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CLINICAL SIGNIFICANCE OF SURGICAL INTERVENTION IN CHILDREN WITH ANORECTAL MALFORMATIONS

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Abstract

Anorectal malformations (ARM) are among the most clinically important congenital anomalies in pediatric coloproctology. Their surgical correction is aimed not only at restoration of intestinal continuity and formation of an anatomically correct anus, but also at prevention of obstruction, reduction of postoperative complications and improvement of long-term bowel function. The clinical value of surgery depends on timely diagnosis, precise classification of the defect, detection of associated congenital anomalies and correct selection of a staged or one-stage operative approach. This study presents the experience of surgical treatment of 56 children with ARM treated at the Republican Scientific and Practical Center for Pediatric Minimally Invasive and Endoscopic Surgery, Tashkent, Uzbekistan. The patients were evaluated using clinical, laboratory and instrumental diagnostic methods, including radiography, ultrasonography, contrast studies, echocardiography, neurosonography and specialist consultations when indicated. The novelty of this thesis is the emphasis on surgical intervention as a complex clinical process that includes preoperative risk assessment, individual choice of operative tactics and postoperative functional monitoring. The results showed that early diagnosis, correct anatomical evaluation and planned surgical correction were associated with safer treatment, lower risk of severe complications and better functional outcomes. Staged treatment was particularly important in high and complex forms of ARM, while low forms required accurate reconstruction with preservation of the sphincter complex. Long-term rehabilitation and dispensary follow-up were essential for improving continence, preventing constipation and maintaining quality of life.

Keywords

anorectal malformations, children, surgical intervention, clinical significance, pediatric surgery, staged treatment, PSARP, functional outcomes, rehabilitation.

Introduction

Anorectal malformations represent a heterogeneous group of congenital defects characterized by abnormal development of the anus, rectum and, in many cases, fistulous communication with the urinary or genital tract. ARM occurs in approximately 1:4000-1:5000 live births worldwide, although the incidence may vary depending on geographic, genetic and environmental factors. The condition remains a significant problem in pediatric surgery because untreated ARM may rapidly lead to distal intestinal obstruction, abdominal distension, feeding intolerance and septic complications. Therefore, surgical treatment has a vital clinical role from the first days of life.

The complexity of ARM is determined not only by the type of anorectal defect, but also by the high frequency of associated anomalies. Urogenital, spinal, cardiac and gastrointestinal malformations may influence the operative plan and long-term prognosis. For this reason, modern management requires a multidisciplinary diagnostic algorithm before definitive reconstruction. The aim of surgical treatment is to create an anatomically correct anal opening within the sphincter complex, preserve pelvic structures and achieve acceptable bowel control in later childhood.

Posterior sagittal anorectoplasty (PSARP) remains one of the most widely used operations for many forms of ARM. At the same time, laparoscopic-assisted anorectal pull-through and other minimally invasive approaches are increasingly used in selected high forms because they allow better visualization of pelvic anatomy and may reduce surgical trauma. However, the clinical significance of surgery cannot be assessed only by the technical completion of the operation. Long-term functional outcomes, continence, constipation control, absence of stenosis and quality of life are equally important indicators of success.

Aim

The aim of the study was to evaluate the clinical significance of surgical intervention in children with anorectal malformations by analyzing diagnostic features, operative tactics, associated congenital anomalies, postoperative complications and functional outcomes.

Materials and Methods

The study included 56 children with anorectal malformations who underwent diagnostic evaluation and surgical treatment at the Republican Scientific and Practical Center for Pediatric Minimally Invasive and Endoscopic Surgery in Tashkent, Uzbekistan, during 2023-2025. Among the patients, 46 children (82%) were boys and 10 children (18%) were girls. Fifty children (89%) were born at term and 6 children (11%) were born prematurely.

All patients were examined according to a unified diagnostic approach. Clinical assessment included general condition, abdominal distension, passage of meconium, perineal inspection, presence or absence of fistula and signs of associated congenital anomalies. Instrumental diagnostics included abdominal and retroperitoneal ultrasonography, plain radiography of the chest and abdomen, Wangensteen-Rice or cross-table lateral radiography when indicated, fistulography, distal colostography, proximal irrigography through the stoma, cystography, excretory urography, gastrointestinal contrast passage, MRI, multislice computed tomography, neurosonography and echocardiography. Consultations with a geneticist, pediatric neurologist and neonatologist were performed when clinically necessary.

Patients were classified according to the Krickenbeck classification. The observed forms included rectoperineal fistula, rectourethral fistula, rectovesical fistula, rectovestibular fistula, cloaca, anal atresia without fistula, anorectal atresia, pouch colon and H-type variant. The choice of surgical approach depended on the anatomical type of malformation, the presence of fistula, the level of the rectal pouch, general condition of the child and associated anomalies. Low forms were treated by definitive perineal or posterior sagittal reconstruction, while high and complex forms usually required staged treatment with initial colostomy, further anatomical evaluation and delayed definitive correction.

The main analyzed criteria were the clinical effectiveness of operative treatment, elimination of obstruction, safety of the selected surgical method, postoperative complications, anal stenosis, mucosal prolapse, need for repeated intervention, bowel function, continence potential and the role of rehabilitation during follow-up.

Results

Isolated anorectal malformation was found in 11 children (20%), whereas 45 children (80%) had two or more associated congenital anomalies. This finding confirmed the need for complex preoperative evaluation before choosing definitive surgical treatment. The most clinically important associated defects involved the urogenital system, spine, cardiovascular system and other parts of the gastrointestinal tract.

Fistulous and non-fistulous forms were both observed. Rectourethral, rectovestibular and rectoperineal fistulas required precise preoperative localization of the fistulous tract. In non-fistulous forms, radiological assessment of the distance between the rectal pouch and perineum

was important for selecting the safest surgical approach. High and complex forms, including cloaca, rectovesical fistula and rare variants, required staged correction.

Surgical intervention had three major clinical effects. First, it eliminated distal intestinal obstruction and prevented progression of abdominal distension, aspiration risk and intestinal complications. Second, it allowed reconstruction of the anorectal canal with attention to the sphincter complex, which is essential for future bowel control. Third, it created conditions for planned rehabilitation and long-term functional follow-up.

Staged surgery was especially valuable in high ARM. Primary colostomy allowed bowel decompression, reduced septic risk and provided time for complete evaluation of associated anomalies. Definitive repair was performed after stabilization and adequate anatomical assessment. In low forms, earlier definitive correction reduced the need for prolonged staged treatment and allowed more rapid restoration of intestinal passage. Postoperative problems included wound inflammation, anal narrowing, constipation and functional bowel disorders. These complications were more frequent in patients with high malformations, sacral anomalies and complex associated defects. Regular dilatation, bowel management, diet correction and follow-up examinations helped reduce late functional problems.

Discussion

The obtained results show that surgical intervention in ARM has high clinical significance because it determines both survival in the neonatal period and quality of life in later childhood. The high rate of associated anomalies in the analyzed group supports the international view that ARM should not be treated as an isolated local defect. Each patient requires systemic examination and individualized operative planning.

The choice between one-stage and staged surgery remains a key clinical decision. In low forms, definitive reconstruction may be performed earlier if the child is stable and the anatomy is clear. In high and complex forms, staged treatment is safer because it decreases the risk of infection, allows detailed visualization of the fistula and protects the definitive repair. This approach is particularly important when associated urinary, spinal or cardiac anomalies are present.

PSARP remains an important method because it provides direct access to the fistula and sphincter complex. Its clinical advantage is accurate placement of the rectum within the muscle complex. Laparoscopic-assisted approaches may be useful in selected high forms because they improve visualization of pelvic structures and reduce extensive perineal dissection. Nevertheless, the success of any method depends on correct patient selection, surgical experience and postoperative management.

The main novelty of this work is the interpretation of surgical treatment as a continuous clinical pathway rather than a single operative event. Early diagnosis, classification, detection of associated defects, operative correction, prevention of complications and rehabilitation are connected stages of one treatment system. Even after technically successful reconstruction, children may develop constipation, soiling or delayed bowel control. Therefore, functional therapy, bowel management programs and dispensary follow-up are necessary components of treatment. This integrated approach improves the clinical value of surgical intervention and supports better long-term outcomes.

Conclusion

Surgical intervention in children with anorectal malformations has decisive clinical significance because it eliminates life-threatening obstruction, restores anorectal anatomy and creates the basis for future bowel function. The results of the study indicate that treatment success depends on early diagnosis, accurate classification, complete assessment of associated congenital anomalies and individualized selection of operative tactics. Staged treatment is

preferable in high and complex forms, while low forms may be corrected by earlier definitive reconstruction. Postoperative rehabilitation and long-term follow-up are essential for improving continence, preventing constipation and enhancing quality of life. The use of a multidisciplinary and individualized approach should be considered a key principle in the management of children with ARM.

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