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Research Article

THE FORENSIC SIGNIFICANCE OF THE BURN INJURY CRITERIA

Submission Date: February 28, 2022, **Accepted Date:** March 20, 2022,

Published Date: March 31, 2022 |

Crossref doi: <https://doi.org/10.37547/TAJMSPR/Volume04Issue03-13>

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ABSTRACT

In the modern world there is a constant increase in the number of fires in residential and industrial premises, transport, which leads to injuries and often fatalities [4,15]. According to data of the summary reports on activity of territorial bureaus of forensic-medical examination of the Russian Federation at fires from thermal traumas and carbon monoxide poisoning 15 918 persons were lost in 2000 and 16 416 - in 2008. It makes about 3 % from all forensic medical autopsies [5]. A similar situation is typical for the Republic of Tajikistan [11].

By now, the causes, pathogenesis, pathomorphosis [6, 12], clinical and morphological features [1, 10], epidemiology of thermal injuries [5], combined effects of thermal and carbon monoxide [7, 9], injuries caused by mechanical effects of falling parts of a burning building and various objects [14] have been studied in sufficient detail.

KEYWORDS

Burn injuries, mechanical impact, thermal injuries.

INTRODUCTION

In recent years, there has been an increase in the incidence of burn injuries caused by flammable liquids on the human body, but there has been little research in this area [8]. Thermal trauma injuries and resulting diagnostic and treatment failures often lead to death or disability [2,13].

Due to the great importance of the problem of fatal thermal trauma, there is a need to develop morphological criteria for assessing injuries, a methodology for determining whether the circumstances and conditions of trauma are consistent with the results of forensic examination of a corpse [11].

According to other researchers, the number of cadavers with lethal thermal trauma over 5 years (from 2003 to 2007) against the total number of examined corpses was 5.73%; the number of expert examinations performed to determine damage to health caused by exposure to extreme temperatures in living persons averaged about 0.6% of the total number of examinations performed [3].

It should be noted that thermal trauma requires a special scientific and methodological approach in determining the severity of harm to health, as it is not an uncommon type of forensic medical examination.

The aim of the study was to identify forensic criteria for burn injury.

MATERIALS AND METHODS OF RESEARCH

Our researches are executed on the practical forensic-medical material. All of them are the results of the forensic medical examinations carried out in the Samarkand Regional Branch of the Republican Scientific and Practical Center of Forensic Medicine. In

the course of the study the analysis of acts of forensic medical examination of living persons and experts' conclusions, as well as the examination of living persons were carried out. The material used is mostly own observation, and was conducted jointly with other experts. Macroscopic examination was performed using traditional methods. A study of patients who were inpatients at the Combustology Department of the Samarkand Regional Branch of the Republican Scientific and Practical Centre for Emergency Medicine was also carried out by examining case histories. Of the total number of persons examined for thermal trauma -60 cases, of which 21 were examined in the forensic-ambulatory department (group I) and the rest in the combustology department (group II). There were 19 females and 41 males aged 6 to 69 years.

Non-fatal thermal trauma was observed in all investigated cases. In this type of trauma, there was a predominance of injuries to the head, neck, chest, upper and lower extremities. All persons were examined in the forensic and ambulatory department more than 1 day after the injury, some of them after in-patient treatment. The examination was carried out in the combustology department at different periods of in-patient treatment.

According to anamnestic data, all those examined prior to the trauma were considered to be healthy and able to work. Diseases that were found in living persons were noted in patients who had been inpatients at the Department of Combustology of the Samarkand Regional Branch of the Republican Scientific and Practical Centre for Emergency Medicine.

STUDY RESULTS

Among all thermal trauma cases, 32 cases from flames (53.3%) and 13 cases from ignition of flammable liquids (25.0%) were observed. There were also electrical burns in 6 (10.0%) and contact burns in 4 (6.7%). In 6 of the observations, the flammable liquid ignition injuries occurred at work, in 4 observations (13.95%), road traffic accidents involving exposure to flammable liquids (petrol) and in 5 cases at home. Injured by thermal trauma in the first group lived in rural areas in 12 cases (63.8%) and in urban areas in 9 cases (36.2%).

In 41 observations (66.5%), the body showed a peculiar ring shape of burns with petals oriented parallel or perpendicular to the length of the body. The burns often covered an area of 25 to 80% of the body surface.

In a small proportion (3) of the inpatient cases, there was a combination of thermal trauma and mechanical injuries that could not have been self-inflicted. In such circumstances, a separate evaluation of the severity of the injuries was carried out.

The study revealed that the number of patients with a total burn area was distributed as follows: 20-29% - 10 (16,7%), 30-39% - 8 (13,3%), 40-49% - 11 (18,3%), 50-59% - 13 (21,7%), 60-69% - 9 (15,0%). The area of deep burns was in the following order: 10-19% - 12 (20,0%), 20-29% - 10 (16,7%), 30-39% - 16 (26,7%), 40-49% - 9 (15,0%), 50-59% - 8 (13,3%).

In identifying features, it was noted that in Group I, the total area of burns in 5 cases (23.8%) was up to 10%, in 6 cases 31-40% (28.6%). It should also be noted that in 5 cases (23.8%) the area of the burn was not indicated in the report.

Group I examinees were distributed according to the degree of burns as follows: Grade I burns were

observed in 2 persons (9.5%), Grade I-II and III, III AB in 4 (19.0%) each. II-III and II-III degree by 3 (14.3%).

We analyzed the hospitalization of Group I patients as follows: up to 10 days - 9 patients (42,9%), 11-20 days - 5 (23,8%), 21-30 days - 1 (4,8%), over 30 days - 2 (9,5%), 4 (19,0%) did not apply for medical help. An analysis of the structure of burns localization revealed the following features. Thus in Group I examinees they were distributed in the following order: head, neck (19.0%), trunk, extremities (19.0%), upper extremities (19.0%), lower extremities (14.3%). And in group II patients who were hospitalized, the distribution was as follows: trunk, extremities (30.8%), head, extremities (28.2%), trunk (15.4%), lower extremities (12.8%). In a direct analysis of the localization of injuries separately by area in Group I, they were distributed in the following order: Head (15.6%), neck (10.0%), upper extremities - shoulder (11.1%), elbow (14.4%), hand - (10.0%), trunk - chest (10.0%), abdominal region (5.6%), lower extremities - hip (10.0%), shin (8.9%), foot (2.2%), gluteal region (2.2%).

When examining Group I individuals, the presence or development of comorbidities and their complications was denied. In particular, the following pathologies were revealed at the examination of persons in group II - general atherosclerosis, coronary atherosclerosis (15.4%), hypertension (25.6%), CHD (12.8%), diabetes mellitus (17.9%), chronic bronchitis, pulmonary emphysema, pneumosclerosis (12.8%), pulmonary tuberculosis (2.6%), gastrointestinal diseases (duodenal ulcer, gastric ulcer, chronic gastritis) (12.8%).

An analysis of postoperative complications developed in inpatients with thermal trauma was also performed.

1. One frequent postoperative complication was suppuration of the donor area. As the donor area

was insufficiently treated in the postoperative period.

2. Pneumonia mainly occurred in those with upper airway burns and prolonged recumbency.
3. Lysis of the autograft was observed in patients with burns on the posterior surface of the torso who were in a supine position on this surface for a long time, which contributed to displacement of the graft and its partial lysis. In the later post-traumatic period the most frequent immediate complications are pneumonia, sepsis, renal and liver failure, DIC, blood loss due to bleeding from acute stomach ulcers, acute cardiovascular failure, pulmonary and cerebral oedema, etc.

In determining the severity of bodily injuries in Group I examinees the following was observed - mild bodily injuries without health disorder in 2 persons (9,5%), mild with health disorder in 7 persons (33,3%), moderate in 1 (4,8%), severe in 10 (47,6%). In one case (4.8%) the degree of severity was not specified.

CONCLUSIONS

Thus, the findings indicate that thermal trauma is mainly caused by exposure to high temperature (flame, flammable liquid), and the gender predominates in men of working age. To determine the area of the injury, the burn surface area can be determined (as a percentage of the body surface); the depth of the injury must be determined separately. The severity of injuries due to high temperatures must be assessed in terms of the duration of the disability or the extent of permanent disability. Concomitant pathologies (cardiovascular diseases, gastrointestinal diseases, diabetes mellitus, etc.) that are found in thermal trauma lead to slower healing of the burn surface, development of complications (suppuration, etc.), as well as exacerbation of the aforementioned diseases. Therefore, these characteristics must be

taken into account when determining the severity of injuries, especially with regard to the criterion of the duration of the health disorder.

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