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Research Article

ASSESSMENT OF THE NATURE OF THE JAW INJURY

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ABSTRACT

Based on the analysis of forensic medical examinations conducted for jaw fractures, it was found that they occurred more often due to domestic trauma (fight) and sharply in a fall from a height. The most typical fracture lines are the neck of the articular process, the angle of the mandible, the mental foramen, and the midline. In the case of impact with a blunt, hard object in the region of the mandible, the mechanism of displacement of fractures under the influence of the traction of the masticatory muscles is characteristic. In all cases, the upper jaw fractures were open as well as unilateral and bilateral. In unilateral upper jaw fractures, the fracture line ran sagittally along the palatal suture. The displacement of bone fragments in the upper jaw fractures depends on the force and direction of the impact; on the weight of the fragments themselves; on the strength of the masticatory (wing) muscles traction.

KEYWORDS

Jaw fractures, types, mechanism of formation, forensic medical examination.

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INTRODUCTION

At present, injuries to the maxillofacial bones account for 2.5-4.5% of all skeletal bone injuries [9]. At the same time, the most frequent injuries of the lower jaw are caused by blunt objects, which, according to different authors, account for 26% to 86% of all injuries of the facial skeleton bones. Also, isolated upper jaw injuries occur in 1.8-34% of all maxillofacial bone injuries [1,8].

It has been established that the most frequent causes of injuries to the maxillofacial bones are: domestic (64.4-95.5%), transport (3.7-13.3%) and sports (1.6-3.3%) trauma [7,10].

Pashinian et al. in their analysis of the mechanism of mandibular fractures (565 cases) found that the latter were most frequently caused by domestic trauma (85.7% of observations), transport (11.3%), sports (1.4%) and industrial (1.1%) injuries [3]. In modern clinical practice, modern methods of computer-assisted diagnosis of jaw fractures are widely used along with radiography [4,6].

It should be noted that the criteria for forensic diagnosis of the mechanism of trauma fractures of the upper and lower jaw bones have not been fully developed to date, and the morphological signs of these fractures, their nature and localisation have not been established. This contributes to certain difficulties in the forensic examination of such injuries [2,5].

The aim of the study was to identify the types and nature of the formation of injuries of the upper and lower jaws.

MATERIALS AND METHODS

A retrospective analysis of 36 forensic medical examination reports conducted in the outpatient department of the Tashkent City Branch of the Republican Scientific and Practical Center of Forensic Medicine in 2019-2020 was conducted as material. Medical documents (case histories) were also analysed, as all the persons examined had been treated as inpatients. Generally accepted research methods were used - macroscopic, radiological, statistical research methods.

STUDY RESULTS

Blunt trauma to the jaw was determined in all cases studied. There were 28 males (77.78%) aged 16 to 60 years and 8 females (22.22%) aged 18 to 52 years. In this case, fractures of the lower jaw constituted about 66.67% of all fractures of the facial bones. According to the victims and the circumstances of the case, the most frequent fractures of the lower jaw were sustained in a fight and rarely in a fall from a height. The following types of fractures of the lower jaw were identified: Open (16.67%) and closed (83.33%); complete (77.78%) and incomplete (22.22%); single (72.22%), double (19.44%), multiple (8.33%); unilateral (80.56%) and bilateral (19.44%); linear (86.11%) and comminuted (13.89%); with (22.22%) and without (77.78%) dislocation; straight (88.89%) and indirect (11.11%).

There was disruption of oral mucosal and skin integrity in open mandibular fractures, i.e. all fractures in the dentition line were open. Bilateral mandibular fractures were characterised by the presence of two fracture lines on opposite sides. In the case of an incomplete fracture (fracture), the integrity of the cortical plate on one side was observed to be intact.

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The most typical fracture lines were the neck of the articular process, the angle of the mandible, the mental foramen, and the midline.

A mandibular fracture was accompanied by trauma to the soft tissues of the maxillofacial region (abrasions, contusions, haematomas, wounds). Sometimes the diagnosis of a mandibular fracture was difficult due to swelling. Pain, "step" and "crepitation" symptoms detected by palpation on the edge of the lower jaw, and indirect loading symptoms were noted. Examination of the oral cavity revealed malocclusion, alveolar mucosal tears, and tooth mobility. X-rays in the straight (nasolabial) and lateral projections revealed a disruption in the integrity of the lower jaw bone. It should be noted that fractures in the region of the mandibular condyle were detected using tomography or zonography of the temporomandibular joints, sometimes using computer diagnostics.

When a blunt, hard object strikes the mandibular region, the mechanism of fracture displacement under the influence of masticatory muscle traction is characteristic. In particular, with a unilateral fracture of the jaw, the larger fracture moves downwards and inwards, and the smaller fracture moves inwards and to the side of the fracture. With bilateral fractures in the mandibular region or in the region of the body of the lower jaw, the central fragment moves inwards and downwards, which can lead to serious life-threatening complications (tongue root protrusion, asphyxiation).

Fractures of the upper jaw were always open, as the integrity of the oral mucosa was compromised. The LeForet classification of maxillofacial fractures is now widely used and distinguishes between the following types:

1. Le Fore I (mandibular fracture) - the fracture line of the maxilla runs horizontally over the alveolar process, from the base of the sternum to the pterygoid process of the main bone. It usually fractures the floor of the maxillary sinus and breaks the base of the nasal septum;
2. Le Fore II (midline fracture). This fracture line runs transversely through the nasal dorsum, medial wall, floor, and mandibular margin, and extends through the zygomatic jaw suture to the pterygoid process of the main bone. This fracture is often referred to as a suborbital or pyramidal fracture because it involves a maxillofacial separation where the upper jaw, along with the nasal bones, separates from the zygomatic bones and the base of the skull;
3. Le Fore III (upper level fracture). This fracture line runs transversely through the nasal dorsum, medial wall, fundus and external wall of the eye cavity, through the superior external margin of the eye cavity, and on through the zygomatic arch and pterygoid process of the main bone. This fracture is often referred to as a subbasal fracture, since it is a complete craniofacial separation, i.e. the upper jaw and nasal and zygomatic bones are separated from the base of the skull. Le Fore III fractures are usually accompanied by cranial trauma and often by a fracture of the skull base, i.e. an open cranial injury.

According to the results obtained, upper jaw fractures were unilateral and bilateral 75% and 25%, respectively. Bilateral fractures were symmetrical and asymmetrical. In unilateral maxillary fractures, the fracture line was sagittal to the palatal suture. It should be noted that displacement of bone fragments in upper jaw fractures depends on the force and direction of impact; on the weight of the fragments themselves; on the strength of the masticatory (wing) muscles. The upper jaw is usually displaced to the bottom and back, so that an open bite (occlusion in the region of the maxillary teeth only), an oblique bite or a false protrusion occur.

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Examination revealed the following main symptoms characteristic of upper jaw fracture - injuries (bruises, haematomas, wounds) of soft tissues of head and face; pronounced edema of both eyes, bleeding into the tissue around the eyes and into conjunctiva (symptom of glasses); lengthening and flattening of the midface; bite disorder, mucous membrane tears (often along midline of palate), submucosal bleeding along the transitional fold.

The history of bleeding from the nose, mouth and ears is characteristic. Licorrhoea (double stain symptom); anaesthesia or paresthesia of the upper lip, nasal wing and suborbital area, diplopia or double vision; pain, crepitus and stepping stone when palpating the bridge of the nose, lower orbital margin and upper outer edge of the orbit as well as along the zygomatic arch and in the malar-alveolar ridge; mobility of the upper jaw (as a reliable sign of a fracture) that can be palpated and the "cracked pot" symptom on percussion of the upper jaw teeth. In the case of an embedded maxillary fracture, there may be no mobility of the upper jaw.

X-rays of the upper jaw were used to examine the appendicular sinuses and zygomatic bones in the naso-parietal (semi-axial) projection with the mouth open. The most informative X-rays of the middle face in the axial view, X-ray of the facial skeleton bones in the nasolabial projection and orthopantomogram were the most informative. In cases of upper jaw fractures, we determined the disruption of the integrity of the bone tissue at the junction of the upper jaw with other bones of the facial skeleton, as well as darkening of the maxillary sinuses due to hemosynus. In complicated cases, computer tomography of head is highly informative and allows diagnosing injuries of both facial and cerebral cranial tissues.

CONCLUSIONS

Thus, the obtained data testify to the fact that men of working age predominated among the examined subjects in forensic medical practice. Lower jaw fractures were more often caused by domestic trauma (fights) and sharply by falls from heights. The most typical fracture lines were the neck of the articular process, the angle of the mandible, the mental foramen and the midline. In the case of impact with a blunt, hard object in the mandibular region, the mechanism of fracture displacement due to the traction of the masticatory muscles is characteristic.

Consequently, in all cases, the upper jaw fractures were open, as well as unilateral and bilateral. Bilateral fractures were symmetrical and asymmetrical. In unilateral upper jaw fractures, the fracture line ran sagittally along the palatal suture. The displacement of bone fragments in upper jaw fractures depends on the force and direction of the impact; on the weight of the fragments themselves; and on the strength of the masticatory (wing) muscles.

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