Differential explanation for collapse in Baby J

There are several reasons why a neonate who had surgery for necrotizing enterocolitis (NEC) with removal of a section of bowel may need two stoma bags:

In some cases, two stomas can be formed from the same area of the bowel after surgery for NEC. These are referred to as the proximal and distal stomas[5]:

- The proximal stoma is the one that produces stool.
- The distal stoma (also called a mucous fistula) is non-functioning but may produce mucus and gas.

Creating two stomas may be a temporary measure to allow the affected portion of the bowel to heal before reconnecting it later. This is often done when:

- The remaining bowel does not seem healthy enough to reconnect immediately.
- A large part of the bowel was removed.

Having two stomas allows the surgeons to completely divert the flow of stool, giving the affected portion of the bowel time to rest and recover.

The distal stoma may be used for a procedure known as "recycling," where some stool is reintroduced to stimulate that part of the bowel. This is often done in preparation for a future operation to reverse the stoma.

Having two stomas allows medical professionals to monitor both ends of the bowel separately, which can be useful in assessing healing and function..

The surgeon will typically plan to reconnect the two segments of the bowel and close the stoma openings when the baby is doing better, usually at least 2 months later and when the baby is growing well..

[1] Neonates living with enterostomy following necrotising enterocolitis are at high risk of becoming severely underweight

[2] Outcome of stoma closure in babies with necrotising enterocolitis: early vs late closure | Pediatric Surgery International

There are several common challenges in managing two stomas in neonates with necrotizing enterocolitis (NEC):

Growth failure and malnutrition:
- Significant faltering growth occurs in most babies (89%) with an enterostomy following NEC..

- 42% of babies meet the criteria for being severely underweight at the time of stoma closure. Poor weight gain is a common challenge due to reduced small bowel surface area, enterocyte damage, and malabsorption.

Fluid and electrolyte imbalances:

High stoma output can lead to significant fluid and electrolyte losses, which can be life-threatening, especially in extremely low birth weight infants. Babies may lose more salt than normal, requiring additional salt supplementation in their diet.

Stoma-specific complications:
- Stoma prolapse: More of the bowel may come out of the baby's abdomen.
- Parastomal hernia: The bowel attached to the stoma can slip back into the abdomen..
- Stenosis: Narrowing of the stoma opening, which may require surgical intervention..
- Skin problems: The skin around the stoma can become red, sore, or infected..

Dependence on parenteral nutrition (PN):

A significant proportion of infants (over 70%) require adjuvant PN for adequate growth.

Prolonged PN use increases the risk of complications such as PN-associated liver disease and catheter-related sepsis.

Vascular access complications:

The need for ongoing vascular access for PN and medications can lead to complications in 59-90% of cases.

Challenges in establishing enteral feeds:

Less than half of the babies are successfully established on full enteral feeds prior to stoma closure.

A significant proportion (39%) of babies discharged to local units or home required emergency readmission due to stoma-related issues.

High reoperation rates (52%) have been reported, with stoma-related issues being the primary cause (71%) of reoperations.

Stoma associated morbidity in the preterm infant

Enterostomy complications in necrotizing enterocolitis (NEC) surgery, a retrospective chart review at Odense University Hospital - PMC

Surgery to treat necrotising enterocolitis (NEC) | Bliss

Seizures are a known complication due to malnutrition of vitamins, minerals, and salt in preterm neonates with stomas following necrotizing enterocolitis (NEC).

Electrolyte imbalances: Deficiencies in sodium, calcium, and magnesium can alter the electrical activity of brain cells and cause seizures. Preterm neonates with stomas are at high risk for significant fluid and electrolyte losses, which can lead to these imbalances.

Vitamin deficiencies:

Vitamin B6 (pyridoxine) deficiency: This is known to cause or worsen seizures, especially in newborns and infants.

Vitamin B12 deficiency: Has been reported as a cause of seizures in both adults and infants.

Vitamin D deficiency: can lead to hypocalcemia, which in turn can cause seizures.

Specific mineral deficiencies:

Hyponatremia (low sodium): Can lead to seizures and is a risk for neonates with high-output stomas.

Hypocalcemia: A common cause of seizures, especially in the context of vitamin D deficiency..

Hypomagnesemia: Can cause seizures, particularly in infants with levels below 0.8 mEq/.

Seizures are more likely to occur with rapidly evolving electrolyte disturbances rather than gradual changes.

General malnutrition can exacerbate the risk of seizures by compromising overall brain health and development.

Acute Symptomatic Seizures Caused by Electrolyte Disturbances - PMC

Dietary and lifestyle behavior in adults with epilepsy needs improvement: a case-control study from northeastern Poland | Nutrition Journal

Nutritional Deficiencies as a Seizure Trigger | Epilepsy Foundati

Seizures in preterm neonates can cause cardiopulmonary collapse.

Seizures can directly impact cardiorespiratory function in neonates, potentially leading to apnea, bradycardia, and hypoxia..

Preterm neonates are particularly susceptible to cardiorespiratory instability due to their immature nervous and cardiopulmonary systems.

Neonatal seizures can cause systemic manifestations including temperature instability, apnea, bradycardia, oxygen desaturation, and hemodynamic instability.

Once diagnosed, the progression of seizures and their complications can be rapid, potentially leading to significant clinical consequences including cardiopulmonary collapse..

Seizures may cause or exacerbate electrolyte disturbances, which can further compromise cardiopulmonary function.

Seizures can interfere with vital brainstem functions responsible for breathing and heart rate regulation.

Electrographic-only seizures without clinical signs are common in preterm infants and can still impact cardiorespiratory function.

Characteristics of Neonates with Cardiopulmonary Disease Who Experience Seizures: A Multi-Center Study - PMC

Seizures in children undergoing extracorporeal membrane oxygenation: a systematic review and meta-analysis | Pediatric Research

Characteristics of Neonates with Cardiopulmonary Disease Who Experience Seizures: A Multicenter Study
Neonatal seizures: diagnostic updates based on new definition and classification

Neonatal Seizures and Neonatal Syndromes - The Epilepsies - NCBI Bookshelf

Seizures in the neonate

Necrotizing Enterocolitis in the Premature Infant: Neonatal Nursing Assessment, Disease Pathogenesis, and Clinical Presentation - PMC

Early Death & SUDEP | Epilepsy Foundation

Electrolyte imbalances and deficiencies can cause seizure-like movements:

Hypocalcemia, hypomagnesemia, and other electrolyte disturbances can lead to neuromuscular irritability and CNS hyperexcitability, which may manifest as seizure-like movements- Calcium and magnesium deficiencies in particular are known to cause seizures in neonates.

Differential diagnosis is crucial:

Normal jitteriness or tremors in preterm infants can be mistaken for seizures.

Electrographic confirmation via EEG is necessary to distinguish true seizures from non-epileptic movements..

Mineral and vitamin deficiencies can affect neuromuscular function, potentially leading to abnormal movements but since not all involuntary movements in preterm infants are seizures, careful evaluation is needed.

Neonatal seizures: diagnostic updates based on new definition and classification

Neurodevelopmental outcomes of preterm with necrotizing enterocolitis: a systematic review and meta-analysis | European Journal of Pediatrics

Metabolic Bone Disease of Prematurity: Diagnosis and Management - PMC

Seizures: Premature Infant

Minerals in Pregnancy and Their Impact on Child Growth and Development - PMC

Acute Symptomatic Seizures Caused by Electrolyte Disturbances - PMC