ORIGINAL ARTICLE

Necrotizing Enterocolitis in an Asphyxiated Premature Infant

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Abstract A case of NEC in a six days old asphyxiated premature infant was reported. The diagnosis was based on predisposing factors including low weight infant, severe ashpyxia, her mother sufferef from fever and premature rupture of the amniotic membrans more than 24 hours. Clinical features include abdominal distention with discoloration of the abdominal wall, vomiting bloody stool, sclerema, temperature instability, jaundice, and respiratory distres. Plain abdominal X-ray examination showed significant intestinal distention, and hiponatremia. The patient was treated with supportive therapy and surgical intervention was not done because the poor condition of the patient. The prognosis of NEC depend on the severity of disease, with mortality rate varies from 0 to 64%. The prognosis of our case is not good and on January 28, 1994 she died. **[Paediatr Indones 1996;36:126-131]**

Introduction

Necrotizing enterocolitis (NEC) is mainly a disease of low birth-weight infant and especially common among infant weighing 1500 grams or less at birth.[1] It is most common serious disease of the gastrointestinal tract.[2] NEC is a disease with multifactorial etiology leading to the one common final pathway of necrosis and inflammation of the neonatal intestine.[3] The incidence of NEC varies from one center to another. In 1985 the child Health Department Medical School of Indonesia University/Cipto Mangunkusumo Hospital was reported 3 cases of NEC.[4] In the united States, from recent surveys involving 31 centers, the incidence of NEC was 1.1 per 1000 livebirths and 24 per 1000 admission to the neonatal intensive care unit.[1] In the United Kingdom, the average reporting rate of definite cases of NEC was 0.3 per 1000

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livebirths, ranging from 9.5 per 1000 in neonates weighing <1000 g at birth to 0.2 per 1000 in neonate weighing >2500 g at birth. Another population study, carried out in the Netherlands, reported NEC in 6% of livebirths who were very low birth weight (VLBW) and/or < 32 weeks gestation.[3]

The purpose of this paper in to report a case of necrotizing enterocolitis in order to remind us of this problem.

Report of the Case

DN, an Indonesian girl, aged six days was admitted on January 23rd, 1994 at the Child Health Department of Denpasar Central General Hospital. She was born vaginally at Kasih Ibu Maternity Hospital on January 17, 1994 at a gestational age of 29 weeks and birth weight of 1500 grams. Her mother suffered from fever and premature rupture of the amniotic membranes more than 24 hours. Apgar score was 3 at 1 minute and 4 at 5 minutes. No history of earlier oral feeding after birth. At 5 days of age she suddenly became lethargic, mildly jaundiced, with abdominal distention, vomiting, respiratory distress, and bloody stool.

On January 23ed, 1994 the baby was referred to Denpasar Central General Hospital. Physical examination on admission revealed lethargy, hypotonia, poor peripheral circulation, jaundice Kramer grade 3 with a body weight of 1400 grams, the heart rate 144/minute. The respiratory rate 64/minute irregular, the rectal temperature 36.4oC. The major fontanel was flat and signs of anemia was observed. On chest inspection the thoracic movement was symmetric on both sides, and subcostal retraction was observed. On auscultation the first and second heart sounds were regular, no murmurs were heard, and breath sounds were bronchovesicular, no crackle and no wheezing. The abdomen was distended with discoloration of the whole abdominal wall and the inguinal region, peristalsis were diminished and the liver and spleen could not be palpable. The extremities were pale, sclerema was present, and no cyanosis.

The laboratory investigation revealed the following result: HB 10.4 g/dl, WBC 10.400/cmm, hematocrit 30% and blood sugar 85 mg/dl. Liquor: NOnne and Pandy negative, cells 0/cmm and glucose 50.3 mg/dl. The blood culture on January 24, 1994 was negative. The results of serum electrolytes: Sodium 117.8 mmol/l, Potassium 6.46 mmol/l, Chloride meq/l and calcium 9.0 mg/dl. BUN 23.8 mg/100ml and serum creatinine 0.0 mg/100ml. Plain abdominal X-rays film showed significant intestinal distention with signs of ileus and positive foot ball sign. The radiologist's interpretation suggest a pattern supporting NEC.

The working diagnosis was NEC. The patient was put in a incubator with nasogastric decompression and intermittent suction and oral feeding was withheld. The patient was treated with intravenous feeding, started by using half-strength aminofusin, diluted with 10% dextrose solution at the rate of 150 cc/kg body weight/day which is equivalent of 75 cal/kg body weight/day, Ampicillin 75 mg and Gentamycine 7.5 mg twice daily intravenously, transfusion of 15 cc whole

blood/day for 3 days. Hyponatremia correction by using sodium chloride 3% 12 cc intravenously.

On January 25, 1994 the patient became lethargic with heart rate 160/minute, respiratory rate 44/minute with frequent attack of apnea and rectal temperature was 36oC. The abdominal distention was increased and peristaltic sounds were absent. The patient was referred to the Department of Surgery where it was diagnosed as paralytic ileus with NEC as the possible underlying cause. Surgical intervention was not performed because of the poor condition of the patient. On January 28, 1994 at 08.00 PM the patient was somnolent with a heart rate of 118/minute irregular, respiratory rat 28/minute irregular with recurrent apnea period and at 20.30 PM the patient died.

Discussion

NEC is commonly thought of as occurring in the premature infant, usually in the first one to two weeks of life. Indeed, 75% to 95% of cases of NEC occur in infants of less than 38 weeks gestation, and with onset typically at 4 to 6 days of age.[5] In our case, she was born from a mother with a gestational age of 29 weeks and onset of clinical signs of NEC at 5 days of age.

The etiology of NEC is still obscure and is considered to be multifactorial with many predisposing factors including low weight infants, particularly prematurity, asphyxia, bottle feeding, hyperviscosity, umbilical catheterization, premature rupture of the amniotic membranes and maternal disorder (e.g., toxemia, infection).[3,4,6] Hypoxia or ischemic injury of bowel wall, direct injury to the mucosal wall by hyper-osmolar feeding and infection with gram negative microorganism have been suggested as etiologic factors.[6] The current most acceptable theory of the pathogenesis is hypoxia which evokes a reflex resulting redistribution of blood, shunted away from less vulnerable organs like the mesenteric, the renal and the peripheral vascular bed to first class organs (the brain and the heart) which would suffer irreversible damage if deprived of adequate perfusion.[3,4,7] The mucosal cells, which are highly sensitive to ischemia, stop secreting protective mucous, and hence proteolytic autodigestion of mucosa occurs.[6,8]

Once the integrity of mucosa is broken, it will be invaded by gas forming micro organism. Bacteria are absorbed into the lymphatic and into the radices of the portal venous system, leading to overwhelming sepsis and death.[6] The predisposing factors for our case were found that low birth weight infant (birth-weight 1500 grams) with severe asphyxia, her mother suffered from fever and premature rupture of the amniotic membrane for more than 24 hours.

The diagnosis of NEC based on clinical features: systemic manifestation include recurrent apnea and bradycardia, lethargy, hypotonia, poor peripheral circulation, temperature instability, jaundice, respiratory distress, sclerema and metabolic acidosis. Gastorintestinal manifestations include abdominal distention, poor feeding, pre-gavage residue, vomiting discoloration of the abdominal wall and blood in stool.[1,3,6] But all these clinical

manifestation might not be present in each case.[6] In our case the clinical manifestation we found were lethargy, hypotonia, apnea, poor peripheral circulation, jaundice, sclerema, abdominal distention, vomiting, blood in stool, discoloration of abdominal wall and inguinal region and temperature instability. Munit[6] found abdominal distention and prolonged gastric emptying were always present in each case. Apnea, cyanosis and sclerema were seen among severe cases. In any authors opinion, a neonate with diarrhea, especially of low birth weight, who has abdominal distention, a positive guaiac test and positive reducing substances in the stool with nonspecific radiological findings in the x-ray should be treated as a NEC (6). Radiology: Abdominal x-rays have an important role in established the diagnosis of NEC and evaluating the severity and extent of the disease. Nospecific radiological findings which frequently accompany or precede the appearance of pneumatosis intestinalis, is a pathognomic sign of NEC, which is shortlived, and usually disappear within 12 hours,.[10] Although the radiological hallmark of NEC is pneumatosis intestinalis, this may be absent in 14-17% of definite NEC cases.[3] Abdominal radiograph will often reveal an abnormal gas pattern consistent with ilues, gaseous distention, foamy pattern and asymmetric of gas pattern portal or hepatic venous air, and pneumoperitoneum.[3,6,11] On the other hand, asymmetry of gas pattern is associated with NEC only about 30% of cases. Pneumoperitonium occurs in 10-30% of cases and develops most frequently early in the course of the disease. Portal vein gas is a sign of advance disease, and in many neonatal unit, an indication for surgical intervention.[3] In our case the plain abdominal x-ray film showed significant intestinal distention with ilues. Laboratory features: Blood studies will often reveal, thrombocytopenia, persistent metabolic acidosis, and severe refractory hyponatremia. The are the most common triad and help to confirm the diagnosis.[11] Microbiology examination, only 30-40% of neonates with NEC have positive bacterial culture of blood, stool or peritoneal fluid.[3] In our case we found hyponatremia but culture of blood was negative.

Treatment of NEC include supportive therapy and operative intervention.[1,3,12] Supportive therapy includes cessation of enteral feeding, nasogastric decompression with intermittent suction. Parenteral nutrition should be initiated through a peripheral vein as soon as possible, with the aim of providing 75-110 cal/kg/day once both amino acid solutions and intralipid are tolerated, correction of electrolyte and acid-base balance and if hypotension develops resuscitation with blood or plasma.[1,4,12] Parenteral antibiotics are started usually a combination of a penicillin and an aminoglycoside such as gentamicin.[1,3] Alternatively, one of the third generation cephalosporins such as cefotaxime is used in some neonatal units.[3] If abdominal perforation has occurred, coverage for anaerobic bacteria should be added, Usually clindamycin is used for this purpose.[12] Operative intervention is indicated in stage III (advance), NEC, vary among neonatal units but have include pneumoperitoneum, localized abdominal mass, portal vein gas and clinical deterioration despite medical therapy.[1,3] Surgery usually consist of the

resection of gangrenous or perforated intestine and either exteriorisation of the ends in an enterostomy or primary anastomosis.[3] The management of our case only supportive therapy by cessation of enteral feeding, institution of parenteral nutrition, administration of antibiotic intravenously, correction of electrolyte and blood transfusion. Surgical intervention was not performed because the poor condition of patient.

NEC must be distinguished from disorders as follow:[3,11]

1. Pneumonia and sepsis are common in this population and frequently associated with an abdominal ilues. The abdominal distention and tenderness characteristic of NEC will be absent, however.
2. Surgical abdominal catastrophes include malrotation with obstruction (complete or intermittent), malrotation with mid gut volvulus, intususception, ulcer diathesis gastric perforation and mesenteric vessel thrombosis. The clinical presentation of these disorder may overlap with that of NEC. Occasionally the diagnosis is made only at the time of exploratory laparotomy.
3. Infectious enterocolitis is rare in the population, but must be considered if diarrhea is present. These children lack of any other systemic or enteric signs of NEC.
4. Feeding intolerance is common but an ill-defined problem in the premature infant. Differentiation of this problem from NEC is difficult at times. Cautious evaluation by withholding enteral feedings and administering intravenous fluids and antibiotics for 72 hours may be indicated until this benign disorder can be distinguished from NEC.

The prognosis of NEC depends on the severity of the disease. The mortality rate of NEC varies from 0 to 64%. Survival for patients treated conservatively, who obviously have a less advanced diseases is from 60% to 90%. Currently the survival rate after operation (stage III) is 50% to 77% in North America.[7,11] The survival rate reported for VLBW neonates with NEC have a range from 61% to 88%.[11] Risk factors for death include female sex, early onset among those who are VLBW, abnormal bleeding, thrombocytopenia, DIC, positive blood culture especially with gram negative bacteria, and need for surgery.[3] The incidence of complication such as intestinal stricture among NEC survivors varied from 14% to 42%.[1,3] The strictures are in the large bowel in 75% and multiple in one third of cases.[1] Due to some risk factors for death was found in this case such as abnormal bleeding, birth weight 1500 grams, female and need for surgery we concluded the prognosis of our case is not good.

Prevention of NEC is the ultimate goal. Prevention of prematurity will reduce the incidence of NEC but this goal will not be achieved in this century.[3,12] Attention must be given to the early diagnosis and prompt treatment of perinatal and neonatal conditions which predispose to the development of NEC predominantly through the hypoxic-ischemic injury pathway,[3] also prophylaxis with enteral antibiotics.[12] Althoug breast milk does not offer absolute protection against NEC, multicenter study has proven efficacy of breast milk in reducing the risk of the development NEC.[3]

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