ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-515-x, Impact Factor: 9.23

American Academic publishers, volume 6, issue 01,2026

Journal: https://www.academicpublishers.org/journals/index.php/ijai

FORENSIC MEDICAL ASSESSMENT OF INTERNAL ORGAN INJURIES BASED ON CLINICAL, MORPHOLOGICAL, AND IMAGING CRITERIA IN COMPLEX TRAUMA CASES

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Annotation

Internal organ injuries in complex trauma cases present significant challenges in forensic medical practice due to their concealed nature, variable clinical manifestations, and high medico-legal significance. Accurate forensic assessment requires the integration of clinical data, morphological findings, and modern imaging techniques. This article analyzes the role of clinical signs, anatomical and pathological features, and radiological evidence in the forensic evaluation of internal organ injuries. The study highlights the importance of a multidisciplinary and standardized approach to improve the objectivity, reliability, and scientific validity of forensic medical conclusions in complex trauma cases.

Key Words

Forensic medicine, internal organ injuries, complex trauma, clinical criteria, morphological findings, imaging techniques, medico-legal assessment

Introduction

Complex trauma involving internal organ injuries remains one of the most difficult areas in forensic medical expertise. Such injuries frequently occur as a result of road traffic accidents, falls from height, industrial accidents, interpersonal violence, or combined mechanical forces. Due to the absence of visible external injuries in many cases, internal organ damage may remain undetected during initial examination, leading to delayed diagnosis and complicated medico-legal evaluation.

From a forensic perspective, accurate assessment of internal organ injuries is essential for determining the severity of bodily harm, establishing causal relationships between trauma and clinical outcome, and resolving legal issues related to criminal responsibility or civil compensation. Traditional forensic evaluation based solely on external examination is insufficient in complex trauma cases, necessitating the use of comprehensive diagnostic criteria.

Clinical findings, morphological evidence, and imaging techniques each provide valuable but incomplete information when considered independently. Only through their integration can forensic experts achieve a reliable and objective assessment. This article examines the forensic medical assessment of internal organ injuries using combined clinical, morphological, and imaging criteria in complex trauma cases.

Methods

This study is based on a qualitative review of forensic medical literature, trauma surgery guidelines, and diagnostic imaging references. Scientific sources were selected from peer-

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reviewed forensic medicine journals, pathology textbooks, and international medico-legal publications.

The analysis focused on identifying key forensic criteria used in assessing internal organ injuries, including clinical presentation, morphological characteristics observed during surgery or autopsy, and findings obtained through imaging modalities such as computed tomography and magnetic resonance imaging. Comparative analysis was used to evaluate the contribution of each diagnostic component to forensic decision-making. No experimental research was conducted, as the study relies on secondary data analysis.

Results and Discussion

The analysis demonstrates that clinical criteria represent the initial and essential component of forensic assessment in complex trauma cases. Symptoms such as acute pain, signs of internal bleeding, shock, organ dysfunction, and prolonged hospitalization provide important indicators of injury severity. However, clinical manifestations may be nonspecific or delayed, limiting their forensic reliability when used alone.

Morphological findings offer objective anatomical evidence of internal organ damage. Ruptures, lacerations, hematomas, perforations, and ischemic changes observed during surgical intervention or autopsy allow direct evaluation of injury extent and severity. Morphological analysis also provides insight into the mechanism of injury and the presence of secondary complications such as infection or hemorrhage.

Imaging techniques have become indispensable in modern forensic medical practice. Computed tomography is particularly valuable in detecting internal bleeding, organ rupture, and associated skeletal injuries in living patients. Magnetic resonance imaging provides detailed visualization of soft tissue damage and is useful in assessing functional impairment. Radiological findings serve as objective, documentable evidence that bridges clinical observation and morphological confirmation.

The integration of clinical, morphological, and imaging criteria significantly enhances forensic accuracy. Correlation between imaging data and morphological findings strengthens expert conclusions and reduces the risk of misinterpretation. This multidisciplinary approach is especially important in complex trauma cases involving multiple injuries, delayed medical intervention, or disputed circumstances.

The findings emphasize that reliance on a single diagnostic criterion may result in underestimation or overestimation of injury severity. Comprehensive forensic assessment requires systematic analysis of all available data to ensure scientifically grounded and legally defensible conclusions.

Conclusion

In conclusion, forensic medical assessment of internal organ injuries in complex trauma cases requires a comprehensive and integrated approach based on clinical, morphological, and imaging criteria. Due to the hidden nature and variable presentation of internal injuries, isolated evaluation methods are insufficient for accurate medico-legal analysis.

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Clinical findings provide essential information regarding patient condition and injury consequences, while morphological evidence offers objective anatomical confirmation of trauma. Imaging techniques serve as a critical link between clinical observation and anatomical assessment, enhancing diagnostic precision and documentation.

The integration of these criteria improves the objectivity, reliability, and consistency of forensic medical conclusions, supporting accurate determination of injury severity and causal relationships. Continued development of standardized forensic assessment protocols and interdisciplinary collaboration between clinicians, radiologists, and forensic experts are essential for advancing the quality of forensic medical practice in complex trauma cases.

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