DIAGNOSTIC APPROACH AND ALGORITHMS FOR MANAGING CHILDREN WITH COMBINED INJURIES OF THE CHEST AND RETROPERITONEAL REGION

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Abstract. *Combined chest and retroperitoneal injuries in children are considered severe traumatic injuries and are associated with a high risk of life-threatening conditions and multisystem complications. Rib elasticity, compensatory capabilities, and age-related plasticity of the child's body may obscure the severity of the injury and complicate diagnosis. Standardized, step-by-step examination algorithms and a multidisciplinary approach are essential for a timely and accurate assessment of the child's condition [1–3].*

Key words: *complicate diagnosis, examination algorithms, vital function monitoring, massive hemothorax.*

Objective: to develop and validate step-by-step diagnostic and treatment algorithms for combined chest and retroperitoneal injuries in children.

Materials and Methods. The study included 131 children aged 1–16 years: 67 with chest injuries and 64 with retroperitoneal injuries. Clinical assessment, vital function monitoring, laboratory examination (complete and biochemical blood tests, urinalysis, coagulation profile), and instrumental diagnostics (X-ray, ultrasound, CT, MRI, urography) were performed. The PTS and RTS injury severity scales, as well as puncture and drainage interventions, were used. Two step-by-step examination algorithms were developed: a six-step one for the chest and a five-step one for the retroperitoneal region. Treatment tactics were developed by a multidisciplinary team (thoracic surgeon, abdominal surgeon, urologist, orthopedist, anesthesiologist).

Results. The implementation of step-by-step diagnostic algorithms demonstrated a significant improvement in clinical outcomes in children with combined chest and retroperitoneal injuries. The percentage of early detection of life-threatening conditions increased from 62% to 89% (+27%), indicating more timely detection of critical injuries such as massive hemothorax, tension pneumothorax, and ruptures of major vessels and retroperitoneal organs. Early identification of these conditions enabled prompt decisions on urgent treatment, reducing the risk of mortality and severe complications.

The detection of occult lung injuries increased from 45% to 78% (+33%), and of retroperitoneal structures from 39% to 74% (+35%), demonstrating the effectiveness of structured examination using combined imaging (X-ray, ultrasound, CT, and MRI). Improving the accuracy of diagnosing occult injuries helps minimize the risk of missing potentially dangerous injuries that, with a traditional approach, might remain undetected until clinical complications develop.

The rate of unnecessary surgeries decreased from 21% to 8%, while the share of minimally invasive procedures increased from 18% to 41%. These figures reflect improved evidence-based surgical decision-making: the use of algorithms allows for the avoidance of excessive interventions while simultaneously increasing the use of gentle techniques that preserve organ function and accelerate patient recovery.

Stabilization within the first 24 hours increased from 57% to 83%, indicating more effective early patient management, including adequate hemodynamic support, respiratory control, and vital sign monitoring. The incidence of early complications decreased from 28% to 12%, and late complications from 19% to 7%, confirming that a systematic and stepwise approach to diagnosis and treatment improves pediatric safety, reduces the morbidity of interventions, and improves clinical outcomes.

Conclusions. Step-by-step diagnostic algorithms combined with a multidisciplinary approach improve diagnostic accuracy and completeness, promptly identify hidden injuries, reduce the invasiveness of interventions, decrease the incidence of complications, and improve clinical outcomes in children with severe multi-trauma injuries. The proposed algorithms are recommended for implementation in pediatric trauma hospitals and emergency care centers.

Literature.

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