Spontaneous neonatal gastrointestinal perforation: surgical or conservative management?

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Abstract

Background: Spontaneous neonatal gastrointestinal perforation occurs without any primary lesion of the gastrointestinal tract. It is a rare surgical emergency that may be caused by shunting of blood from renal, peripheral and mesenteric vascular bed to vital organs such as heart and brain during periods of perinatal stress.

Aim: To report three neonates with spontaneous gastrointestinal perforation.

Results: Between 2001 and 2005, we managed three cases of spontaneous gastrointestinal perforation in neonates at the University of Benin Teaching Hospital, Benin City. The perinatal stress factors were caesarian delivery, prematurity and fetal distress due to prolonged obstructed labour. Two had exploratory laparotomy and their perforations were closed in 2 layers while one was managed conservatively. They survived and were discharged after ten, thirty-six and eight days on admission and remained well during one year of follow up.

Conclusion: Early diagnosis, adequate resuscitation and timed surgical intervention resulted to encouraging outcome.

Key words: Spontaneous, Neonatal gastrointestinal, Perforation

Introduction

Intestinal perforation is a well known pathology in neonates. It is classified into secondary or primary (spontaneous). Secondary perforation is due to gastrointestinal lesions causing bowel obstruction, as well as invasive gastrointestinal procedures. Incidences of 1:2900 per live births and 1-3% among neonates in neonatal intensive care units have been reported. Spontaneous neonatal gastrointestinal perforation occurs without any primary lesion. This is a rare surgical pathology when perforation due to necrotizing enterocolitis is excluded. There could be a time lag between the perinatal stress and occurrence of perforation. Spontaneous neonatal gastrointestinal perforation has been reported to occur between the first and thirty-ninth post natal day. Hence a high index of suspicion is needed although correct diagnosis in most cases is made on the operating table.

Between 2001 and 2005, three neonates with spontaneous gastrointestinal perforation were managed at University of Benin Teaching Hospital, Benin City. The perinatal stress factors were caesarian delivery, prematurity and fetal distress due to prolonged obstructed labour. From our literature search, not much publication has been done on spontaneous neonatal gastrointestinal perforation in Nigeria. We hereby report our experience in the management of these cases and draw attention to the fact that neonates who suffered perinatal stress need to be observed closely for some days before discharge.
Case reports

Case 1

A six-day-old boy delivered by caesarean delivery to a twenty four year-old P0+1 woman was admitted into the Special Care Baby Unit on account of abdominal distension which was noticed on the fourth day of life. Antenatal care was uneventful but there was prolonged, obstructed labour due to cephalopelvic disproportion. The baby cried and passed meconium immediately after birth and was doing well until the fourth day of life when he developed progressive abdominal distension, refusal to suck and constipation. Birth weight was 3.45kg.

He was dyspnoeic with poor respiratory effort and a rectal temperature of 36.84°C. Cardiovascular and central nervous system examinations were normal. Abdomen was markedly distended; umbilical stump was clean and dry. Percussion note was tympanic with absent bowel sound. Perianal sensation was intact with good anal sphincteric tone and normal recto-anal reflex. The rectum was empty and gloved finger smeared with mucus. Plain abdominal X-ray showed massive pneumoperitoneum, elevated diaphragm, collapsed bowel with absence of rectal gas. Haematocrit, white cell count and blood chemistry were normal. Full sepsis work up was done, nasogastric tube passed, fluid and electrolyte maintenance were started and broad spectrum antibiotics commenced with nursing in a thermo-neutral incubator. Laparotomy through an upper transverse incision showed wide area of necrosis on the anterior surface of the stomach measuring 10cm x 6cm. Other intraabdominal visceral were normal. The necrosed portion was excised and the fresh edge closed in two layers with nasogastric tube in situ. The baby made a remarkable improvement. Post operative course was uneventful and the baby was discharged on 10th day post operation. He remained well at follow up for one year.

Case 2

This baby was delivered at 33 weeks of gestation to a 35-year-old P4+2 hypertensive mother. Hypertensive control, antenatal care and delivery were done at the University of Benin Teaching Hospital. Pregnancy was uneventful until 33 weeks of gestation when she developed premature rupture of membranes. She presented immediately and had assisted vaginal delivery of a 2.32kg female neonate who was admitted into the Special Care Baby Unit (S.C.B.U) for treatment and observation. Respiratory efforts were adequate and assisted ventilation was not required.

On the seventh day the baby suddenly developed progressive abdominal distension, vomiting and constipation. The neonate was pink in room air with good respiratory effort and a rectal temperature of 36.47°C. Abdomen was distended with pitting oedema of anterior abdominal wall and hyperaemia on lower abdomen which extended just above the umbilical region. The umbilical stump was clean and dry and bowel sounds were absent. Anal sphincter tone was normal, rectum was empty, capacious and gloved finger was smeared with mucus. Plain abdominal x-ray revealed air under the diaphragm, and between bowel loops which were collapsed, free intraperitoneal fluid and absent pelvic gas (Figure 1).

Figure 1. A plain abdominal X-ray of case 2, showing hydropneumoperitoneum
Full blood count showed elevated leucocytes and chemistry showed acidosis and hypokalaemia. She was resuscitated, and had exploratory laparotomy on ninth day. Findings were free intraperitoneal gas, a slough of 2cm x 5cm on the lateral aspect of the cecum and extensive peritoneal faecal soilage. The rest part of the gut and other intraabdominal visceral were normal. The slough was excised and closure done in 2 layers. Extra-mucosal rectal biopsy done showed well ganglionated rectum. She had a turbulent post operative period, broad spectrum antibiotic was continued for two weeks and oral sips commenced and tolerated on eleventh day post operation. She was discharged on the thirty sixth day on admission. She remained in good health at follow up in surgical out patient clinic for one year.

Case 3

The paediatric surgical unit was invited to review an 8-day-old boy in the S.C.B.U on account of abdominal distension, vomiting, constipation, refusal to suck and respiratory difficulty which started on the sixth day of life. The baby was delivered full term to an unbooked 32-year-old P2 woman who had antenatal care in a private clinic. She was referred to U.B.T.H due to prolong labour for two days. The labour was augmented and monitored in U.B.T.H and she had vaginal delivery of a 3.32kg baby on the third day of labour. The baby was doing well until the sixth day of life when the above symptoms set in.

There was obvious respiratory embarrassment due to the grossly distended abdomen. Rectal temperature was 36.78°C. There were no features suggestive of peritonitis and umbilical stump was clean and well healed. There was no significant finding on rectal examination. Plain abdominal x-ray showed massive pneumoperitoneum, collapsed bowel loops and absence of pelvic gas. Haematocrit was 14.5mg%, potassium 2.5mmol/l, sodium 134mmol/l, chloride 104mmol/l and bicarbonate 27mmol/l. Oxygen saturation room air was 82%. Full sepsis screening was negative. The baby was resuscitated, hypokalaemia corrected and broad spectrum antibiotics commenced. While preparation was being made for surgery a size 21G needle was inserted at the epigastrum with resultant escape of large volume of gas and the needle removed. The condition improved dramatically and 8-hourly measurement of abdominal girth over the next 24hrs showed there was no further increase. Conservative management was, therefore continued. On the third day on conservative management, oxygen saturation was 98% in room air and the baby started moving his bowel. A repeat plain x-ray done on the fifth day of treatment showed well distributed bowel gas down to the rectum and complete resolution of the pneumoperitoneum. Oral sip was commenced on the fifth day of treatment and it was tolerated. He was observed for three more days and discharged on the eighth day. He remained stable on follow up in surgical out patient.

Discussion

Spontaneous neonatal gastrointestinal perforation was first reported by Siebold in 1826 but attracted little or no attention. The first successful surgical closure was achieved in 1943. At risk neonates are those delivered by emergency caesarean section, pregnancies complicated by abruptio placenta, placenta praevia, amnionitis and other causes of severe fetal distress.

Irrespective of its location in gastrointestinal tract the perforation occurs as a result of ischaemic necrosis which is sequel to blood being shunted from the mesenteric vascular bed during perinatal stress as seen in our cases. This shunting of blood to the heart and brain at the expense of peripheral, renal and mesenteric vascular bed results in microvascular injury and subsequent loss of mucosal integrity. Persistence of the ischaemic insult allows extension of microvascular thrombosis resulting in transmural necrosis culminating in perforation. Many aetiological factors such as congenital muscular wall defect, increase in gastric acidity and compression of a fluid filled stomach during birth have been suggested. These are however rarely seen and none was recorded in our patients. Okuyama et al observed that spontaneous perforation was seen.
more in the low and very low- birth weight neonates. The neonate has an immature immune system and prematurity is associated with deficiencies in complement, opsinization, phagocytes function, immunoglobulin A (IgA) and immunoglobulin M (IgM), and the function of T-lymphocytes. Gut colonization by pathogenic organisms, presence of hyperosmolar luminal substrates such as carbohydrates and even intrauterine exposure to cocaine have been reported to play contributory role. Perforation in our patients occurred after commencing oral feeds; and emergency caesarean delivery, prematurity and fetal distress were implicated in cases 1, 2 and 3 respectively as the remote cause.

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Calisti et al reviewed 85 cases of neonatal intestinal perforation over 10 years. Isolated (spontaneous) perforation accounted for 19 cases (22%), while Okuyama et al reported 39 cases over 20 years and 8 (20%) were due to spontaneous perforation. Survival rate for neonatal bowel perforation was initially very poor but has increased from less than 30% in 1969 to more than 70% in 1996.

The cases reported were seen over a 5-year period accounting for 3 (21%) of the 14 cases seen with neonatal bowel perforation, hence having similar incidence in the literature. Combining clinical features with radiological investigations can almost always lead to correct diagnosis and predict the site of perforation. The cardiopulmonary instability may result in anaesthetic problems and early invasive resuscitation has been advised. The site of perforation may not be seen in up to 10% of those who had laparotomy as they have sealed before operation. Puncturing the abdomen with large bore needle or cannula to relieve pneumoperitoneum causing respiratory embarrassment can be done as in case 3.

In conclusion, spontaneous gastrointestinal perforation is a rare surgical emergency that may be caused by shunting of blood from mesenteric vascular bed during periods of perinatal stress. Early diagnosis, adequate resuscitation and timed surgical intervention usually lead to encouraging result.

References

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