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# PERFORATION OF SMALL INTESTINE IN PREMATURE NEONATE – POSTOPERATIVE MANAGEMENT -CASE REPORT-

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## Abstract

Gastrointestinal perforation (GIP) in neonates is a severe, acute, life-threatening condition associated with multiple complications and a high mortality rate.

It is most often associated with necrotizing enterocolitis, but it also often occurs spontaneously due to local intestinal ischemia.

Early detection and timely surgical intervention, with appropriate respiratory support and individualized nutritional support, are crucial in the outcome and survival of extremely premature neonates.

We present a case of postoperative management of an extremely premature infant from a twin pregnancy after surgical intervention due to intestinal perforation.

**Keywords:** premature neonate, spontaneous gastrointestinal perforation, necrotizing enterocolitis

## Introduction

Gastrointestinal perforation (GIP) in neonates is a severe and life-threatening condition associated with high mortality, most often associated with necrotizing enterocolitis in premature neonates [1]. Gastrointestinal perforation often occurs spontaneously due to local intestinal ischemia, especially in neonates with low birth weight below 1000 g and is not related to the method of feeding.

The main causes of gastrointestinal perforation are low gestational age, low birth weight, feeding with adapted milk formula, early and rapid increase in the volume of meals, bacterial colonization and intestinal ischemia [2,3].

In premature neonates, necrotizing enterocolitis most often develops in the second week of life, while in full-term neonates it usually occurs earlier, i.e. in the first week of life [4].

A second specific clinical entity that should be distinguished from necrotizing enterocolitis is spontaneous intestinal perforation. Spontaneous intestinal perforation is a multifactorial disease in very low birth weight neonates (< 1000 g), which is not related to the feeding pattern. Local intestinal ischemia is considered the main risk factor for the occurrence of spontaneous intestinal perforation. Additional risk factors associated with spontaneous intestinal perforation include: neonatal hypotension, umbilical artery catheter, dehydration, use of indomethacin and steroids.

Less common causes of perforation include intestinal obstruction, idiopathic gastric perforation and iatrogenic perforation [5].

Additionally, neonates with necrotizing enterocolitis and intestinal perforation are at higher risk of mortality. Survivors have an increased risk of EUGR (extrauterine growth restriction) and the development of cholestasis.

Intestinal perforation is usually characterized by abdominal distension and pneumoperitoneum on abdominal radiographs. The current standard of care for neonates with intestinal perforation is surgery.

However, although laparotomy can repair the lesion in very low birth weight (VLBW) and extremely low birth weight (ELBW) neonates, it also carries significant risks, including anaesthesia, operative risks, and possible infection. However, in the literature, there are some carefully monitored VLBW/ELBW neonates with pneumoperitoneum who have made a full recovery without surgery or peritoneal drainage with appropriate nutritional and pharmacological strategies [6].

**Case report**

We present a case of a premature neonate with intestinal perforation. This is a neonate born from a twin pregnancy at 28 weeks of gestation via caesarean section, with a birth weight of 930 grams. The neonate was initially placed on non-invasive ventilation, then was intubated and, after a short period placed on invasive ventilation.

A nasogastric tube was placed, and on the third day after birth, adapted milk formula nutrition was started. On the sixteenth day after starting the diet, abdominal distension occurred and the neonate had not passed stool for 4 days. An abdominal X-ray was performed with the finding of formed aero-fluid levels predominantly in the upper abdomen.

The neonate was transferred to the Paediatric Surgery Unit where an urgent abdominal laparotomy was performed. After entering the abdomen, a huge amount of faecal mass was found in the peritoneum and there was a perforation in the high part of the ileum.

On the same day after the performed surgical procedure for suspectedileal perforation, pneumoperitoneum, diffuse stercoral peritonitis, and suspected meconium ileus, the premature neonate at the age of 19 days was transferred to the Intensive Therapy and Care Unit.

On admission, two separate stomas were present in the lower abdominal quadrant, sedated, with mottled skin.

The neonate was placed on MV. Parenteral dual antibiotics from the aminoglycoside and carbapenem groups were included, and internal homeostasis was corrected. Laboratory, imaging and microbiological analyses were performed, and regular consultations with the attending pediatric surgeon. Parenteral nutrition was initially prescribed and administered.

Enteral nutrition was started on the fifth day of the hospital stay, with a gradual increase in volume and good tolerance.

The neonate was extubated on the 27th day of the hospital stay, after which he was placed on non-invasive ventilation NIV B-CPAP, maintaining stable vital parameters.

From the 39th day of the hospital stay, the infant was placed on oxygen support via mask, which was removed after the infant showed stable vital parameters.

After 47 days of its hospital stay in the Intensive Therapy and Care Unit in a stable general condition, at the age of 66 days, with a present ileostomy, the infant was transferred to the neonatology department. In the Neonatology Department, the initiated antibiotic therapy was continued for 14 days. Nutrition was provided through a nasogastric tube with adapted milk formula for premature infants and with extensive protein hydrolysate.

After a 2-week stay in the Neonatology Department, the infant was transferred in a good general condition to the PHI UC Paediatric Surgery Ward for planned elective surgical treatment - closure of a previously created ileostomy.

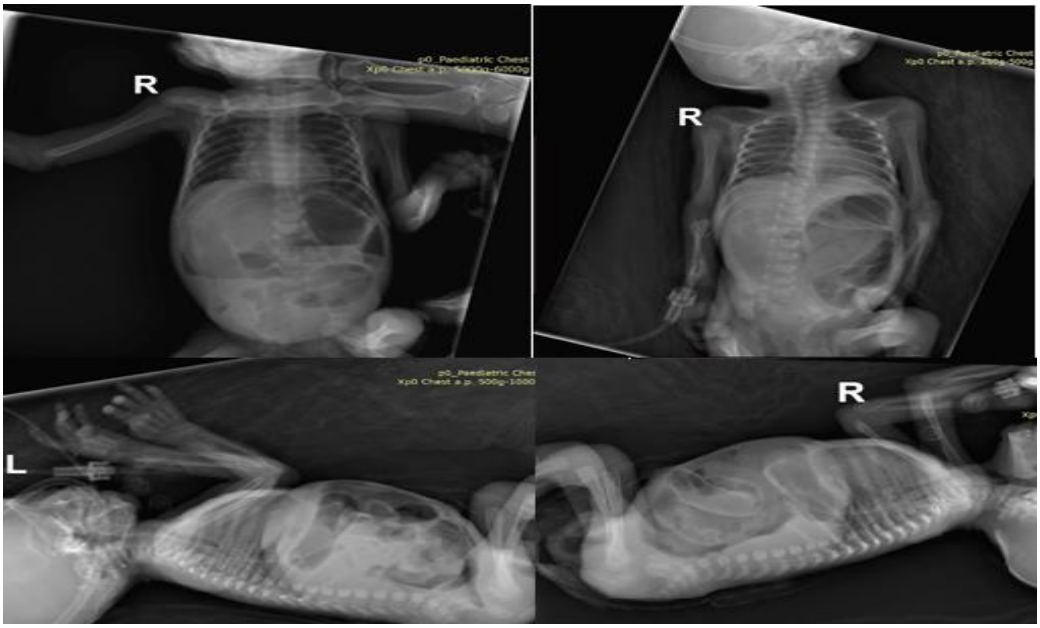


**Figure 1.** Aero-fluid Levels in the Upper Abdomen

**Discussion**

Survival of extremely low birth weight infants remains a significant global challenge. In an international comparison of 10 national neonatal networks, survival rates for extremely preterm infants between 27 and 29 weeks of gestation in Japan (93.3%) were significantly higher than those observed in other developed countries. Survival rates for extremely low birth weight (ELBW) infants have shown significant improvement in recent decades in developing countries. Nutritional support is crucial for extremely low birth weight (ELBW) infants. Although the primary goal is to initiate enteral feeding as soon as possible in premature infants, ensuring optimal growth and nutrition and avoiding potential complications associated with rapid introduction of feedings, it should be noted that extremely preterm neonates, especially those weighing less than 1000 g, require individualized approaches and feeding protocols because they often do not tolerate larger amounts of food.

However, even with this type of feeding, a significant incidence of gastrointestinal perforation has been observed, which may be further attributed to the extremely underdeveloped gastrointestinal tissues in extremely low birth weight (ELBW) neonates [7].

There is also a causal relationship between infections and gastrointestinal perforation in extremely low birth weight (ELBW) infants due to their compromised immunity, allowing pathogens to enter the digestive tract and disrupt the protective barrier of the intestinal mucosa, thereby increasing susceptibility to gastrointestinal perforation. This highlights that severe infection and sepsis are significant risk factors for gastrointestinal perforation in extremely low birth weight (ELBW) infants [7,8].

Necrotizing enterocolitis and spontaneous intestinal perforation are among the most common risk factors for increased mortality in extremely low birth weight infants. Therefore, it is imperative that surgeons accurately differentiate between spontaneous intestinal perforation (SIP) and necrotizing enterocolitis (NEC) before surgery. Extremely low birth weight (ELBW) infants who undergo surgery for necrotizing enterocolitis (NEC) or spontaneous intestinal perforation (SIP) have a postoperative in-hospital mortality rate of approximately 50%.

Spontaneous intestinal perforation (SIP) has been observed to occur in infants of lower gestational age compared to those with necrotizing enterocolitis (NEC) [8].

However, the clinical symptoms of necrotizing enterocolitis (NEC), spontaneous intestinal perforation (SIP), and gastrointestinal perforation (GP), such as abdominal distension, feeding intolerance, intestinal bleeding, and infectious parameters, are nonspecific. The pathogenesis of necrotizing enterocolitis (NEC) is based on mucosal injury with subsequent bacterial translocation across the intestinal epithelial layer and deregulation of innate immune defences leading to subsequent inflammation and tissue necrosis. In contrast, spontaneous intestinal perforation (SIP) and gastrointestinal perforation (GP) mainly affect extremely low birth weight infants in the early postnatal period. They are characterized by an isolated perforation without surrounding necrosis or neutrophilic infiltrate, and are often accompanied by focal thinning or absence of the intestinal muscularis propria [8]

## Conclusion

In conclusion, gastrointestinal perforation (GIP) in neonates is rare, but is associated with high mortality rates. A high index of suspicion for this condition and early surgical intervention with appropriate respiratory support and nutritional management are key to increasing survival of these neonates and reducing morbidity rates.

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