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FORENSIC MEDICAL ASSESSMENT OF HEAD WOUNDS CAUSED BY SHARP AND BLUNT OBJECTS

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Abstract

One of the important sections of forensic medicine is forensic traumatology. It is devoted to the study of various mechanical injuries to the human body. Bodily injuries are violations of anatomical integrity or function of an organ [1].Sharp objects are characterised by the presence of a sharp edge , sharp end or both. sharp end and cause the occurrence of injuries both when acting normal to the body surface and at various angles [2]. At forensic examination of injuries by sharp and blunt objects a wide range of questions is solved, establishing the presence and nature of injuries, the type and features of the damaging object, the direction and number of movements or blows by the trauma instrument, the force of blows, the possibility of infliction of injuries by the victim himself, the position of his body at the time of injury [8]. Unfortunately, to date there is no clear definition of the concept of ‘brain injury’, revealing its content, scope and establishing its meaning [6].

Keywords: Blunt impact, sharp impact, head injuries.

Introduction

When all layers of the dermal-aponeurotic layer were damaged with the formation of a notch on the skull vault, the shape, size, and location relative to the dermal-aponeurotic wound were recorded. The description was made visually and using a magnifying glass (magnification 2×-4×). Initially, the preparation of the modelled wounds for further study was carried out in the traditional way - drying and restoration of skin preparations in a vinegar-alcohol-water solution (1 : 2 : 7) according to the method of A. N. Ratnevsky (1969, 1972). However, this type of preservation resulted in changes in the skin (elasticity, colour, epidermis damage) and hair, which distorted the morphological properties of the lesions. Therefore, further preservation of skin flaps was performed in the solution of D.A. Karpov, B.A. Sarkisyan (2009) (propylene glycol, glycerin, ethyl alcohol, sodium chloride, sodium benzoate, purified water). The skin preparation in this technique retains all its original properties. The lesions on the reconstructed object were examined visually and by stereomicroscopy (MS-2, 4×-10×) using oblique illumination, brightfield in reflected light, and combined illumination. Macro- and micro-measurements were made using a

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ruler and micrometer grid. Morphological features of the lesions obtained during experimental modelling, as well as their general features were recorded in verbal description and measurement. In addition, we recorded morphological features of the lesions (CanonEOS 300 D) and made their graphic models [3]. Although the Naumenko-Grekhov method has certain advantages, one cannot but agree with V.L. Popov that the choice of the number and levels of frontal slices is not fundamental. An expert who has a good understanding of the volumetric structure of the internal brain structure and uses anatomical atlases is able to clearly localise the location of pathological or traumatic foci in relation to these structures. Therefore, having previously examined the surface of the brain and having found visible areas of brain damage (contusions, traps, haemorrhages, etc.), it is necessary to outline in each specific case such levels of frontal slices that would allow an objective view of the internal volumetric boundaries of the lesion foci Undoubtedly, the best results will be achieved in the study of the whole fixed brain, as recommended in most sources. It is desirable, and in many cases obligatory, to make brain incisions and take material for examination after fixation. Examination of the neonatal brain is always best performed after fixation, as incisions of the fresh brain may completely change the relationship of the parts and make it difficult to find and assess the effects of the injury [4]. The frequent occurrence of fractures of the skull vault and skull base and foci of UGM in blunt hard object impact and their absence in fist and footwear impact is a diagnostic criterion allowing to distinguish these groups of acting objects [7].

Materials and Methods:

The material of the study was literature data presented in scientific articles, textbooks, journals.

Results:

In the right temporal region, 158 cm from the plantar surface of the feet and 11 cm from the anterior midline of the body, an oblong-shaped wound was horizontally located, after the edges were brought together it was linear in shape, 8.5 cm long. The wound edges are irregular, bloody, partially crushed, sedimented throughout, the wound corners are pointed. The sedimentation reaches a width of 0.4 cm along the upper edge and 0.1 cm along the lower edge. The upper wall of the wound is oblique, the lower one is undermined. In the depth of the wound between its walls are visible lintels. In the subcutaneous tissue surrounding the wound there is a dark-red oval-shaped haemorrhage, 10x4 cm in size. The bottom of the wound is a crushed temporal muscle and intact bone, the cranial vault is deformed due to the result of flattening of the left half of the frontal scales half of the scales of the frontal remnant. The area of flattening contains a 5x5 cm area and is shown by fragments ranging in size from 0.5x1 cm up to 1x1.5 cm. The flattening is bounded by a rounded fissure, the sides of which are radially separated by openwork cracks extending into the base and the skull base.

Predominant flow of cracks ahead backwards, left to right. At 2, 7 and 12 cm from the flattening boundary and parallel to it there are fractures, which intersect the radial fractures in a bayonet-like fashion [5]. Due to the comparable mass of a blunt hard object and the head, the distribution of velocity parameters of the traumatic object in the proximity phase (Kkin.etc.) in impacts is different than in falls. Firstly, the kinetic energy of the object causes predominantly local deformation of the head at the point of contact. Secondly, the kinetic energy of head displacement during impacts is, as a rule, several times higher than the energy of head displacement during falling. As follows from Carnot's theorem, at blows with blunt hard objects of mass 3.0 kg. and more, the absolute values of kinetic energy of displacement of the head in general begin to exceed the values of energy used for deformation of the head at its contact with the object. There were no differences in length, body masses, head masses in the victims of blows with fists (Group 1), feet with shoes (Group II) and blunt hard objects (Group III) (all p>0.05), so these factors did not influence intergroup differences in the incidence and size of injuries.

The combination of SDH and alcohol intoxication was found in 55% of victims with fist blows and in 77% of victims with foot blows in shoes.

In two groups frequency of occurrence of SDH was importantly (p<0,01) dependent on the free position of the head in the period of shock, and in the team, in which place of the traumatic injury appeared with kicks in shoes, also on the distance between C7 and external occipital tubercle (gram=0,996, p<0,01) and the people of the head of victims (gram=0,810, p<0,0G). Alcohol intoxication caused a decrease in the tone of the muscular skeleton of the neck or in the value of its flexible destruction (Rsh), preventing the displacement of the head after contact, and an increase in the same value of the velocity parameters of the head in the phase of displacement after contact (Eg): Ekin. Prospector.n= ΔE +Eg+ Rsh Increase in the distance between C7 and the external occipital tubercle was accompanied by an increase in the carbon and linear high-speed velocity of the head in this phase, and an increase in the people on the contrary, brought about a decrease in this velocity.

In the presence of fist blows only effective (p<0.01) SACs were detected, which in 80% covered the list of sources of SDH in the variant of ruptures of plastic cerebral layers and vessels of the cortex surface. The area of SAC was no more than 1 square cm. In group II SACs were most often (75.0%) located in the impact and anti-impact zones at the same time, and the areas of impact SACs, in comparison with the areas of SACs of the previous group, were significantly larger (p<0.01), which was associated with the greater weight of the foot in shoes, and, therefore, with the increased value of local bone deflection in the contact phase and head velocity in the phase of displacement after it. In every observation, the area of SAC in the impact zones, compared to the counter-impact zones, appeared to be predominant (p<0.01), and in about 80% of cases their ratio was more than 2:1.

Thus, the high incidence of SDH and SAC in these two groups with, as a rule, bruises, or the smallest skin injuries, and in the absence of fractures, was due, first of all, to the influence of the velocity of body parts when approaching the head and of the head when displaced after contact. This gave rise to three variants of intracranial injuries: 'SAC + SDG', "SDG" and "SAC". A comparative analysis of the nature of injuries in practically healthy and lip patients during blows with body parts revealed no influence of the previous pathology on the frequency of SDH and SAC, as well as the size of SAC. The peculiarity of the traumatic injury that caused death and occurred from a single blow with a blunt hard object was the presence of a bruised wound, foci of SAC and, along with this, fracture and foci of UGM in each observation (per.+SAC+UGM) (p<0.01) [7].

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Conclusion:

The wound was caused by a blunt hard object, which is indicated by bruising, roughness, smearing and sedimentation of its edges, the presence of connective tissue bridges in the depth of the wound. The linear shape of the wound indicates that it was caused by the edge of a blunt-force object. The impact of TTP at an acute angle forms a hole-punch fracture, which is characterised by the presence of a bone defect with a cone-shaped expansion combined with complete and incomplete immersion of bone fragments and fragments in the cranial cavity.

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