IMPROVING THE TIMING OF SOFT TISSUE INJURY IN BLUNT FORCE TRAUMA BASED ON MORPHOMETRIC ANALYSIS

Ibragimov Botirjon Inomidinovich
Andijan State Medical Institute
Ruziev Sherzod Ibadullaevich
Tashkent Pediatric Medical Institute

Abstract. The review presents studies devoted to the issue of determining the duration of formation of soft tissue damage. Despite the significant number of sources, this problem requires further study and identification of new criteria.
Keywords: Damage, duration, postmortem period, soft tissues.

INTRODUCTION

Establishing the age of formation of mechanical damage to soft tissues in the postmortem period is a very difficult and practically important issue. This problem is widely represented in both domestic and foreign literature and is considered by forensic scientists in a variety of aspects. The first publications devoted to solving this issue appeared in the early stages of the development of forensic medicine [2].

Establishing the age of skin damage is mainly carried out on the basis of a macroscopic and histological picture, according to which an expert, based on literature materials and his own experience, evaluates it [1].

MATERIALS AND METHODS

The age of abrasions is determined by the presence or absence of a crust, its color, rejection, and disappearance of the area of redness at the site of the former abrasion. The age of bruising is determined by the color change. The age of wounds according to the processes of inflammation and healing, and the presence and nature of the formed scar [3]. However, it should be noted that the accuracy of determining the color of damage requires improving the procedure for determining it. Such opportunities are provided by modern spectroscopy and colorimetry. Indicating the color of damaged tissues in the form of a colorimetric formula or according to a color catalog allows you to accurately formalize the color characteristics of damaged tissues. The methods of spectroscopy and colorimetry make it possible to quantitatively study the color of damaged tissues, their changes - the “blooming” of bruises, abrasions and hematomas [4].

RESULTS AND DISCUSSION

Forensic histological diagnosis of the age of formation of mechanical damage is primarily based on the study of the dynamics of organ, tissue, inflammatory and regenerative changes in the damaged tissue. It has been established that when skin wounds are up to 40 minutes old in the papillary layer, the number of detected leukocytes around the lesions ranges from 10-15 to 20-25 in the field of view; when aged from 40 minutes to 1 hour, up to 40-50 in the field of view; when aged 1-2 hours and 2-4 hours up to 60-80 in the field of view. In the reticular layer and hypodermis: up to 100 per field of view in a group of up to 40 minutes; up to 150 in the field of view in groups of 40 minutes-1 hour and 1-2 hours; up to 200 in the field of view in a group of 2-4 hours. Taking into account localization, the earliest leukocyte reaction (up to 80 per field of view in the lower layers of the dermis and hypodermis) develops in a period of up to 40 minutes. The earliest leukocyte reaction (up to 80 cells per field of view) develops in the lower layers of the dermis and hypodermis up to 40 minutes after injury in wounds of the forearm, shoulder, torso and head in the form of a perifocal “shaft” around hemorrhages, marginal leukocytes in vessels, migration of leukocytes through the vascular wall, single

perivascular location. An inflammatory reaction in the distal parts of the extremities (fingers, hand, wrist) begins to form by the end of the 1st hour after damage in the lower layers of the dermis and in the hypodermis, up to 50 leukocytes in the field of view. By 4 hours after injury, inflammatory processes intensify in all wounds, except for wounds of the lower extremities [3].
In recent years, scientists have identified some features of reactions to damage to tissues and organs.
However, it should be noted that the results of histological examination, unfortunately, are not always specific and depend on many exo- and endogenous factors.
Biochemical and biophysical research methods are widely used in forensic medical practice, as they make it possible to record changes occurring in the damaged area at a more subtle level. Their high sensitivity and the possibility of strict objective registration of the results obtained make it possible to reliably establish the lifetime and duration of damage.
Lifetime mechanical damage to the skin is characterized by a significant increase in the content of free serotonin from the first minutes of the post-traumatic period. The concentration of these biologically active substances is associated with the destruction of mast cell membranes, which are an integral part of the inflammatory response.
A number of researchers used the chemiluminescence method to establish the survival and duration of mechanical injury to skeletal muscles. At the same time, the dependence of chemiluminescence parameters on the duration of the post-traumatic period was established [2].
Indicators of electrical conductivity of skeletal muscles have been studied at various times after death [1].
In a number of works, the impedansometry method was used. This method is quite effective in establishing the age of bruises within a period of up to 140 hours from the moment of injury [2]. Studies of skin and muscles on expert material using the ultrahigh frequency method have shown that the study of the biophysical properties of soft tissues makes it possible in a number of cases to speak out about the cause of a person's death and how long ago it occurred, even when examining parts of a dismembered corpse [1]. Determination of the thermal conductivity coefficient of a number of tissues and organs made it possible to identify some patterns depending on the age of formation of damage. According to the authors, the coefficient of thermal conductivity of biological tissue in the area of damage naturally increases in the first hours after injury with a gradual decrease thereafter [4].

CONCLUSION

The realities of today, when the issue of protecting human rights and freedoms is especially acute [3], require new approaches and methods based on more subtle, sensitive, advanced methods of studying the processes that arise when human organs and tissues are damaged , which will help improve the quality of forensic medical examinations.

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