

## SPECIFICITY OF THE INJURY OF THE METACARPAL BONES UNDER THE IMPACT OF BLUNT OBJECTS AND ITS CONSEQUENCES

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### Abstract

In order to identify the features of the formation, course and outcomes of fractures of the wrist bones, and the fracture of the wrist bones in 24 persons, the male field aged 15 to 48 years, who received injuries under various circumstances. It is established that from exposure to blunt objects most often form fractures of the scaphoid (81.8%) bone, fractures of the remaining bones of the wrist are detected relatively less often (18.2%).). In the scaphoid bone, type A fractures are often formed - an incomplete fracture of the waist, relatively less often - types B 2 - a completed fracture of the waist and B 4 - through a scaphoid - perilunar fracture o-dislocation. Frequent types of fractures of other wrist bones are a fracture of the bodies of the semilunar and hook-shaped, intra-articular uncomplicated fractures of the pisiform bone and palmar fracture of the triangular bone.

In patients with fractures of the scaphoid bone, especially in cases of late seeking medical help, complications in the form of a false joint and aseptic necrosis can be observed, causing a pronounced violation of the functions of the wrist joint, up to a functionally disadvantageous position of it. These data should be taken into account in clinical and forensic practice in the processes of providing medical care and qualification of the severity of the harm caused to health in injuries to the bones of the wrist, as well as in the development of measures for the prevention of such injuries and their complications.

**Keywords:** wrist bones, fractures, types, outcomes, complications, severity of injury.

Injuries to the bones of the hands are characterized by polymorphism of damage and an extraordinary variety of fractures and deformation of bone structures, which is due to the anatomical and functional features of this part of the body. In this regard, the problem of treatment and rehabilitation of patients with fractures of the bones of the hand continues to be highly relevant for modern traumatology and orthopedics, due to a significant risk of developing post-traumatic contractures [Rodomanova L.A., Kubyanov D.I., Melikhov K.S., et al., 2011; Beidik O.V., Zaretskov A.V., Butovsky K.G. et al., 2011; Meals at Clifton, Meals at Roy, Broken Hands, 2013; Kneser U., Goldberg E., Polikandriotis E. et al., 2009; Mohammed R., Farouk M., Newman K., 2011].

The bones of the wrist belong to the spongy structures. Fractures in them are observed most often with an indirect mechanism of injury. This is due to their special anatomical structure, the presence of a large number of sedentary joints, strengthened by stretched ligaments, as well as the locations of the triangular, pisiforms, hamate, cephalic, trapezium bones in the form of a vault with a bulge to the rear [Grishin I.G., Divakov M.G., 1997; Kotelnikov G.P., Mironov S.P., 2008].

With injuries with blunt objects, fractures of the scaphoid (60.88%), then the semilunar and triangular bones (up to 12%) are most often observed, and damage to other bones of these structures is rare. The mechanism of formation of fractures of each structure has its own intensities. Fractures of the scaphoid bone usually occur when falling on an outstretched arm with an emphasis on the palm, while there is an overextension in the carpal joint and a load of force falls on this bone. The formation of scaphoid bone fractures from the effects of direct traumatic force is rare. The course and outcome of fractures of these structures depend on both the nature of the fractures and the timing of patients' treatment for medical care, as well as the qualifications of the assistance provided [Chang K. K.. 2008; Francis H. McGuigan, Randall W., 2002; Jones D.B., Moran S.L., Bishop A.T., and others., 2010].

Studying the circumstances of damage to the bones of the wrist and identifying the features of the formation and outcomes of fractures of these structures, aimed at improving the forensic examination to establish the mechanism of injury, the prescription, and severity of fractures, will contribute to the development of methods for early diagnosis and the provision of qualified medical care to patients at various stages of treatment, as well as the prevention of hand injuries.

The purpose of the study is to identify the features of the formation, course, and outcomes of fractures of the bones of the wrist, in persons affected by various types of mechanical trauma from the effects of blunt objects.

Material and research method. Fractures of the wrist bones in 24 persons, men aged 15 to 48 years, who received injuries under various circumstances: falls on the plane (11), shock effects of blunt objects in the hand area (6), bicycle trauma (1), collisions with moving vehicles and sports games (6) - 1 were studied (Table No 1).

Table 1 Fractures of the wrist bones in persons affected, depending on the circumstances of the injury

№	Circumstances of injuries	Fractures of the wrist bones					Total
		Navicular bone	cuboid	Semilunar	hamate bone	pisiform	
1	Falls to the plane surface	11					11
2	Stressing the impact of blunt objects in the area of the hands	4		1	1		6
3	Falling off a moving bike	1					1
4	Collisions with moving vehicles and sports injury	4	1			1	6
	Total	20	1	1	1	1	24



From Table No. 1 it can be seen that on the part of the structures of the wrist, fractures of the scaphoid (81.8%) bone were most often noted, and fractures of the remaining bones were noted in 18.2% of cases. All the victims were provided with the necessary medical care, and a full clinical examination and treatment were carried out in accordance with the standards. In respect of 13 persons with fractures of the wrist bones after the treatment, a forensic medical examination (FME) was prescribed to establish the mechanism of injury and the severity of the harm caused to health. During the FME process, the victims were subjected to additional examinations. The identification of the nature of bone fractures was based on medical records, the results of radiographs in 2 projections, in some cases on the basis of CT. Separated outcomes of the injury were established on the basis of examination of the conditions of the hands after the end of treatment.

It was established that 17 of the injured persons had an isolated hand injury with fractures of the wrist bones, in the remaining 5 cases, the injury of the hands was combined with injuries to other parts of the body: with fractures of the bones of the forearm (2), craniocerebral injury (2) and with fractures of the bones of the shoulder, hip and lower leg (1).

Types and subtypes of fractures of the wrist bones were established on the basis of classifications of fractures of these structures (Herbert, Russe) - tables No. 2 and No. 3.

Table 2 Types and subtypes of scaphoid fractures

No	Types of fractures	Fracture subtypes	Quantity
1.	Type A – stable fresh fractures	A 1- fracture of the tubercle	-
		A 2 – incomplete fracture of the waist (horizontal, semilunar, vertical 12)	14
2.	Type B – unstable fresh fractures	B 1 - distal oblique fracture	-
		In 2 – completed waist fracture	4
		B3 – completed fracture of the proximal pole	-
3.	Type C – delayed consolidation	B4 – through scaphoid – perilunary fracture-dislocation of the wrist	2
4.	Type D – Proven Nonunion	D1 Fibrous-nonunion	-
		D-2 - pseudoarthrosis	-
Total 18			20

Table 3 Types and subtypes of fractures of other wrist bones

No	Wrist bones	Types and subtypes of fractures	Quantity
1.	Semilunar	- Body fractures - Rear pole fractures - Marginal fractures	1 - -
2.	Triangular	- avulsion fractures - Dorsal indented fractures - Body fractures -Palmar fractures combined with perilunar dislocations	- - - 1
3.	Bone hamate	- body fractures - hamate fractures - Fractures of articular surfaces	1 - -
4.	Trapezius bone	- fractures of tuberosity - Body fractures	- -
5.	Capitate bone	- isolated fractures - combined with a fracture of the scaphoid bone	- -
6.	Pisiforms bone	- intraarticular fracture Complicated Uncomplicated	- 1
7.	Small polygonal bone	- intra-articular - comminuted bone	- -
Total			4

As can be seen from Tables No. 2 and 3, type-A 2 fractures were most often observed in the scaphoid bone - an incomplete fracture of the waist (14), relatively less often - types B 2 - a completed fracture of the waist (4) and types B 4 - through a scaphoid - perilunar fracture-dislocation of the wrist (2). On the part of other bones, a fracture of the bodies of the semilunar and hook-shaped (2) was noted, an intraarticular uncomplicated fracture of the pisiform (1) and a palmar fracture of the triangular (1) bone

20 patients with wrist bone injury, who sought timely medical care, underwent conservative treatment with the application of a plaster cast for a period of 8 to 12 weeks. The outcomes of the injury in these patients were favorable, and the functions of the hands and wrist joints were restored. In relation to 6 patients with isolated fractures of the wrist bones, who sought medical help a few years later. Weeks and months after the injury, surgical treatment was performed, subsequently, 2 of them had a restoration of the function of the hands, and 4 had complications in the form of a false joint (3) and aseptic necrosis (1). A patient with aseptic necrosis experienced a loss of movement in the wrist joint with loss of hand function for hard work, and in patients with false joints, there was a pronounced the function of movement in the wrist joint is impaired, up to a functionally disadvantageous position, with a feeling of severe pain in the process of hand movement.



The results of the study showed that the structure of injury to the wrist bones is dominated by fractures of the scaphoid bone (81.8%). It distinguishes four types of fractures, our observations were dominated by stable above horizontal, semilunar and vertical fractures - (Type A2), the origin of which was due to the s mainly shock effect of blunt objects on the tuft of the hands, or the impact of the zone of these bones against them. Of the 20 cases with fractures of the scaphoid bone in 4 victims in the distant outcome of the injury, unfavorable outcomes were observed in the form of false joint (3) and aseptic necrosis (1). It should be noted that with fractures of the wrist bones, patients usually do not feel pain, or pain and swelling are insignificant, which patients do not pay attention to. This is due to the absence of periosteum in these bones, and therefore - even with timely operations, an unfavorable outcome can be observed, among which the formation of a false joint prevails [Boyer M. I., von Schroeder L. P., Axelrod T. S., 1998; Chang K. K. , 2008].

In the semilunar bone, fractures of the bodies of the dorsal, palmar pole and marginal fractures are distinguished. In our observations, one victim of the impact of a blunt object had a fracture of the body of the back pole. Fractures of the triangular bone are often found, it distinguishes detachable, dorsal, indented, palmar fractures and body fractures. In our observations, no cases of fractures of this bone were noted. In the hamate bone, fractures of the body, hook and articular surfaces can be observed. In our observation, the victim of the impact of a blunt object had a fracture of her body. Fractures of the capitate bone are usually combined with fractures of the scaphoid bone, but in our observation, such fractures were not observed. The pisiform bone is a sesamoid bone located inside the tendon tissue, and therefore its fractures are of an intra-articular nature, which in our observation was noted in a pedestrian injured as a result of a collision of moving vehicles. Fractures of the cuboid (trapezoidal) bone are usually rare, there are fractures of the tuberosity and its body. In our observations, such fractures were not noted. The outcomes of fractures of the semilunar, triangular, hamate and pisiform bones were favorable. Fractures of the small polygonal bone are rare, distinguish between intraarticular and splinter fractures of it. In our observation, injuries to this bone are also not noted.

Based on the nature and outcomes of fractures of the wrist bones, isolated injuries to these structures, taking into account the duration of the health disorder for a period of more than 3 weeks, less than 4 months, the severity of the injury in 15 victims were qualified as moderate severity. In 4 victims with isolated fractures of the scaphoid bone, complicated by a false joint and aseptic necrosis, in the outcome of which there were pronounced violations of the function of the wrist joint, up to a functionally disadvantageous position, the severity of the harm caused to health according to the criterion of loss of permanent loss of general disability over 1/3 (35-40%), were qualified as grievous bodily harm. Qualification of severity in victims with fractures of the wrist bones with combined injuries (5), in accordance with the nature and severity of combined injuries of the head, limbs [Appendix2 and No. 9 to the Order of the Minister of Health of the Republic of Uzbekistan No. 153 of June 1, 2012].

## Conclusions

1. It was established that in persons affected by exposure to blunt objects, fractures of the scaphoid (81.8%) bone is most often formed, and fractures of the remaining bones of the wrist are detected relatively less often (18.2%).).
2. In the scaphoid bone, type A fractures are often formed - an incomplete fracture of the waist, relatively less often - types B 2 - a completed fracture of the waist and B 4 - through a scaphoid - perilunary fracture-dislocation. Frequent types of fractures of other wrist bones are a fracture of the bodies of the semilunar and hamate bones, intra-articular uncomplicated fracture of the pisiform, and palmar fracture of the triangular bone.
3. In patients with fractures of the scaphoid bone, especially in cases of late medical aid, complications in the form of a false joint and aseptic necrosis can be observed, causing a pronounced violation of the functions of the wrist joint.
4. In forensic-medical terms, isolated uncomplicated fractures of these structures, taking into account the duration of the health disorder for a period of more than 3 weeks, less than 4 months, the severity of the harm to health is qualified as moderate severity. And isolated scaphoid bone fractures, complicated by false joint and aseptic necrosis, resulting in pronounced impairment of the function of the wrist joint, up to a functionally disadvantageous position, the severity of the caused health, according to the criterion of loss of permanent disability of the general working capacity of more than 1/3 (35-40%), qualifies as serious bodily injury. Forensic to the severity of fractures of the bones of the wrist, with combined injuries in the formation, taking into account the nature and severity of the combined injuries to other parts of the body.
5. These data should be taken into account in clinical and forensic practice in the processes of providing medical care and qualification of the severity caused by harm to health during injuries to the bones of the wrist, as well as in the development of measures for the prevention of such injuries and their complications.

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