fractures in the nearby Arab countries (such as Saudi Arabia and Lebanon); it is ranging from 10 to 25%.[16,17,19,25,26] Our findings showed a 12.8% 1-year mortality rate, which is at the lower limit of the rates of nearby Arab countries.

Blood transfusion for elderly hip fracture patients is associated with higher costs and transfusion-related complications. The American Academy of Orthopaedic Surgeons recommends a blood transfusion threshold of no higher than 8 g/dL in asymptomatic patients with hip fractures postoperatively.[27] In our study, nearly one-third of all patients (34.5%) received a blood transfusion. The postoperative hemoglobin level was more than 8 g/dl in 84.4% of patients who received blood. Unfortunately, we did not find a well-documentation for those patients if they were symptomatic or without symptoms before blood transfusion.

Previous Studies About Hip Fractures in Jordan

To the best of our knowledge, we identified two studies about hip fractures in Jordan. The first study discussed the practice of management of elderly hip fracture in a single center within one year compared to the guidelines recommended by the American Academy of Orthopaedic Surgeons.[9] Their findings were close to our findings regarding average age, female gender and trochanteric type predominance, medical comorbidities, and the average length of hospital stay. The second study focused on the relationship between red cell distribution width and 6-months mortality of hip fractures. It was also from single center but included patients over 3.5 years duration.[10] They reported a 12.8% mortality rate within 6 months of surgery. Our study is a multicenter study from 4 major hospitals covering about 50% of hip fracture care in Jordan. This study is the first study from Jordan reporting the incidence and mortality over a 1-year duration.

Clinical Implications

Based on the findings of this study, here we provide recommendations that may help clinicians and healthcare policy-makers to improve the delivered care for hip fracture patients.

- Although the incidence of hip fractures in Jordan is lower than the incidence in some nearby Arab countries, it is still a common problem. Approximately, 10,000 cases will present annually to the hospitals in Jordan.
- Osteoporotic hip fracture is a disease, and the first step in the treatment of a disease is prevention. Healthcare policymakers should stress more on prevention projects such as community education, guidelines for bone density tests, methods for prevention of falls at home, and medical therapy for osteoporosis.
- Majority of osteoporotic hip fractures patients in Jordan are older than 75 years and have at least two medical comorbidities. Hospitals should have a special treatment protocol for management of those high-risk patients. We recommend involvement of geriatric specialists in the treatment pathway.
- Blood transfusion for elderly hip fracture patients is associated with higher costs and complications. We advise following international blood transfusion guidelines or implementing a national protocol to minimize the transfusion rate and its adverse effects.
- Orthopedic surgeons are advised to be aware and updated about all measures that could help in reducing the mortality rate and complications of hip fracture patients. These measures include, but are not limited to, medical optimization preoperatively, surgical intervention within 48 hours, thromboembolic prophylaxis, adequate analgesia, early mobilization, medical therapy for osteoporosis, patient education about falls prevention at home, and regular follow-up by bone density scan.

Unanswered Questions and Future Research

This study provides a valuable set of data about the characteristics and outcomes of patients with hip fractures. Future research based on this study should be conducted to analyze the risk factors that are significantly associated with in-hospital, short-term, and long-term mortality. Additionally, several comparative studies can be implied to explore the difference between practice in university hospitals and governmental hospitals. This will help improve the outcomes of perioperative care for high-risk patients.

Limitations of this study include the descriptive nature and lack of comparison between the included groups. Nonetheless, it provides new information about the situation of elderly hip fractures in Jordan. The authors confirm that more than one comparative study will be conducted based on the available data. Moreover, this study did not include patients from the military hospitals which approximately provide one-third of hip fracture care in Jordan. We recommend implementation of a similar study in this indispensable healthcare-providing sector.

Conclusion

The annual incidence of elderly hip fractures in Jordan is approximately 96 per 100,000 individuals; this is at the lower range of incidence in the Middle East Arab region. They are more common in females with a mean age of 75 years. Trochanteric fractures are the most common fracture type. The average time from admission to surgery was 2.96 days. The 1-year mortality rate (12.8%) is at the lower limit of the range of nearby Arab countries.

Ethics

The authors certify that this research was approved by the institutional review boards of Jordan University Hospital, King Abdullah University Hospital, and Jordanian Ministry of Health. This study complies with the Declaration of Helsinki. As our study is a retrospective one that does not include patient identifying features, the institutional review boards documented that informed consent is not required from the participants.

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Disclosure

The authors declare that they have no conflicts of interest in relation to this work.

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