Frequency of Midfacial Traumatic Injuries - A report from the Maxillofacial Reconstructive and Plastic Surgery Department of Kyrgyz Republic Health Service Ministry's National Hospital, Bishkek from 2013-17 - A Retrospective Study

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Abstract

Introduction: The aim of the study was to conduct a retrospective analysis of the fractures of the mid-face zone from 2013 to 2017 years in the above hospital and to determine the nature of the injuries and the main methods of diagnosis and treatment. Materials and Methods: This was a retrospective analysis of 4966 patients who underwent treatment at the hospital from 2013 to 2017. Data about etiology, site of injury, time of admission to the clinic, number and type of associated injuries, type and length of treatment, and complications were analyzed. Results: Of total 4966 patients, 581 (11.69%) were with traumatic injuries and 114 (2.3%) were with injuries of the middle face zone. The most common age was 21–30 years, male-to-female ratio – 6:1, reason of trauma was assaults – 50 (44%), road traffic accidents – 28 (25%), falls – 19 (31%), and horse riding trauma – 16 (14%). Discussion: The main treatment approaches were wiring or titanium plates on open reduction and splint intermaxillary fixation.

Keywords: Hospital, middle face zone fractures, retrospective study

Introduction

Traumatic injuries to the maxillofacial region are amongst the most common injuries. They can result from a variety of causes and can lead to significant compromise in the health and life of the patient due to injuries to the eyes, accessory muscles and the brain, thus leading to inflammatory complications. The Kyrgyz Republic (Kyrgyzstan) is a Central Asian landlocked country with mountainous terrain (area – about 200,000 km²). It is bordered by Kazakhstan, Uzbekistan, China, and Tajikistan, with population of 6,400,000 (according to the 2019-year census). Conventionally, horse breeding in the Kyrgyz Republic is the oldest traditional branch of animal husbandry. The presence of wide swaths of pastoral terrain coupled with relatively simple cultivation technologies results in certain peculiarities to the traumatic injuries that are common to the region. In traumatology, the maxillofacial area is distinguished as the “middle zone” of the face. The upper face area is bounded by the upper orbital line and below by the dentition. The following bones should be included in this zone: nose, orbit, zygomatic complex, and maxilla. The anatomical commonality of the facial and cerebral skull creates peculiar patterns in the occurrence of craniofacial injuries. The degree of severity of traumatic brain injury can variably affect the immune system, cardiovascular system, respiratory system, and others.

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digestive system, endocrine and nervous systems as well deleteriously affect the functions of vision, smell and hearing as well as changes in electrical and regulatory activities in the brain. All these fall under the category of diseases caused by trauma. The clinical symptomatology of concomitant injury depends on the severity and nature of traumatic brain and maxillofacial injuries. In the case of concomitant injury with severe head injuries, neurological symptoms predominate the clinical picture, which significantly complicates the diagnosis of injuries of the maxillofacial area. It is not always possible to conduct high-quality X-ray studies in the necessary projections. Therefore, quite often, the main diagnostic method of the facial bone damages is a clinical examination, and this requires the doctor to receive appropriate training and the necessary experience in working with such a cohort of patients.[1] Complications that arise as a result of a maxillofacial trauma can lead to permanent disability. Actually, in Kyrgyzstan, traumatic injuries occupy second place after advanced inflammatory diseases of the maxillofacial area.[2] In this regard, we were tasked to determine the prevalence of injuries of the middle face area based on data from the Department of Maxillofacial, Reconstructive, and Plastic Surgery of the Kyrgyz Republic Health Service Ministry’s National Hospital, Bishkek.

The aim of this study
The aim of the study was to conduct a retrospective analysis based on the data of patient case histories with fractures of the mid-face zone from 2013 to 2017 and to determine the nature of the injuries and the main methods of diagnosis and treatment of patients with injuries to the midfacial region.

Materials and Methods
This work was based on a retrospective analysis of 4966 patient case histories who underwent inpatient treatment at the Department of Maxillofacial, Reconstructive and Plastic Surgery from 2013 to 2017. From the standard case histories, the records about demographics, etiology of trauma, bone anatomic site of injury, time of admission to the clinic, number and type of associated injuries, type and length of treatment, and complications were analyzed. We included only midfacial bone fractures and excluded skull and soft-tissues trauma. Age of patients ranged from below 20 years to over 50 years. Trauma causes were classified under falls, horse riding trauma, assaults, traffic accident, and sports trauma. The diagnosis of midfacial fracture was based on clinical and radiographic investigation.

Results
Between 2013-17, 4966 patients were admitted to the Department of Maxillofacial, Reconstructive and Plastic Surgery. Out of this, 581 (11.69%) were with traumatic injuries. Over a period of five years, there were a total of 114 patients with midfacial injuries. This amounted to 2.3% of the total number of hospitalized patients. Most common cause was assaults followed by road traffic accidents, falls and finally by horse riding accidents. The most frequently observed age group was 21–30 years. The male-to-female ratio was 6:1. There was mandibular trauma in 467 out of 581 cases. The main treatment approaches were wiring or titanium plates with open reduction and intermaxillary fixation. The results are shown in Tables 1-3 and Figures 1-3.

Discussion
All 581 cases of injuries of the facial bones were divided into groups according to the injury. Mandibular fractures were noted in 467 (80.37%) cases, zygomatic bone fractures were noted in 82 (14.11%), and maxillary fractures were detected in 32 (5.5%) cases.

The age of patients who had suffered traumatic damage of the middle face was as follows: up to 20 years – 13.15%, 21–30 years – 42.98%, 31–40 years – 20.17%, 41–50 years – 13.18%, and over 50-year-old – 10.52%. The analysis of the primary material showed that the greatest percentage of midfacial injuries are people of young working age (up to 40 years old), with a predominance of males (86.95%). Obtained data corresponds to current facial bone trauma statistics.[3-5] The predominance of maxillofacial injuries among the male population is due to their greater employment in industrial and agricultural production, transport, and the abuse of alcoholic beverages. The prevalence of males over females is a common finding with every researcher.[6-8]

Table 1: Etiology of trauma

| Etiology             | Number of patients (%) |
|----------------------|------------------------|
| Falls                | 19 (31)                |
| Horse riding trauma  | 16 (14)                |
| Assaults             | 50 (44)                |
| Traffic accident     | 28 (25)                |
| Sport trauma         | 1 (1)                  |

Table 2: Age distribution

| Age group (years) | Number of patients (%) |
|-------------------|------------------------|
| Up to 20          | 15 (13)                |
| 21-30             | 49 (43)                |
| 31-40             | 23 (20)                |
| 41-50             | 15 (13)                |
| Over 50           | 12 (10)                |

Table 3: Localization of fracture

| Localization                          | n (%) |
|---------------------------------------|-------|
| Mandible                              | 467 (80) |
| Isolated Zygomatic Arch               | 54 (9) |
| Zygoma-maxillary Complex              | 18 (3) |
| Zygoma-nasal and Orbital Complex      | 10 (1.7) |
| Maxilla Le Fort I                     | 16 (2.7) |
| Maxilla Le Fort II                    | 12 (2.1) |
| Maxilla Le Fort III                   | 4 (0.7) |
Trauma of the facial bones and jaws is a fairly common pathology, widely studied in modern medical literature. Analysis of injuries to the face and jawbones and comparison with published data show approximate compliance with data from the world and local literature.\cite{9-11}

By etiology, traumatic injuries of the middle facial had a nonoccupational character in 97.3% of cases. Injuries resulting from falls were observed in 30.7% of cases. Injuries of the facial skeleton undoubtedly have some regional, ethnic, and cultural features. In English-language literature, we have not found much data about the frequency and features of trauma in Central Asian countries. There are articles describing the frequency of injuries in India,\cite{12-14} the Arab countries,\cite{15} Turkey,\cite{16} Iran,\cite{17} and the Central Asian part of China.\cite{18} With the abundance of pastoral terrain and relatively simple cultivation technology - Horse Breeding is the most common and oldest traditional branch of animal husbandry in the country. Therefore the frequency of trauma, associated with horse breeding, in our opinion, is specific for Kyrgyzstan because there was nothing similar in the literature that we reviewed. Trauma resulting from horse riding, was found at 14.28% of the total number of falls. Injuries from assaults accounted for 43.85%, injuries from traffic accidents – 24.56%, and sports injuries – 0.87%. The data obtained on the etiology of injuries corresponded to data obtain by some authors.\cite{9,13,2-3}

Regarding location of trauma, mandibular fracture was noted in 467 (80.37%) cases. Fractures of the zygomatic bones were noted in 82 (14.11%) cases, with isolated fractures of the zygomatic bone and zygomatic arch – 54 patients (65.85%), damages of zygoma–maxillary complex – 18 (21.95%), and zygoma–nasal and zygoma–orbital complexes – 10 patients (12.19%). Fractures of the maxilla were detected in 32 (5.5%) cases, with Le Fort I – 16 patients (50%), Le Fort II – 12 (37.5%), and Le Fort III – 4 (12.5%). The same distribution was obtained in a few other studies.\cite{2,3}

Regarding the duration of time that had elapsed before admission to the hospital, on the First day, there were 52.63% of the patients, on the second day – 14.03%, and more than 2 days – 33.33% of the patients. Upon admission to the hospital, patients with trauma to the midfacial region often complained of greatest pain in the area of fractures, contusion and hematoma of the soft tissues of the face, esthetic deficiency (deformation or retraction of the face), numbness in the area of innervation of the infraorbital and zygomatic nerves, limited movement of the mandible (92.1%), epistaxis (21.05%), subconjunctival hemorrhage (15.78%), malocclusion (5.26%), diplopia (2.63%), and Malevich’s symptom (cracked pot symptom) – 2.63%.

Regarding trauma complications, the frequency of brain damage depends largely on the location and type of fractures of the facial skeleton. Fractures of the midfacial bones were accompanied by a craniocerebral injury (CCI) to a lesser degree of open CCI – 5.26% and to a large extent closed CCI – 52.63%. The clinical picture of combined maxillofacial trauma developed from a set of symptoms characteristic of fractures of the middle facial bones and neurological manifestations caused by CCI, as well as cerebral and focal symptoms.\cite{2} Diagnosis of patients with injuries of the midfacial region using computer tomography was performed in 9.65% of the cases. Radiography of the bones of the facial region of the skull in the straight, lateral, axial, and semi-axial planes was performed for all 114 patients. Magnetic resonance imaging, panoramic radiography (Dental Orthopantomography) as diagnostic approach were used not enough frequent (0.87%). Radiographically, fractures of the zygomatic bone were most often linear in nature – 96.49% and impression-commminuted – 3.51%.

The provision of specialized care to patients with damage to the midfacial region was started immediately or in the first hour after the patients arrived at the clinic.\cite{6,7} The main
and most common surgical intervention for fractures of the midfacial region was extraoral manual repositioning of the zygomatic bone with Limberg hook – 67.54%, osteosynthesis of the bones of the middle facial section – 52.6%, revision of the maxillary sinus – 4.38%, and overlay double-jaw tire (Tiegerstedt) – 26.31%. Splinting was performed under conduction anesthesia, during osteosynthesis of the midfacial bones, sinus surgery, and manual repositioning of zygomatic and nasal bones under general anesthesia.

**Conclusion**

From 2013-17, 4966 patients were admitted to the maxillofacial reconstructive plastic surgery department out of which 581 (11.69%) had traumatic injuries, a mandibular fracture was noted in 467 (80.37%) cases, zygomatic bone fractures – 82 (14.11%), and maxilla fractures were detected in 32 (5.5%) of cases. Of 4966 patients hospitalized in the maxillofacial reconstructive plastic surgery department, over a 5-year period, 114 were patients with injuries of the middle face. In 97.3% of the cases, traumatic injuries of the middle facial had a nonproductive character. Injuries resulting from the assaults composed 44% and from falls were observed in 30.7% of patients. As a feature peculiar to Kyrgyzstan, trauma caused by horse riding was found at 14.28% of the total number of falls. The predominance of injuries of the maxillofacial region among the male population is due to their greater employment in industrial and agricultural production, transport, and the abuse of alcoholic beverages. The main informative method for diagnosing patients with injuries of the middle zone fractures at the stages of providing specialized care is computed tomography, which is the gold standard for diagnosis, as well as the choice of treatment methods for patients with appropriate traumatic injuries.

The number of serious traumatic injuries of the midfacial region in Kyrgyzstan is ever on the increase and is a serious social problem. Maxillofacial injuries are often combined with injuries to vital organs, which requires appropriate specialist care to shorten the period of temporary disability with successful rehabilitation of the patient.

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**Conflicts of interest**

There are no conflicts of interest.

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