IMPROVEMENT OF METHODS OF DIFFERENTIAL DIAGNOSIS OF FUNCTIONAL AND ORGANIC VOMITING AMONG INFANTS

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Abstract. *Vomiting syndrome among infants is one of the most common reasons for seeking inpatient care and requires recognizing the differences between functional and organic causes. To improve the accuracy and speed of diagnosis of vomiting syndrome among infants by creating and implementing a differential diagnosis scheme for disorders of functional and organic genesis. We analyzed 170 case histories of children under 3 months old admitted to the hospital with the main complaint - vomiting. It was revealed that in a surgical hospital, functional disorders were observed in 63.5% of cases, and organic pathology - in 36.5%. The most significant in diagnostic terms were ultrasound examination (sensitivity 85%, specificity 90%) and endoscopic examination (sensitivity 94%, specificity 97%). Radiography with the use of a contrast agent was highly informative, but its use is limited by the possibility of contrast entering the respiratory tract and high radiation levels. Laboratory tests were of secondary importance. Based on the obtained results, an algorithm for differential diagnostics of vomiting syndrome among infants was developed and introduced into medical practice. The use of the algorithm for differential diagnostics of vomiting syndrome among infants made it possible to reduce the time required to establish a diagnosis, increase the accuracy of diagnostic measures, reduce the frequency of using radiocontrast methods and provide timely treatment.*

Key words: *infants, vomiting syndrome, functional disorders, organic pathology, ultrasound diagnostics, endoscopy, radiography, algorithm.*

Introduction. The problem of regurgitation and vomiting among infants is a fairly common occurrence encountered by neonatologists, pediatricians and pediatric surgeons. Statistics indicate that 10 to 20% of infants during their first year of life face this problem [1,3,5]. The causes may vary: from common functional disorders to serious organic diseases. The difficulty in making a correct diagnosis in the early stages is due to both the similarity of symptoms and the fact that newborns cannot describe their condition.

Incorrect interpretation of the causes of vomiting is fraught with a delay in identifying life-threatening pathologies (congenital gastrointestinal anomalies, pyloric stenosis, intestinal obstruction), which certainly affects the effectiveness of treatment and the outcome of the disease [2,4]. At the same time, excessive diagnostics and the use of a large number of additional examination methods create an unjustified burden on the small patient and his family. Modern clinical guidelines emphasize the importance of improving the diagnostic approach for prompt and accurate differentiation of organic and functional causes of vomiting among infants. This makes it relevant to search for innovative solutions, including a comprehensive assessment of the clinical picture, modern laboratory and instrumental methods adapted to the characteristics of infancy [8].

The goal is to improve the accuracy and speed up the diagnosis of vomiting syndrome anomg infants by developing and implementing a differential diagnostic algorithm that allows distinguishing between functional and organic disorders [7].

Research objectives: To analyze the informativity and diagnostic significance of existing methods for determining the causes of vomiting among children of the first year of life.

To develop a clear algorithm for the differential diagnosis of vomiting among infants, allowing to distinguish between functional and organic causes.

Materials and methods of research. The medical records of 198 infants from birth to three months of age, hospitalized with the dominant symptom - vomiting, were studied. All children were observed and received therapy in a specialized children's surgical hospital from 2019 to 2024. Depending on the cause of the vomiting syndrome, the patients were divided into two subgroups: the first subgroup - children with functional disorders of the gastrointestinal tract, amounted to 108 observations (63.5%); the second subgroup - children with organic diseases, included 62 cases (36.5%). The examination included: anamnesis and clinical examination; a set of laboratory tests (clinical blood and urine tests, biochemical blood tests, stool tests); instrumental diagnostic methods (ultrasound examination of the abdominal organs, neurosonography, endoscopic examination, X-ray examination of the gastrointestinal tract).

Results and discussion. During the analysis, among the observed functional disorders, the most frequently detected were pyloric spasm (7.1%, n=12), perinatal encephalopathy with various syndromes (32,4%, n=55), feeding disorders (8.2%, n=14) and malabsorption syndrome (12,4%, n=21). Vomiting, as a symptom of other somatic diseases, was observed in 4,1% of cases (n=7). Organic pathologies included congenital gastrointestinal anomalies such as pyloric stenosis (15,9%, n=27), Ladd's disease (1,8%, n=3), congenital intestinal obstruction (8.8%, n=15), esophageal atresia (1.8%, n=3), intestinal intussusception (1.5%, n=3) and necrotizing enterocolitis (6.5%, n=11).

Statistical analysis demonstrated the predominance of functional disorders over organic ones in a surgical hospital (63.5% versus 36.5%; $p < 0.01$). The most common functional cause was perinatal encephalopathy (32,4%), and among organic pathologies - congenital pyloric stenosis (15,9%). Clinical and anamnestic analysis together with physical examination allowed us to suspect the functional nature of the disorders in most cases (sensitivity of about 70%), but they were insufficient for precise confirmation of organic pathology. Laboratory studies were of an auxiliary nature, recording mainly nonspecific changes, such as leukocytosis and electrolyte balance fluctuations, and did not provide unambiguous differentiation between functional and organic causes. Leukocytosis and an increase in the CRP level turned out to be typical for NEC and can be used as additional differential criteria (sensitivity 55%, specificity 60%).

Organic pathologies were characterized by an earlier onset of symptoms: the average age of vomiting was 12.4 ± 3.1 days, especially early (from several hours to a day) in congenital atresia. In functional disorders, this figure was 24.6 ± 4.7 days ($p < 0.05$). Leukocytosis and elevated C-reactive protein were more often observed in NEC: leukocytosis - in 76.9% of cases, increased CRP - in 84.6% ($p < 0.01$). Acid-base balance disorders were recorded in 42.3% of patients with organic pathology (metabolic alkalosis - in 31.9%, metabolic acidosis - in 10.4%), whereas in functional disorders such deviations were less common (17.5%; $p < 0.05$). Therefore, the study of the acid-base balance can serve as an informative additional method of differential diagnostics, allowing to assume the organic nature of the vomiting syndrome. Among the instrumental methods, ultrasound has proven to be the most valuable and minimally invasive (sensitivity 85%, specificity 90%). EGDS had high information content, especially in the early stages of pyloric stenosis and obstruction of the upper gastrointestinal tract (sensitivity 94%, specificity 97%). Neurosonography was used to confirm or exclude perinatal encephalopathy. Radiography with contrast of the gastrointestinal tract turned out to be informative (sensitivity 92%, specificity 95%), but due to the risk of barium aspiration and high radiation exposure, it was used sparingly, mainly when obstructive disorders of the lower gastrointestinal tract were suspected, allowing to establish a diagnosis in most patients in this group. In 42% of cases (n=71), the referral diagnosis did not match the final clinical diagnosis.

Thus, the analysis showed that the most informative methods in the early diagnosis of organic pathology were ultrasound and endoscopy. X-ray examinations (irrigography) were performed when the above were ineffective and partial and complete lower intestinal obstruction was suspected, while

clinical and laboratory data were more important at the stage of the initial diagnosis. When perinatal pathology of the nervous system was suspected, gastrointestinal tract was performed.

The use of this algorithm made it possible to reduce the time required to make a diagnosis, increase the accuracy of diagnosis and reduce the frequency of using contrast radiography.

Conclusion:

1) Among infants with vomiting syndrome, functional disorders are detected in most cases (63.5%), less often - organic pathology (36.5%). The greatest diagnostic value was shown by: ultrasound - to detect organic diseases of the gastrointestinal tract; EGDS - in early forms of pyloric stenosis and obstruction of the upper gastrointestinal tract; radiography with contrast - to diagnose organic diseases. Neurosonography - in perinatal encephalopathy; laboratory indicators are not specific and have only additional diagnostic value.

2) The developed algorithm of differential diagnostics made it possible to reduce the time of diagnosis and reduce the need for contrast radiography.

REFERENCES

1. Lightdale JR, Gremse DA; Section on Gastroenterology, Hepatology, and Nutrition. Gastroesophageal reflux: Management guidance for the pediatrician. *Pediatrics*. 2013 May; 131(5): e1684–e1695.

2. Vandenplas Y, Rudolph CD, et al. Pediatric gastroesophageal reflux clinical practice guidelines. *Journal of Pediatric Gastroenterology and Nutrition*. 2009; 49(4): 498–547.

3. Rosen R, Vandenplas Y, et al. Pediatric gastroesophageal reflux clinical practice guidelines: Joint recommendations. *Journal of Pediatric Gastroenterology and Nutrition*. 2018; 66(3): 516–554.

4. Hall NJ, Eaton S, Pierro A. Surgery in infants and children. *The Lancet*. 2013; 382(9904): 142–152.

5. Panteli C. New insights into the pathogenesis of infantile pyloric stenosis. *Pediatric Surgery International*. 2009; 25(12): 1043–1052.

6. Daneman A, Navarro O. Intussusception. Part 1: A review of diagnostic approaches. *Pediatric Radiology*. 2003; 33: 79–85.

7. American College of Radiology. ACR Appropriateness Criteria: Vomiting in Infants. *Journal of the American College of Radiology*. 2018; 15(11S): S502–S509.

8. Dominguez SR, et al. Diagnostic imaging of vomiting in infants. *Seminars in Roentgenology*. 2012; 47(1): 62–73.