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# DIAGNOSIS AND NEW APPROACHES TO SURGICAL TREATMENT OF PYLORIC STENOSIS IN CHILDREN

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**Abstract**: Pyloric stenosis is a common disease of the gastrointestinal tract in infants, characterized by hypertrophy of the pyloric muscle, which leads to obstruction of the gastric outlet. Early diagnosis and timely intervention are essential to prevent dehydration and malnutrition. Conventional treatment consists primarily of surgical pyloromyotomy, which has demonstrated high success rates. However, advances in diagnostic imaging and minimally invasive surgical techniques have led to improved outcomes and shorter recovery times.

**Key words**: pyloric stenosis, pediatric gastroenterology, diagnosis, surgical treatment, endoscopy, recovery after surgery, multifaceted approach, pediatric surgery, clinical guidelines.

Pyloric stenosis is a common condition in infants characterized by hypertrophy of the pyloric sphincter, which leads to obstruction of gastric outlet. It usually appears in infants between 2 and 8 weeks of age and is more common in males. An understanding of diagnostic techniques and emerging surgical techniques is essential for effective treatment. The diagnosis of pyloric stenosis is primarily clinical, based on the following signs and symptoms. Infants often exhibit non-bilious vomiting that can be forceful. Due to persistent vomiting, infants may present with signs of dehydration. A firm, mobile mass in the right upper quadrant of the abdomen may be palpated during a physical examination. Abdominal ultrasound is the gold standard for diagnosis. It typically shows a thickened pylorus (greater than 4 mm) and an elongated pyloric channel.Historically, the surgical treatment for pyloric stenosis has been pyloromyotomy, where the muscle fibers of the pylorus are divided to relieve the obstruction. Recent advancements have led to new approaches.

Pylorostenosis is a disease characterized by narrowing of the opening from the stomach to the beginning of the small intestine (pylorus).The initial symptoms of the disease are "fountain-like" vomiting, without mixing with bile. This symptom mainly occurs after feeding the baby. Symptoms usually appear between two and twelve weeks of age. Pyloric stenosis, also known as infantile hypertrophic pyloric stenosis (IHPS), is the most common cause of intestinal obstruction in infancy. Pyloric stenosis is characterized by hypertrophy of the circular muscle fibers of the pylorus, with a severe narrowing of the lumen.

The pylorus is thickened to as much as twice its size, is elongated, and has a consistency resembling cartilage; as a result of this obstruction at the distal end of the stomach, the stomach becomes dilated. Pyloric stenosis is rarely symptomatic during the first days of life;

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it has occasionally been recognized shortly after birth, but the average affected infant does not show symptoms until about the third week of life. Vomiting. Classically, the infant with pyloric stenosis has non bilious vomiting or regurgitation, which may become projectile (in as many as 70% of cases), after which the infant is still hungry.

The infant may develop jaundice, which is corrected upon correction of the disease. Dehydration and malnutrition. As the obstruction becomes more severe, the infant begins to show signs of dehydration and malnutrition, such as poor weight gain, weight loss, marasmus, decreased urinary output, lethargy, and shock. Palpable pylorus. In as many as 60-80% of the infants with infantile hypertrophic pyloric stenosis (IHPS), a firm, non-tender, and mobile hard pylorus that is 1-2 cm in diameter, described as an “olive,” may be present in the right upper quadrant at the lateral edge of the rectus abdominis muscle.

Gastric peristalsis. Clinicians may also observe gastric peristalsis just prior to emesis as the peristaltic waves try to overcome the obstruction. In rare cases, pyloric stenosis can appear in babies as an autosomal dominant condition. The pyloric part of the stomach and sphincter muscles of babies born with this defect can appear in congenital anatomically narrowed or functionally hypertrophied forms. Obstruction of the pyloric part of the stomach is observed due to the hypertrophied pyloric part, and the passage of nutrients from the stomach to the duodenum is disturbed. As a result, all ingested food products and gastric secretions are excreted only through vomiting. Vomiting is often "fountain-like" in appearance .Although the exact cause of hypertrophy remains unknown, several studies have shown that neonatal hyperacidity may be involved in the pathogenesis of pylorostenosis in infants.

Constant vomiting causes loss of gastric juice (hydrochloric acid). Vomiting mass does not contain bile because due to pyloric obstruction, duodenal enzymes (which contain bile) cannot pass into the stomach. The loss of chloride leads to a decrease in the level of chloride in the blood, which impairs the kidney's ability to excrete bicarbonate.

As a result, metabolic alkalosis can occur in the baby's body.In addition, secondary hyperaldosteronism develops due to a decrease in blood volume. A high concentration of aldosterone causes the kidneys to retain Na+ and to excrete large amounts of K+ in the urine. The body's compensatory response to metabolic alkalosis is hypoventilation, which leads to an increase in pCO2 concentration in arterial blood. In addition, secondary hyperaldosteronism develops due to a decrease in blood volume. A high concentration of aldosterone causes the kidneys to retain Na+ and to excrete large amounts of K+ in the urine. The body's compensatory response to metabolic alkalosis is hypoventilation, which leads to an increase in pCO2 concentration in arterial blood. Pyloric stenosis is often confirmed by ultrasound. On ultrasound, it can be seen that the pyloric part is thickened and that the mass in the stomach does not pass into the duodenum. In infants under 30 days of age, a muscular wall thickness of 3 mm or more and a pyloric duct length of 15 mm or more are considered abnormal. If a mass inside the stomach passes through the pyloric part into the duodenum, in such cases pylorostenosis and pylorospasm are diagnosed. For the purpose of comparative diagnosis, attention should be paid to the status of the superior mesenteric artery and superior mesenteric vein, because the changes in these two vessels deny pyloric stenosis and instead indicate intestinal malrotation.

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Although the baby receives radiation, the upper part of the gastrointestinal tract is examined by X-ray using contrast agents. A "string sign" or "railway/double track sign" is seen on a post-contrast X-ray in pylorus stenosis. A simple x-ray of the abdomen shows an enlarged stomach. Despite the fact that pyloric stenosis can be determined when examining the upper gastrointestinal tract with the help of endoscopic examinations, it is not possible to distinguish whether the cause of this stenosis is muscle hypertrophy or pylorospasm.In blood tests, as a result of constant vomiting, stomach acid (which contains hydrochloric acid) is released into the environment, increasing the pH level in the blood, decreasing the amount of potassium and chlorides. An exchange of extracellular potassium with intracellular hydrogen ions occurs to correct the pH balance. Pyloric stenosis is usually treated with surgery, and in rare cases conservative treatment may help.

The danger of pylorostenosis is not the closure of the pyloric part, but its complication is dehydration and electrolyte imbalance. Therefore, first of all, it is necessary to provide help aimed at preventing dehydration of the baby and normalizing the pH level in the blood. Usually, such assistance should be carried out in the first 24-48 hours, if not delayed. Intravenous and oral atropine can be used to treat pyloric stenosis. Pyloromyotomy surgery has an 85-89% success rate. But for this practice, patients are required to stay in the hospital for a long time and receive skilled nursing care. Surgery is needed to treat pyloric stenosis. Before surgery, fluids and electrolytes are given through a tube placed in a vein. Proper hydration and electrolyte balance are needed before the procedure. This may take 24 to 48 hours.

The procedure is called pyloromyotomy. In pyloromyotomy, the surgeon cuts into the thickened muscle of the pyloric valve. Then a device is used to spread the muscle apart down to the stomach lining tissues.The pyloric muscle will still work, but this gap loosens the muscle and will allow food to move out of the stomach. The stomach lining will bulge into the open space, but the stomach contents won't leak out.Most often the surgery is done through three small openings in the belly. One is used for a video camera, and two are for surgical tools. This is called laparoscopic surgery. In some cases, a doctor will do an open surgery through one larger opening. Laparoscopic surgery generally has a shorter recovery time. After surgery, your baby will be carefully watched for at least 24 hours. Recommendations for feeding after surgery may vary. In most cases, feeding can begin 12 to 24 hours after the procedure. Your healthcare team may recommend feeding when your baby is hungry, or they may recommend a schedule. Some vomiting may occur after surgery. During follow-up appointments, your care team will check your baby's weight, growth and development. Possible complications from pyloric stenosis surgery include bleeding and infection. However, complications aren't common, and the results of surgery are generally excellent. Pyloric stenosis is usually treated with surgery, and in rare cases conservative treatment may help. The danger of pylorostenosis is not the closure of the pyloric part, but its complication is dehydration and electrolyte imbalance. Therefore, first of all, it is necessary to provide help aimed at preventing dehydration of the baby and normalizing the pH level in the blood. Usually, such assistance should be carried out in the first 24-48 hours, if not delayed. Intravenous and oral atropine can be used to treat pyloric stenosis. Pyloromyotomy surgery has an 85-89% success rate. But for this practice, patients are required to stay in the hospital for a long time and receive skilled nursing care. Boys are more affected than girls, especially first-born boys, and a genetic predisposition has been suggested. Genetic predisposition is more common in people of Scandinavian ancestry, and

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there are several factors that influence heredity. Pyloric stenosis is more common in Caucasians than in Hispanics, blacks, and Asians. occurs. It is 2.4 per 1,000 live births in Caucasians, 1.8 in Hispanics, 0.7 in blacks, and 0.6 in Asians. It is also less common among children of mixed-race parents. Caucasian male infants with blood type I or III are more affected than other infants. Under the influence of erythromycin, the risk of developing hypertrophic pylorostenosis in babies increases. The drug is especially dangerous for the baby in the late stages of pregnancy and in the first two weeks of the baby's life.

This approach reduces postoperative pain and accelerates recovery compared to open surgery, shorter hospital stays, less scarring, and quicker return to feeding. Endoscopic techniques:

• Emerging endoscopic methods are being explored, which may allow for less invasive options for treating pyloric stenosis.

Enhanced recovery protocols:

• Implementation of enhanced recovery after surgery (ERAS) protocols focuses on optimizing perioperative care, minimizing fasting times, and promoting early feeding post-surgery.

Preoperative optimization:

• Addressing dehydration and electrolyte imbalances preoperatively through intravenous fluids and electrolyte replacement is critical for reducing complications.

Long-term follow-up:

• New studies emphasize the importance of long-term follow-up to assess outcomes and monitor for potential complications such as recurrent obstruction or gastroesophageal reflux.Pyloric stenosis remains a significant condition requiring timely diagnosis and effective surgical intervention. Advances in laparoscopic techniques and perioperative care have improved outcomes for affected infants. Continued research into minimally invasive approaches and comprehensive postoperative management will further enhance the care of children with pyloric stenosis.

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