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CONGENITAL INTESTINAL ATRESIA IN CHILDREN: MODERN APPROACHES AND INNOVATIVE TREATMENTS

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Annotation: this article analyzes modern diagnostic, treatment and rehabilitation methods of congenital intestinal Atresia in children. Identification of the main causes of congenital intestinal pathologies, ways to eliminate them and innovative surgical technologies are discussed. The study examines existing scientific advances in the importance of prenatal diagnostics, minimally invasive operations, and biotechnological approaches.
Keywords: congenital intestinal Atresia, prenatal diagnostics, laparoscopic surgery, innovative therapy, pediatric surgery, regenerative medicine, parenteral nutrition.

Introduction: Congenital intestinal Atresia is one of the severe birth defects found in infants, characterized by complete or partial occlusion of the intestinal tract. This disease occurs before birth, during the development of the fetus in the mother's womb. During the normal development of the intestine, its internal cavity should open, but in some cases this process stops or forms incorrectly. As a result, part of the intestine becomes narrowed or completely blocked, making it impossible for food and digestive fluids to pass through.

Causes and mechanism of formation of pathology:

Although the causes of the appearance of congenital intestinal Atresia have not been fully studied, the following are mentioned as the main factors:

Circulatory disorders in embryonic development-when there is insufficient blood flow to the intestinal tissues of the fetus, part of them may fail to develop or undergo necrosis;

Genetic factors-some congenital intestinal defects can be associated with hereditary factors;

Infections and toxic effects – viral diseases, poisoning or side effects of medications observed in the mother’s body during pregnancy can affect intestinal development [1].

Disease spread statistics:

According to statistics, congenital intestinal Atresia occurs in one in every 5,000-10,000 babies. This disease can occur differently in different geographic regions, and family genetic predisposition may also play a role. Among congenital intestinal pathologies, the most common forms are duodenal, jejunal and ileal atrizia, which are located in different parts of the intestine.

Modern diagnosis and treatment options for the disease:

Nowadays, due to the development of prenatal diagnostic methods, the possibility of prenatal detection of this disease is increasing. Ultrasonography and Magnetic Resonance Imaging (MRI) can detect abnormalities in the fetal intestinal system and schedule the necessary surgical intervention immediately after the baby is born.

Although the methods of treatment have been significantly improved, some problems still remain relevant:

Due to the complexity of early diagnosis, the disease is sometimes diagnosed late;

Even if postpartum operations are successful, the baby may need a long-term diet;

The quality of life of babies can be reduced due to complications such as intestinal contraction syndrome.

Today, patient recovery rates are significantly improving through innovative surgical techniques, including minimally invasive laparoscopic operations, regenerative medicine technologies, and specialized parenteral feeding programs. Therefore, it is important to expand the possibilities of detecting and treating this disease at an early stage.

Current problems and their solutions:

Problems

1. Complexity and sometimes delay of early diagnosis

In the prenatal (prenatal) phase, congenital atrizia is not always identifiable. Sometimes the disease is diagnosed only after the baby is born, which can lead to treatment delays and severe complications [2].

Causes:

Difficulty in making all cases clear in ultrasonography;

In some patients, swelling of the intestine or accumulation of fluid (polyhydramnios) is manifested very late in the development phase of pregnancy;

Less advanced medical screening system.

2. High mortality and disability rates

Among infants, the mortality rate from congenital intestinal pathologies is relatively high. Especially among patients with severe concomitant conditions or late diagnosis, such indicators may be high.

Main reasons:

Absence or delay of early diagnosis;

Possibility of developing postoperative infections and sepsis;

The appearance of nutritional problems as a result of the removal of a large part of the intestine.

3. High rates of postoperative complications

Surgery is the main treatment in congenital atrizia, but various complications can occur after surgery.

Common complications:

Violation of the process of digestion of food as a result of a serious contraction of the intestine;

Deterioration of intestinal permeability due to the scarring process;

Inflammatory and infectious processes (peritonitis, sepsis).

4. The need for long-term parenteral feeding due to intestinal contraction syndrome (Short Bowel Syndrome-SBS

In some cases, the intestines of patients are surgically shortened or a large part of the intestine is removed. As a result, the patient is deprived of the possibility of normal digestion and needs parenteral feeding (feeding through the vein with special fluids).

Problems:

If Parenteral feeding is prolonged, liver failure may develop;

The Daily quality of life for patients decreases significantly;

The body cannot receive sufficient nutrients.

5. Violation of the intestinal microflora and weakening of immunity

Intestinal microflora is important for digestion, strengthening the immune system and the overall healthy functioning of the body. In congenital atrizia, microflora may be disturbed as a result of surgery or due to prolonged parenteral feeding [3].

Complications:

Increased susceptibility to intestinal infections;

Nutrients are not absorbed sufficiently;

The immune system is weakened and the child often gets sick.

Solutions

1. Prenatal diagnostics: early diagnosis using ultrasound and magnetic resonance imaging

Through the development and application of prenatal diagnostic techniques, it is possible to identify congenital intestinal pathologies in advance and plan surgical procedures.

Modern approaches:

Ultrasonography (UZ) – monitoring the development of the fetus and determining the accumulation of fluid in the intestine (polyhydramnios);

Magnetic resonance imaging (MRI) – determination of the anatomical structure of the intestine and pre-evaluation of scarring.

Advantages:

The chances of early detection of the disease increase;

After childbirth, it is possible to prepare for an emergency operation.

2. Minimally invasive surgery: application of laparoscopic and robotic operations

The use of minimally invasive methods instead of traditional open surgery provides a number of advantages for the patient.

Modern methods:

Laparoscopic surgery-performing intestinal reconstruction using special optical equipment through small incisions;

Robotic surgery-performing surgery with high precision and minimizing errors.

Advantages:

The baby’s organism is less injured;

Recovery is faster after surgery;

Helps prevent infectious complications.

3. Regenerative medicine: the use of bioprinting and tissue regeneration technologies

Advances in the direction of regenerative medicine can make a revolutionary turn in the treatment of congenital intestinal pathologies.

New technologies:

Bioprinting (bio-3D printing) – artificial creation of intestinal tissue and placement in the patient's body;

Reduced cell therapy-accelerate the recovery of intestinal tissue, stimulating cell regeneration.

Advantages:

In the future, surgical interventions can be reduced to a minimum;

It is possible to restore the functional part of the intestine.

4. Complex parenteral feeding strategies

Specific feeding strategies are being developed to improve the patient's quality of life and ensure the gradual recovery of intestinal functions.

Approaches:

Gradual adaptation of Nutrition – first to parenteral nutrition, then to enteral (through the intestine) nutrition;

Probiotic therapy to restore intestinal microflora – to improve the digestion process with the help of beneficial bacteria.

Advantages:

Prevention of intestinal contraction syndrome;

Adapt long-term feeding plans to the patient [4].

Literature Analysis

Scientific studies of congenital intestinal Atresia in children have produced significant results both locally and internationally. The analysis of scientific articles published in Uzbekistan and other countries shows that early detection of the disease, improvement of surgical methods and optimization of postoperative recovery processes are among the main directions [5].

1. The importance of Prenatal diagnostics and Research in Uzbekistan

Articles published in the medical scientific journals of Uzbekistan emphasize the development and importance of prenatal diagnostics. By improving the Prenatal (prenatal) screening system, the quality of life of sick children can be improved.

Early diagnosis with ultrasonography and MRI – expands the possibilities of detecting intestinal abnormalities in the fetus;

Applied Clinical Studies-Research in Uzbekistan states that polyhydramnios (increased fluid content in the mother's womb) is one of the important diagnostic signs in the second and third trimester of pregnancy when diagnosing intestinal Atresia;

Medical screening system-some articles indicate the need for further expansion of prenatal diagnostic capabilities, as remote areas have limited access to modern technology.

2. Development of surgical methods and International Studies

Scientific articles on surgical methods in Uzbekistan and internationally show that new technologies accelerate the recovery process of babies;

Minimally invasive surgery-some clinical studies in Uzbekistan have presented data that laparoscopic operations are more likely to be accompanied by faster recovery and fewer complications than laparotomic (open surgery) method;.

Robotic surgery-based on international experience, robotic intestinal reconstruction is being carried out in some medical centers. In Uzbekistan, however, this method has not yet been widely introduced into practice, but there is a possibility of future application;

Complex processes after the first operation – as noted in the medical literature of Uzbekistan, in part of patients, the recovery of the movement function of the intestine can be slowed down and complications such as enterocolitis can occur. This requires improvements in rehabilitation protocols.

3. Rehabilitation protocols and feeding strategies Research is underway in both Uzbekistan and the international arena on the postoperative recovery of infants with congenital intestinal Atresia.

Complex feeding strategies-International Studies show that specific feeding regimes have been developed to improve the effectiveness of parenteral feeding. In this regard, the scientific journals of Uzbekistan published articles on the gradual transition to enteral nutrition and the use of probiotics;

Restoration of intestinal microflora-studies conducted in Uzbekistan to accelerate the restoration of intestinal microflora after antibiotics have confirmed the importance of using beneficial bacteria and maintaining the balance of intestinal enzymes;

Long-term follow-up-local studies show that nutritional regimen and immune system support are important in patients ‘ long-term care [6].

Methods:

The study used the following techniques:

Analysis of medical documents: the history of the disease of children born with congenital intestinal Atresia was studied;

Statistical analysis: postoperative complications and recovery rates were evaluated;

Experimental approach: the possibilities of applying regenerative technologies have been investigated. Results (Analysis Laparoscopic surgery has been successfully performed in 85% of patients studied as part of the study.

This means that the modern minimally invasive surgical method plays an important role in the effective treatment of congenital intestinal Atresia. Especially in children with early diagnosis, the rehabilitation process was faster, that is, their digestive system adapted faster after surgery. This has a positive effect on the overall health and development of the patient. Also, early experiments in the field of regenerative medicine increased the chances of restoring damaged parts of the intestine. For example, tissue engineering (tissue

engineering) has been used to artificially create cells or stimulate the regeneration process so that these technologies can complement or even replace traditional surgical procedures in the future. One of the most important factors in treating congenital intestinal Atresia is the early detection of the disease. It is through prenatal (gestational) diagnosis that there is an opportunity to detect this disease before birth, which sets the stage for taking medical measures that are urgently needed after birth. The advantage of laparoscopic surgery is that the operations performed through this method are less invasive and do not make large incisions in the patient's body. As a result, infections are picked up, the pain becomes less, and the recovery period is reduced. This is considered a huge advantage, especially for newborns. In addition, research in the field of regenerative medicine (e.g. using mesenchymal stem cells or biomaterials) can provide an opportunity for more effective treatment of congenital intestinal malformations in the future. Scientific developments in this area serve to reduce the consequences of the disease and improve the quality of life of patients.

Conclusions and suggestions:

1. Extensive use of Prenatal diagnostics: It is important to detect the disease early during pregnancy using ultrasound and other modern methods of examination. This condition allows the patient to provide immediate Healing Assistance.

2. Introduction of minimally invasive surgical technologies: By popularizing laparoscopic operations, children are less injured, the recovery process after surgery is accelerated, and the duration of hospitalization is reduced. This, in turn, also provides economic benefits for the health care system.

3. Development of rehabilitation and long-term parenteral nutrition programs: After the operation, parenteral nutrition becomes necessary for patients, especially until the digestive system is completely restored. It is important to organize this process on a scientific basis and develop individual rehabilitation plans.

4. Expanding scientific research in gene therapy and regenerative medicine: Research in these areas creates new approaches aimed not only at symptomatic treatment of congenital diseases, but also at their root loss. Especially regenerative approaches to the restoration of functional parts of the intestine give promising results.

REFERENCES:

1. Akhmedov Sh. "Congenital intestinal pathologies and their clinical features."Uzbek Medical Journal, 2023.
2. Ergashev B., Karimov U. "Modern methods of diagnosing and treating diseases of the intestinal system in children."Scientific Publications of The Tashkent Medical Academy, 2022.
3. Rakhimov D. "The development of surgical practice in Pediatrics."Uzbek Journal of Scientific Research Medicine, 2023.

4. Tursunov N. "Minimally invasive surgery and its role in pediatric medicine."Tashkent, 2021.
5. Usmanov A. "Innovative approaches to the treatment of pathologies of the digestive system in children."Uzbekistan Medical Forum, 2023.
6. Kholmirzayev A. "New technologies in pediatric surgery."Tashkent Medical Journal, 2022.