

A SPECTRUM OF MAXILLOFACIAL FRACTURES IN FALLS DUE TO SYSTEMIC DISEASES

Nigam Sattar¹, Muslim Khan², Rabia Noreen³, Laraib Siddiqui²,
Syeda Rabia Rahat Gillani⁴, Osama Mushtaq⁵, Atta ur Rehman²

¹Department of Oral Surgery, Shifa College of Dentistry, Islamabad, Pakistan

²Department of Oral & Maxillofacial Surgery, Khyber College of Dentistry, Peshawar, KP Pakistan

³Department of Oral Medicine, Shifa College of Dentistry, Islamabad, Pakistan

⁴Department of Oral Surgery, Foundation University College of Dentistry, Islamabad, Pakistan

⁵Department of Oral Surgery, Margalla Institute of Health Sciences, Islamabad, Pakistan

ABSTRACT

Objective: The objective of this study was to determine the medical etiologies leading to maxillofacial fractures and associated pattern of facial fractures.

Materials and Methods: Patients who fell due to systemic diseases and had maxillofacial fractures with age ranging from 16-75 years presenting to the department of maxillofacial surgery at Khyber college of Dentistry, Peshawar from January 2017 to January 2020 were included. Patients who fell due to environmental reasons (fall from stairs, falls from heights and falls due to tripping, slipping and falls in patients who presented with preexisting maxillofacial bony pathologies or had chances of pathological fractures were excluded.

Results: 54 patients were males and 10 were females with age range from 16 to 64 years (Mean: 46.61, SD±19.142). Epilepsy was the most common etiology of fall (28.1%), Parkinsonism in 26.6%; stroke; 21.9%, cardiac reasons 20.3% and antipsychotic drugs 3.1%. Patients with parkinsonism had 47.1% of mid face fractures, 47.1 % upper face fractures and 5.9% lower face fractures. Patients with stroke had 92.9% lower face fractures and 7.1% mid face fractures. Patients with epilepsy lower face fractures in 94.4% cases and mid face fractures in 5.6%. These differences were statistically significant (p value <0.001).

Conclusion: Epilepsy was the most common cause of falls with predominantly mandible fractures. In Parkinson's disease, upper and mid face fractures are more common. Mid face fracture is more common in patients who use antipsychotic drugs.

Keywords: falls, medical factors, maxillofacial fractures, epilepsy, parkinsonism

INTRODUCTION

“Fall is an event in which a patient accidentally and unintentionally comes to rest on ground or another lower level.” Falls are one of the leading causes of maxillofacial fractures. Fall related injuries and hospitalizations are significantly increasing.² They

cause a significant financial burden on the healthcare system¹

In literature, frequency of falls related facial fractures have been reported from 9-16%. Some studies have reported it to be up to 25%.³ Falls could be due to environmental factors, occupational factors or it could be due to systemic diseases.^{4,5} Systemic diseases are one of the leading causes for falls.⁶

Studies have reported many medical factors for falls; Parkinson's disease, syncope, epilepsy, atrial fibrillation, osteoporosis, Alzheimer disease, dimin-

Correspondence:

Dr. Atta ur Rehman

Associate Professor, Department of Oral & Maxillofacial Surgery, Khyber College of Dentistry, Peshawar, KP Pakistan
Email: dratta80@yahoo.com
Contact: +923459355309

ished eye sight and use of antipsychotic drugs.^{3,7-12} Fall rates are very high in Parkinson's disease and a recent systemic review reported that 35-90% of patients with Parkinsonism fell at least once in life.⁸ O'Neal et al reported that falls were more commonly reported in patients with atrial fibrillation (10%) than in those without AF (6.5%).^{13,14} Stroke is also a significant risk factor for falls, 37% of all stroke survivors reported at least one fall in the preceding six months.¹⁴ Patients often come to maxillofacial department for treatment of facial fractures as a result of fall. Falls due to medical reason can occur in any age group however, elderly patients are more commonly affected.¹⁵

The aim of this study is to determine the incidence of falls due to systemic diseases and to identify various patterns of fractures in these patients. Our study question was; does fall modality in medically compromised patients cause a specific pattern of maxillofacial fracture? We hypothesized that pattern and site of facial fractures after fall is different in each of these diseases. There is limited information regarding the facts and figures of fall-related injuries in developing countries like Pakistan. Moreover, little is known regarding the risk, safety precautions, training, and experience of fall-related injuries. In the literature of maxillofacial surgery, there is no published data on pattern of facial fractures after falling due to systemic diseases. There remains a need to establish effects of fall due to medical comorbidities on facial bones. It would help us establish maxillofacial healthcare guidelines in comorbid patients. It would help us to provide better precautionary measures for medically compromised patients. Community based programs and combined therapy programs by general medical practitioners and maxillofacial surgeons can be designed for the education of medically compromised patients to prevent facial fractures.

MATERIALS AND METHODS

This study center was department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar with the approval of institutional review board of Khyber College of Dentistry. The duration of study was 3 years from January 2017 to January 2020. The inclusion criteria were: all the patients with maxillofacial fractures as a result of accidental falls due to systemic diseases, aged between 16-64 years. The exclusion criteria were; falls in patients

due to environmental reasons (fall from stairs, falls from heights and falls due to tripping, slipping. Falls in patients who presented with preexisting maxillofacial bony pathologies or had chances of pathological fractures were also excluded. Verbal and written informed consents were taken from all the patients. The patient demographic data (age, gender and address) was recorded. Detailed medical history was taken; reason of fall was asked and recorded on customized Performa. The diagnosis of facial fractures was made by clinical examination, plain radiographs, and computed tomographic scan. The pattern of facial fractures (upper face, mid face and lower face) was documented on customized Performa.

The collected data was analyzed using statistical package for social sciences (SPSS) version 23. Patients and operational characteristics were analyzed using descriptive statistics. Continuous variables were described as the number of observations, mean, median, SD, and range. Categorical variables were described using absolute counts and percentages. Frequencies and percentages were calculated for categorical variables like gender. Mean $\pm$ SD was calculated for numerical variables like age. Patients were divided into three age groups i.e., (16-30, 31-50 and 50-75). Analysis were made for each age group and both genders. The fractures pattern was stratified among age groups, gender and medical reason of fall. Post-stratification chi-square test was applied. A probability of 0.05 was kept as significant.

RESULTS

A total of Sixty-four patients who had maxillofacial fractures after falling due to systemic diseases were included. Among these, 54 were males (84.4%) and 10 were females (15.6%). The age range was from 16-64 years. The mean age was 46.61 SD $\pm$ 19.142.

The most common age group was from 51 to 75 years (46.9%). The patients in middle age group 31-50 were 14.0% and patients in age group of 16-30 were 31.3 %. The details are given in Table I

There were 3 main etiologies of falls due to systemic diseases. Falls due to epilepsy were 28.1%, falls due to Parkinson's disease were 26.6%, falls due to stroke were 21.9%, falls due to cardiac reasons (atrial fibrillation) were 20.3% and falls due to antipsychotic drugs were 3.1%. Details are given

in table II.

Out of sixty-four patients with maxillofacial fractures after falling due to systemic diseases, 23 patients had fractures of mid face (35.9%) and 33 had mandible fractures (51.6 %). 8 patients had fractures in upper third of face (12.5%)

Further analysis was done to measure the association of demographic and etiological features with fracture pattern. Gender distribution was slightly variable, females were more likely to have midface fractures as compared to lower face fractures (80% versus 20%) whereas males were less likely to face midface fractures compared to lower face fractures (27.8 % versus 57.4%), however these differences were not statistically significant (p-value, 0.006). In age group of 16-30, 85% patients had lower face fractures and 15% had midface fractures. In age group of 31-50, 57.1% patients had lower face fractures and 42.9% had midface fractures. In Patients of age group 51-75, 46.7% had midface fractures, 26.7% had lower face fractures and 26.7% had upper face fractures. These differences were proven statistically significant (p-value <0.001). Details are given in table III.

Significant pattern was found between falls due to medical factors and fracture pattern. Patients with Parkinson's disease 47.1% of mid face fractures, 47.1 % upper face fractures and 5.9% lower face

fractures. Patients with stroke had 92.9% lower face fractures and 7.1% mid face fractures. Patients with epilepsy had 94.4% lower face fractures and 5.6% mid face fractures. All of the patients who fell due to cardiac problems had mid face fractures (100%). All the patients who were using antipsychotic drugs had lower face fractures (100%). These differences were highly significant (p value <0.001). Details are given in table IV.

DISCUSSION

Every year about 646,000 individuals die from falls globally, out of whom 80% are from low and middle-income countries.¹⁶ Falls and associated injuries are a priority issue for the national health systems in Europe and developing countries as well.^{17,18} Falls is one of the leading causes of facial fractures.^{19,20} The purpose of this study was to evaluate various medical etiologies of falls in different age groups and pattern of resulting maxillofacial fractures. There is scarce literature regarding etiology of falls due to medical factors in our region and no study has been published to relate facial fractures due to falls in comorbid patients. Unlike previous studies which focused only on types of facial fractures due to falls, this study incorporates systemic diseases as etiology of falls resulting in facial fractures.

The incidence of falls is more common in older patients.^{6,15,23-25} Study done by Lida. S et al shows that

Table 1: Age groups of patients

Age groups	Frequency	Percent
16-30	20	31.3%
31-50	14	21.9%
51-75	30	46.9%
Total	64	100.0%

Table 2: Etiology of fall

Medical disease	Frequency	Percentage
Parkinson's disease	17	26.6
Stroke	14	21.9
Epilepsy	18	28.1
Cardiac problems	13	20.3
Antipsychotic Drugs	2	3.1
Total	64	100.0

Table 3: Pattern of facial fractures after falls due to systemic diseases in different age groups

Age groups	Fracture Pattern						Total		P value
	Upper face		Mid face		Lower face				
	No	%	No	%	No	%	No	%	
16-30	0	0	3	15	17	85	20	100	<0.001
31-50	0	0	6	42.9	8	57.1	14	100	
51-75	8	26.7	14	46.7	8	26.7	30	100	
Total	8	12.5	23	35.9	33	51.6	64	100	

Table 4: Fracture pattern after falls in different systemic diseases

Systemic Disease	Fracture Pattern after Fall						Total		P value
	Upper face		Mid face		Lower face				
	No	%	No	%	No	%	No	%	
Parkinsonism	8	471.1	8	471.1	1	5.9	17	100	<0.001
Stroke	0	0	1	7.1	13	92.9	14	100	
Epilepsy	0	0	1	5.6	17	94.4	18	100	
Cardiac reasons	0	0	13	100	0	0	13	100	
Antipsychotic medications	0	0	0	0	2	100	2	100	
Total	8	12.5	23	35.9	33	51.6	64	100	

fall related maxillofacial fractures, the distribution of age showed two peaks in the fourth and eighth decade.³ The American Geriatric Society recommends an annual falls and instability screening in people above 65 years of age.²³ Our study is in consistence with international studies and we found that the most common age group was from 51 to 75 years (46.9%). The patients in middle age group 31-50 were 14.0% and patients in age group of 16-30 were 31.3%. The increased incidence of falls in elderly is a result of impaired postural reflexes, degenerative changes that accompany the aging process and increased medical comorbidities.

In literature, falls are more common in females than in males.^{3,21,22} This could be attributed to the hormone related changes associated with menopause. These hormonal changes lead to decreased bone mass and early onset of osteoporosis in females.^{23,24} Due to fragile bones, when women fall, they are more likely to sustain fractures. This was in complete contrast to our study which showed increased incidence of falls in male patients. This could be explained by the fact that due to gender discrimination, females in our region are not provided enough medical care and many of their underlying systemic diseases remain

undiagnosed. Hence falls in females are usually labeled to be due to accidental or environmental reasons. The author suggests that detailed medical history and consultation with physician shall be done in elderly females with facial fractures due to falls to diagnose underlying systemic diseases in females.

Studies report that the second most common etiology of falls is medical conditions, after environmental factors (Heights, stairs, stumbling, tripping etc.). Systemic diseases are accounted for 28.2% of facial fractures due to falls. These usually resulted from lipothymia, neurological disorder, stroke, alcohol abuse, syncope and vertiginous abuse.^{3,25,26-29} In contrast, our study had 64 falls due to systemic diseases of which most of the patient were of Parkinson's disease, stroke, epilepsy and psychotropic drugs. We reported epilepsy and Parkinson's disease as the most common medical causes for falls (28.1% and 28.6%) and psychotropic drugs as least common cause. Annette Thierauf conducted a retrospective analysis of falls in which data like age, gender manner and site of fall and possible medical disorders were collected. According to this study 48.6% of fall related injured occurred under the influence of alcohol.¹⁷ But due to religious and ethnic reasons and

patient's fear of being labeled as immoral, falls due to alcohol consumption is rarely reported in our region.

Etiology of falls has a direct impact on the type of injury sustained. The pattern of fracture is influenced by the conditions and mechanism of falls.³⁰ In our study, patients with Parkinson's disease had more upper and mid facial fractures as compared to lower face (47.1% upperface, 47.1% midface versus 5.9% lower face). This could be justified by the fact that patients with Parkinsonism fall head-first, hence they are more prone to injuries of upper and middle face.

Our results showed that patients with stroke had increased incidence of lower face fractures. This is in consistence with studies done by Roccia et al who reported that in falls due to medical conditions like stroke and loss of consciousness, the lower third of the face had the highest percentage of maxillofacial injuries (56%) and the condyle was the most common site of fracture⁴

In Patients with epilepsy, the occurrence of facial fractures is usually due to falls and abnormal uncontrolled movements.¹⁰ Literature had reported increased lower face fractures in epileptic patients which coincide with our results. In the literature, epileptic seizures are most likely to cause mandible fractures.⁴ Our study showed 94.4% lower facial fractures in cases of epilepsy. The patient with epilepsy has an increased risk of accidental injuries due to loss of the muscle tone and self-protective reflexes that minimize trauma during a fall, which result in lower facial fractures.

We hypothesized that pattern and site of facial fractures after fall is different in different medical etiologies. This was proven true as patients with Parkinsonism presented with upper and midface fractures mostly, patients with epilepsy and those using antipsychotic drugs had more mandible fractures and patients with cardiac problems presented with midface fractures. Adults with associated medical conditions shall consider regular meeting with their physicians. Side effects of the medicines shall be discussed clearly with doctors. Eye sights shall be checked regularly and strength and muscle balance exercises shall be taught to them. Use of cane or walkers shall be encouraged in patients with Parkinson's disease.

CONCLUSIONS

Male population is affected in a greater number than female with falls due to systemic diseases in our region. Majority of fall cases due to systemic diseases belong to 5th, 6th and 7th decade. In medically compromised cases, epilepsy is the most common cause of falls. In epileptic patients, mandible fracture is more common. In patients with Parkinson's disease, upper and mid face fractures are more common. Mid face fracture is more common than mandible fracture in patients who use antipsychotic drugs. Patients with systemic diseases, should be encouraged to visit their physicians frequently and timely. When their systemic disease is controlled, there will be significant reduction in fall related maxillofacial injuries and the resultant morbidity and mortality. The Surrounding environment room/ home, in which most of the time these patients spent should be cushioned, to avoid fall related maxillofacial injuries.

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