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Abdulrahman Al-Mirza,
Omar Al-Taei,
Tariq Al-Saadi

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Spinal conditions in geriatric patients in developing countries. A four years institutional experience

Abdulrahman Al-Mirza[1], Omar Al-Taei[1], Tariq Al-Saadi[2]

[1] Sultan Qaboos University College of Medicine, Sultanate of Oman-Muscat, Al-Khoudh, OMAN
[2] Department of Neurology & Neurosurgery - Montreal Neurological Institute, Faculty of Medicine, McGill University, QC, CANADA

Keywords
spinal causes,
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ABSTRACT

Background: The spinal injury in an elderly patient is associated with higher mortality and an increased frequency of life-threatening complications and specifically spinal cord injuries. The aim of this study is to study the prevalence of geriatric spinal neurosurgical conditions in the Neurosurgical Department at Khoula Hospital, Muscat, Sultanate of Oman.

Results: 171 patients were admitted due to spinal pathologies, which will be the main focus of the present study with an average age of 70.7 years. The male-to-female ratio was (1.5:1). Degenerative conditions were the most common spinal diagnosis (90.6%) followed by traumatic accidents (2.9%). Most of the patients underwent surgical intervention (78.9%). The majority of the patients (91.2%) of the patients stayed in the hospital for less than 15 days. There was a significant difference between the age of patients above and below 75 years the gender (p=0.003) and between the length of stay and type of intervention (P<0.005).

Conclusion: Spinal cord-related pathologies are a growing cause of mortality and morbidity worldwide, because of the increasing number of elderly people due to an increasingly rising life span worldwide. In the present study, degenerative conditions were the most common spinal diagnosis followed by traumatic accidents.

INTRODUCTION

Over the past years, the evolution of new medical equipment and enhancing of technology and neuroanesthesia and ICU, have expanded the daily neurosurgical practise. (1). The aging population in western civilization places an increase demand on health system in terms of number and special needs. (1). The elderly population is defined as adults aging 65 years or older. (2). Within Europe, people aged 80 years and older is projected to double from 5% to 9% in 2040. (3). With the increase age, the presence of comorbid conditions probability increase makes the need for specific measures necessarily. (4). Elderly population are not exempt from neurosurgical practise. (5). On the other hand, with this population increase, neurosurgeon workload will

Corresponding author:
Tariq Al-Saadi

Department of Neurology & Neurosurgery - Montreal Neurological Institute, Faculty of Medicine, McGill University, Canada

tariq.al-saadi@mail.mcgill.ca

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involve these patients in greater portions. (5). Moreover, an injury in an elderly patient is associated with a higher mortality and an increased frequency of life-threatening complications and specifically spinal cord injuries. (6). As the incidence of traumatic spinal cord injury in elderly rises, neurosurgeons are increasingly faced with difficult discussions regarding management. (7. The most common mechanism of traumatic spinal cord injuries are falls and they occur frequently due to age-related deteriorations.

Traumatic spinal cord is associated with greater morbidity in elderly (7). A previous study done by Al-Saadi et al investigating the prevalence of low back pain (LBP) among Sultan Qaboos university staff in Sultanate of Oman showed that the prevalence of LBP among them was 44.7% among the included cohort, in which majority (68%) of them were suffering from the pain for more than one year. Among those who had LBP for more than one year, 73.5% were less than 50 years old (8). Carpal tunnel syndrome one the most comments neuropathies with a peak age of 50-54 and second peak 75-84. (2)

The aim of this study is to retrospectively analyse the prevalence of peripheral nerve and spinal cord injuries in Sultanate of Oman. The traumatic spinal injuries service is shared between the neurosurgery department and the ortho-spine department. The current article dealt only with cases admitted under neurosurgery department. The health care services in Oman is considered as having one of the best health care systems in the world according to World Health Organization reports (9,10). The Department of Neurosurgery in KH is the main neurosurgical center in the country with average admissions of 1600 patients annually (11,12). In the present study, we chose a cut of age of 65 years and older according to the local definition, taking into account the increase in life span throughout the last few decades and the improvement in the quality of life that results from many changes in all social and health care sectors in the country.

Methods

Study group

This is a retrospective study conducted at Khoula Hospital located in Muscat, Sultanate of Oman. The study was approved by the Research Ethical Committee at Khoula Hospital/ Ministry of health (PRO122020072). Medical records of 171 patients who are above the age of 65 and admitted to the neurosurgical ward and diagnosed with spinal and peripheral nerve conditions, from the period of January 2016 to 31st December 2019 were included. The study includes both Omani and non-Omani patients. Patients with the following features are excluded:

- Non elderly patient (below 65 years).
- Non neurosurgical conditions and neurosurgical conditions other than spinal and peripheral nerve diseases.
- Elderly with spinal conditions admitted under orthospine department.
- Outside the study period (from 1st January 2016 to 31th December 2019).
- Patients with missing or incomplete data.
- Data collection:

Data was obtained from the health information system included: patient demographics (age, gender), presenting symptom, previous surgical history, preoperative and postoperative Glasgow coma scale (GCS), radiological findings, indication for surgery, diagnosis, length of hospital stay (LOS), length of ICU admission and treatment proposed. Then the information classified into continues and categorized variables and analyzed accordingly.

Data analysis

Research database was analyzed and processed using the statistical package for the social sciences (SPSS) software (version23). The categorized variables were cross-tabulated using frequency tables and pie charts or bar charts. Chi-square test was used to obtain the significance of the association between categorized variables, using a P value of ≤ 0.05 as the cut-off for significance. The numerical variables were summarized by their medians, means, and ranges, and the categorical variables were described by their counts and relative frequencies. All the p values were 2-sided, and a p value < 0.05 was considered to be significant in all the analyses.

Results

Table 1 showing demographic characteristics of the included cases in the present study. We have total of 669 patients admitted in neurosurgical department at Khoula hospital in Muscat the capital city of Sultanate of Oman in four years' period (from 2016 to 2019). Out of those 669 patients, 171 patients

were admitted due to spinal and peripheral nerve pathologies, which will be the main focus of the present study. Fifty-four and four tenths % of the study cohort were more than 75-year-old. Male to female ratio was (1.5:1). Degenerative conditions were the most common spinal diagnosis (90.6%) followed by traumatic accidents (2.9%). Most of the patients underwent surgical intervention (78.9%). Majority of the patients (91.2%) stayed in the hospital less than 15 days.

Table 1. Demographic characteristics of the patients

Category	Number of patients (%)
Number of patients admitted each year	
2019	202 (30.0%)
2018	172 (25.7%)
2017	154 (23%)
2016	141 (21.3%)
Total number of admitted neurosurgical cases (2016-2019)	669
Total number of spine cases	171
Age	
≥75	93 (54.4%)
< 75	78 (45.6%)
Gender	
Female	69(40.4%)
Male	102(59.6%)
Spinal diagnosis	
Degenerative conditions	155 (90.6%)
Traumatic	5(2.9%)
Infection	4 (2.3%)
Peripheral nerve disease	7(4.1%)
Type of interventions	
Surgical	135 (78.9%)
Conservative	36(21.1%)
Length of stay (LOS)	
≤ 15 days	156 (91.2%)
>15 days	15 (8.8%)

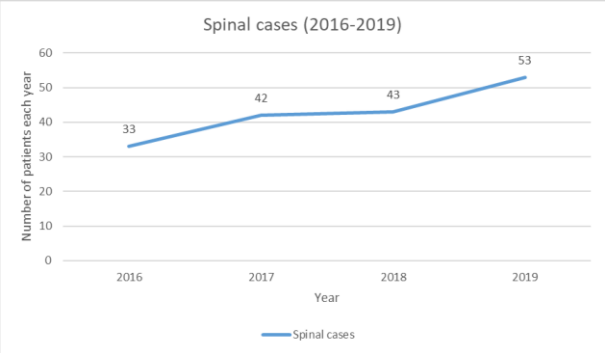

Figure 1. Total number of admitted patients with spinal cases in each year

Figure 1 represents the total number of admitted patients with spinal diagnosis in each year. As seen in the graph, spinal cases were continuously raising among the study years with the highest number of cases in 2019 (n=53, 31.0%).

Table 2 showing the association between the age of the patients with spinal pathologies and the gender. It demonstrates that there was significant difference between age of patients above and below 75 years the gender, in which male patients were more commonly found to belong into the older age group (p=0.003).

Table 2. The association between the age of the patients and other variables (gender and GCS)

		Gender	
		Male	**Female**
AGE	less than 75	46	47
	more than 75	56	22
P-value		0.003	

Table 3. The association between the LOS (length of stay) of the patients and other variables (age and type of intervention)

Length of stay (LOS)	**Age**		**Type of intervention**	
	< 75years	≥ 75 years	Surgical	Conserv -ative
less than or equal to 15 days	86	70	129	27
more than 15 days	7	8	6	9
P-value	0.530		0.005	

The association between the LOS of the patients and other variables (age and type of intervention) is shown in table-3. There was no significant relationship between the age of the patients (more and less than 75 years) and LOS (15 days as a cut off value), (p=0.530). Also it represents that there was a significant difference between LOS and type of intervention (surgical vs conservative), (P<0.005).

Discussion

Increasing life expectancy, along with rising health care related expectations is producing an important workload across all medical fields, considering that most medical diseases increase in frequency with age, more elderly will require neurosurgical care including the spinal cord related diseases. Additionally, with the advances in diagnostic and surgical techniques spinal neurosurgical diseases have led more patients to be treated in a better quality and quantity which explains the continuously raising neurosurgical cases generally and spinal cases specifically among the present study years (1,2). One hundred seventy-one patients were admitted due to spinal pathologies, which will be the main focus of the present study. 54.4% of the study cohort were more than 75-year-old (range 65-68). Another study done by A Gulati et al showed a mean age of 73 years (range 65-88). Male to female ratio was (1.5:1). Inglis et al. conducted a study that showed was in the same line of our study in which 61% of the cases were males. This can be explained by the fact that males are more predisposed to injuries in their daily life activities, as well as the fact that Omani count population states that the male to female ratio in Oman is 180.8 males per 100 females (6,13).

Degenerative conditions were the most common spinal diagnosis followed by traumatic accidents in our study. Correspondingly, Chibbaro et al conducted a study that demonstrate that degenerative spinal diseases were one of the most common procedures performed in along with cranial procedures for tumour resection, and burr hole for chronic subdural hematoma among elderly patients over the two separate time periods (1983-1985 and 2003-2005) which shows the high incidence of those group of diseases. For traumatic spine injuries, it was reported that most of the injuries were due to falls from less than standing height, which may emphasize the age-related reduced capability of the spine to withstand the mechanical stress as only 13% of traumatic injuries occurs due to violent acts and automobile accidents as reported by DeVivo et al (14,15). Carpal tunnel syndrome (CTS) was also reported as it is the most common entrapment neuropathy worldwide and in the present study (2). The few previous studies in the prevalence of peripheral nerve diseases among elderly suggested a bimodal age distribution with a peak between ages 50–54 years, and a second peak between 75–84 years, which is the reason why it's important to take such group of diseases in consideration among geriatric age group (2).

In the current study, most of the patients underwent surgical intervention (78.9%). In contrast, another study shows that 77% of patients were treated conservatively, specifically in traumatic spine injuries (6). Treatment decision making in elderly patients in more arguable than younger age, as they are less likely to withstand the physiological and pathological insult of surgery and more likely to develop post-operative complications, additionally, they often have spine instability requiring extensive surgery with a poor neurological prognosis, and consequences of healthcare issues associated with living with more significant neurological deficit (7)

We found that, 91.2% of the patients stayed in the hospital less than 15 days. In accordance to our study, Chibbaro et al reported a period of stay between 6-8 days, In the other hand, the median hospital stay for patients was 136 days in a study done by A Gulati et al. Those variations are due to the differences in the type of injury, type of intervention, the pre-existing medical conditions and other related factors (1,6). The lack of a long-term rehabilitation center in the country might be another contributing factor to this. As patients should be cleared for discharge home when the safety of the mobility is guaranteed.

The present study also demonstrates that there is significant difference between age of patients above and below 75 years the gender, in which male patients were more commonly found to belong into the older age group. This can due to the fact that increased life expectancy in developing countries in the last few decades, due to better medical scrutiny of the elderly, better knowledge and practice by neurosurgeons and all other associated physicians and surgeons in the elderly patient's management, which improves the patient's ability to practice their

daily life and predispose them to more spinal related injuries and their consequences. (2)

The current study found that there was no significant relationship between the age of the patients and LOS. Also it represents that there is a significant difference between LOS and type of intervention (surgical vs. conservative), (P<0.005). Osteoporosis and other typical spinal problems of advanced age, multiple comorbidities, and the lessened physical performance that goes along with age are accompanied by markedly heightened expectations on the part of our older patients. Thus, the value of different treatment strategies needs to be rationally assessed due the risk of prolonged stay in the hospital (increased LOS) (3). Surgical decision making for this age group is a multifactorial process so its advocated that chronologic age must be evaluated in the light of patient's clinical status to define eligibility for surgery (16,17).

Limitations

There were several limiting factors in the present study. It was a retrospective, single-centered study over a period of four-years. Thus, a number of confounding factors found, for example, the degree of advancement in modern medical technology and the availability of modern diagnostic facilities. Cases admitted under the orthopedic department were not included which might present a large number of patients. The follow-up was not included in the data of the present study. Additionally, the oncological causes of spinal related disorders were not mentioned and discussed in the present paper, as they will be discussed in a separate paper along with all other neurosurgical tumors.

Conclusion

Spinal cord related pathologies are growing cause of mortality and morbidity worldwide, because of the increasing number of elderly people due to an increasingly rising life span worldwide. In the present study, degenerative conditions were the most common spinal diagnosis followed by traumatic accidents. Special care must be taken when dealing spinal cases due its potentially high morbid outcomes, especially among geriatric age group due to the age-related reduced capability of the spine to withstand the mechanical stress.

Abbreviations

Length of hospital stay (LOS)
Carpal tunnel syndrome (CTS)

Availability of data

From medical records of patients from the "Al-Shifa Health Information System" of Ministry of Health in Sultanate of Oman used in Khoula hospital.

Authors contributions

AM and OT: Report writing, data collection and analysis
TS: Research design, analysis and review.
All authors have read and approved the manuscript.

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