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DIFFERENTIATED APPROACH TO THE SURGICAL TREATMENT OF ULCERATIVE-NECROTIC ENTEROCOLITIS IN NEWBORNS

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Abstract

Ulcerative-necrotic enterocolitis is one of the most severe gastrointestinal diseases in newborns, predominantly affecting premature and low-birth-weight infants. The disease is characterized by inflammatory and necrotic damage to the intestinal wall with a high risk of perforation and severe complications. This study presents a differentiated approach to the surgical treatment of ulcerative-necrotic enterocolitis in newborns based on clinical, instrumental, and morphological findings. Clinical manifestations, laboratory indicators, radiological data, and morphological changes of the intestinal wall were analyzed. Severe necrotic lesions, inflammatory infiltration, microcirculatory disturbances, and intestinal perforations were identified as the main indications for surgical intervention. The differentiated surgical approach allowed optimization of treatment tactics depending on the severity and extent of intestinal damage. The obtained results demonstrate the importance of early diagnosis and timely surgical management in reducing complications and improving survival rates in newborns with ulcerative-necrotic enterocolitis.

Keywords

ulcerative-necrotic enterocolitis, newborns, surgical treatment, intestinal perforation, necrosis, inflammation, morphology, diagnosis, neonatal surgery

Introduction

Ulcerative-necrotic enterocolitis (UNEC) is one of the most severe and life-threatening gastrointestinal diseases in newborns, predominantly affecting premature and low-birth-weight infants. Despite significant advances in neonatology and pediatric surgery, the incidence of complications and mortality associated with this pathology remains high. The disease is characterized by inflammatory and necrotic damage to the intestinal wall, impaired microcirculation, bacterial translocation, and a high risk of intestinal perforation and generalized infection.

The pathogenesis of ulcerative-necrotic enterocolitis is multifactorial and includes intestinal ischemia, immaturity of the immune system, enteral feeding disorders, and abnormal bacterial colonization of the intestine. These factors contribute to the development of inflammatory reactions, activation of pro-inflammatory cytokines, vascular disturbances, and progressive necrosis of the intestinal wall. In severe cases, the pathological process leads to perforation of the gastrointestinal tract and peritonitis, requiring urgent surgical intervention.

Early diagnosis and timely determination of indications for surgery remain among the most important challenges in the management of newborns with ulcerative-necrotic enterocolitis. Clinical manifestations of the disease are often nonspecific in the early stages, making diagnosis difficult. Therefore, modern imaging methods, including abdominal radiography and ultrasonography, together with laboratory and morphological studies, play an important role in assessing disease severity and choosing the optimal treatment strategy.

Currently, differentiated approaches to surgical treatment are widely discussed in pediatric surgery. The choice of surgical tactics depends on the extent of intestinal damage, the presence of perforation, the severity of necrosis, and the general condition of the newborn. A comprehensive clinical and morphological assessment allows optimization of surgical

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management and improvement of treatment outcomes in newborns with ulcerative-necrotic enterocolitis.

Materials and Methods

The study was conducted on newborns diagnosed with ulcerative-necrotic enterocolitis who were treated in the departments of neonatology and pediatric surgery. Both premature and full-term infants with different stages of the disease were included in the study.

The diagnosis of ulcerative-necrotic enterocolitis was established based on clinical manifestations, laboratory findings, and instrumental diagnostic methods. Clinical evaluation included assessment of abdominal distension, vomiting, delayed intestinal evacuation, blood in stool, signs of intoxication, respiratory disorders, and general condition of the newborn.

Laboratory investigations included complete blood count, biochemical blood analysis, determination of C-reactive protein, procalcitonin levels, and acid-base balance parameters. Particular attention was paid to inflammatory markers and signs of systemic infection.

Instrumental diagnostics included plain abdominal radiography performed in frontal and lateral projections. Radiological assessment focused on the presence of intestinal pneumatosis, dilated bowel loops, fluid levels, free intraperitoneal gas, and signs of intestinal perforation. In addition, abdominal ultrasonography was performed to evaluate intestinal wall thickness, bowel perfusion, free fluid accumulation, and intestinal motility disorders.

When surgical indications were identified, operative intervention was performed. During surgery, the extent of intestinal necrosis, the presence of perforations, and the severity of intestinal wall damage were evaluated. Resected intestinal segments were sent for morphological examination.

Histological specimens were prepared according to standard protocols. Tissue samples were fixed in 10% formalin, embedded in paraffin, sectioned at 5–7 μm thickness, and stained with hematoxylin and eosin. Microscopic examination included evaluation of mucosal integrity, necrotic changes, inflammatory infiltration, vascular disorders, and structural damage of all intestinal wall layers.

Statistical analysis was performed using standard methods of variation statistics. Mean values (M±m) were calculated, and differences were considered statistically significant at $p<0.05$.

Results and Discussion

The study demonstrated that ulcerative-necrotic enterocolitis occurred predominantly in premature newborns with low birth weight. The clinical course of the disease was characterized by severe general condition, abdominal distension, delayed intestinal transit, bilious vomiting, and signs of systemic intoxication. In several patients, bloody stool was observed, indicating severe damage to the intestinal mucosa.

Laboratory findings revealed leukocytosis, elevated levels of C-reactive protein, and increased procalcitonin concentrations, reflecting the presence of an intense inflammatory response and systemic infection. Metabolic acidosis and electrolyte imbalance were also detected in a number of newborns with severe forms of the disease.

Radiological examination demonstrated characteristic signs of ulcerative-necrotic enterocolitis, including intestinal pneumatosis, dilated bowel loops, and multiple air-fluid levels. In advanced stages of the disease, free intraperitoneal gas was identified, confirming gastrointestinal perforation and indicating the necessity for urgent surgical intervention.

Ultrasonographic examination revealed thickening of the intestinal wall, reduced intestinal motility, free abdominal fluid, and impaired intestinal blood circulation. These findings were important for early detection of complications and for determining surgical indications.

During surgical intervention, extensive necrotic lesions of the intestinal wall, inflammatory-destructive changes, and multiple perforations were identified in most patients. The terminal ileum and proximal colon were the most commonly affected regions. Depending on the severity and extent of the lesions, differentiated surgical approaches were applied, including intestinal resection with stoma formation or primary anastomosis in selected cases.

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Morphological examination demonstrated severe destruction of the intestinal mucosa, coagulative necrosis involving all layers of the intestinal wall, vascular congestion, edema, inflammatory infiltration, and microvascular thrombosis. In some cases, complete transmural necrosis with perforation was observed.

The obtained results confirm that inflammatory-necrotic changes, microcirculatory disturbances, and ischemic injury play a key role in the progression of ulcerative-necrotic enterocolitis in newborns. Comprehensive clinical, radiological, and morphological assessment allows timely determination of surgical indications and contributes to improved treatment outcomes and reduced mortality in affected newborns.

Conclusion

Ulcerative-necrotic enterocolitis in newborns is a severe inflammatory and destructive intestinal disease associated with a high risk of complications and mortality, particularly in premature and low-birth-weight infants. The disease is characterized by progressive necrotic damage to the intestinal wall, microcirculatory disorders, inflammatory infiltration, and gastrointestinal perforation.

The study demonstrated that early clinical manifestations, together with laboratory and instrumental findings, are essential for timely diagnosis and assessment of disease severity. Radiological and ultrasonographic examinations provide valuable information for detecting intestinal pneumatosis, bowel perforation, impaired intestinal motility, and vascular disturbances.

Morphological analysis confirmed the presence of extensive necrotic and inflammatory changes involving all layers of the intestinal wall, accompanied by vascular thrombosis and ischemic injury. These pathological alterations determine the severity of the disease and the necessity for surgical intervention.

A differentiated surgical approach based on comprehensive clinical and morphological evaluation allows optimization of treatment tactics, timely surgical management, prevention of severe complications, and improvement of survival outcomes in newborns with ulcerative-necrotic enterocolitis.

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