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FEATURES OF THE EXAMINATION OF STAB AND INCISED WOUNDS IN FORENSIC MEDICAL PRACTICE

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Abstract: Stab and incised wounds are among the most common injuries examined by forensic medical experts. The aim of this article is to systematize modern approaches to the morphological assessment of such injuries, the methods of weapon identification, instrumental and laboratory techniques, as well as to discuss typical diagnostic challenges and propose a practical algorithm for forensic examination. The study summarizes both domestic and international research data, emphasizing the integration of morphological, instrumental, and forensic evidence.

Keywords: stab and incised wounds, knife injuries, wound morphology, weapon identification, X-ray/CT diagnostics, forensic medical examination.

INTRODUCTION

Stab-and-incised wounds occupy one of the leading positions among bodily injuries encountered by forensic medical experts. Their frequency, social significance and diversity of clinical manifestations make the problem highly relevant. In addition to establishing the mechanism of injury, the expert routinely addresses tasks of determining the direction of the assault, sharpness and defects of the blade, the proportionality of the wound dimensions to the characteristics of the weapon, as well as evaluating accompanying injuries to internal organs and bones [1,2].

For a reliable conclusion a synthesis of morphological signs and instrumental data is required, which imposes high demands on the qualification of the expert [3].

MORPHOLOGICAL CHARACTERISTICS AND CLASSIFICATION OF STAB-INCISED WOUNDS

The morphology of stab-incised wounds is determined by the combination of weapon characteristics (blade shape, width of the edge, sharpness, defects of the tip) and the mechanics of impact (force, angle, direction of the blow, presence of twisting or withdrawal) [4].

They are distinguished as:

- Stab wounds — narrow deep wounds with minimal contusion of the edges;
- Incised wounds — longitudinal, with smooth edges and slight contusion;
- Stab-incised wounds — a mixed type, typical for knife injuries.

The presence of tip defects (serrations, chips) results in characteristic imprints on tissues and bones, which can aid in identifying the blade. It is important to note that the length and depth of the wound do not always correspond to the dimensions of the blade, which often becomes a cause of expert errors [5].

ALGORITHM OF MORPHOLOGICAL EXAMINATION

A practical algorithm of expert investigation includes several stages [6]:

1. Inspection of the scene and photo-documentation of the body in its original position.
2. Macroscopic description of wounds — shape, size, location, contamination.
3. Palpation and measurement of the depth of the wound channel.

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4. Photo-documentation with scale (in frontal, lateral and profile projections).
5. Instrumental investigations — X-ray, CT for assessment of trajectory and depth.
6. Forensic-criminological methods — search for metal traces, microparticles, DNA analysis.

A combined approach allows minimizing the probability of expert error and increasing the reliability of conclusions.

INSTRUMENTAL RESEARCH METHODS

Modern imaging methods — computed tomography and photogrammetry — significantly expand the capabilities of forensic-medical analysis [7].

- CT scanning allows determination of penetration depth, trajectory and damage to internal organs.
- Radiography is used to detect metallic fragments and bone damage.
- Microscopy (including polarising) enables differentiation between incised and torn wounds and also assessment of their age [8].

These methods are especially effective when investigating complex injuries of the thoracic and abdominal cavities.

WEAPON IDENTIFICATION

Assessment of the shape, depth and marginal configuration of wounds allows determination of the type and characteristics of the weapon. From morphological signs (entry opening shape, length-to-width ratio, presence of serrations) the expert may establish the blade group (kitchen knife, folding knife, hunting knife, etc.) [9].

However, precise identification of a specific knife without its seizure remains a complex task. To increase the accuracy of conclusions experimental modelling is used — infliction of test wounds on biomodels of tissues [10].

It should be taken into account that post-mortem changes (charring, the effect of water, temperature) may distort the morphological signs [11].

PROBLEMATIC ISSUES OF EXPERT EXAMINATION

1. Influence of the external environment (moisture, heat, burning) alters the wound margins and may distort their structure [12].
2. Sharpness of the blade — even small defects leave recognisable marks on bone and skin, yet their detection requires standardised methods [13].
3. The ratio of wound depth to blade length is not direct, and depends on anatomical features and the angle of the blow [14].

PRACTICAL RECOMMENDATIONS

- Use a **combined approach** (macroscopy, instrumental methods, criminology).
- Conduct photo-documentation with scale and document all injuries.
- When the weapon is available — perform experimental modelling on tissue biomodels.
- In the conclusion include the **degree of certainty** of the findings and possible distorting factors [15].

CONCLUSIONS

Stab-incised wounds represent a complex object of forensic-medical examination. Reliable diagnosis is possible only when morphological, instrumental and criminological methods are used in combination. Development of technologies (CT, 3D photogrammetry, microscopy) increases the accuracy of weapon and injury-mechanism determination, but requires standardisation of methods and continuous training of experts [16].

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