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CASE REPORT

# Nasogastric Tube Placement and Esophageal Perforation in Extremely Low Birth Weight Infants

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Perforation of the esophagus associated with placement of nasogastric tubes is not uncommon in preterm infants. Herein we report three cases of iatrogenic esophageal perforation associated with nasogastric tube placement. With nonsurgical management of parenteral nutrition and broad-spectrum antimicrobial therapy, all three neonates survived without sequelae. Effective strategies to prevent such complications are discussed.


## 1. Introduction

Nasogastric tube (NGT) placement is a common procedure in extremely low- birth-weight infants. The prevalence of misplaced NGTs in children is difficult to determine because of the differing definitions across studies; however, it has been reported to be as high as 21–43.5%.[1,2] The complications of misplacement range from aspiration pneumonia

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and pneumothorax to perforation of the esophagus or the stomach. Iatrogenic esophageal injury in the neonates usually occurs at the pharyngoesophageal junction where the lumen is narrowed by the cricopharyngeus muscle.[3] A recent report described five cases of esophageal perforation in premature infants over a 9-year period.[4] In Taiwan, Soong et al[5] also reported on three extremely premature infants with iatrogenic cervical esophageal perforation over a 2-year period in a tertiary care hospital. Ultrathin flexible endoscopy is also helpful to confirm the perforation site.[5] Treatment varies with the location of the perforation and the time to recognition. Over the past decade, a shift from an aggressive early surgical intervention to judicious, nonsurgical management of esophageal perforation in selected adult patients has been observed.[6,7] The most important prognostic factor is the time between the injury and the initiation of therapy.[8] The experience in managing esophageal perforation in children, especially extremely low-birth-weight infants, is relatively lacking. We described three cases of probable esophageal perforation and all survived with nonsurgical treatment.

## 2. Case report

During a period of 6 months, three extremely low-birth-weight newborn infants experienced iatrogenic complications associated with NGT placement in a tertiary care hospital. The demographic data and their clinical presentation are summarized in Table 1. The indication for NGT insertion was enteral feeding, and tube replacement was routinely performed every 3—5 days. The placement of NGTs for these patients was performed by three different resident physicians. These 5-French feeding catheters are made of polyvinyl chloride by the same manufacturer (Symphon Chemical Corporation, Taipei, Taiwan). The process of replacement is smooth, and the auscultation method is used to verify the location of the newly placed NGTs. A sudden onset of oxygen desaturation and bradycardia were noted soon after feeding these infants through the newly placed NGTs. Two infants had right-side pneumothorax and underwent immediate chest tube placement. Air was drained from the thoracostomy tubes in these two infants. The third patient had pneumoperitoneum and did not receive laparotomy. These complications were detected by bedside radiographs (Figure 1). Taking the time sequence between NGT insertion and onset of clinical symptoms into account, esophageal perforation was considered to be the most probable cause of pneumothorax and pneumoperitoneum in these infants, although no contrast study or endoscopic examination was performed.

Leukocytosis or leukopenia in these cases may be associated with concomitant infections, such as bacteremia in

**Table 1** The demographic data and clinical presentation of the three infants.

| Case | Age (day) | Birth history | BBW (gram) | Treatment | Leukocyte count (Differential count) | Outcome | Comorbidity |
|---|---|---|---|---|---|---|---|
| 1 | 11 | G5P2A3<br>Vaginal delivery<br>GA: 23 weeks<br>Low Apgar score | 650 | 1. Stop feeding for 10 days with TPN supplement<br>2. Chest tube placement<br>3. Broad spectrum antimicrobial therapy for 2 weeks<br>4. HFVS | 21,700/mm$^3$ (41% segment, 43% lymphocyte, 11% monocyte) | survived | RDS,<br>Ventriculomegaly,<br>ROP,<br>*Escherichia coli* bacteremia |
| 2 | 9 | G2P2<br>Cesarean section<br>GA: 27 weeks<br>Low Apgar score | 995 | 1. Stop feeding for 10 days with TPN supplement<br>2. Chest tube placement<br>3. Broad spectrum antimicrobial therapy for 2 weeks<br>4. HFVS | 3400/mm$^3$ (18% segment, 77% lymphocyte, 3% monocyte) | survived | RDS,<br>Right subependymal cyst,<br>ROP |
| 3 | 12 | G2P2<br>Cesarean section<br>GA: 25 weeks<br>Low Apgar score | 585 | 1. Stop feeding for 8 days with TPN supplement<br>2. Broad spectrum antimicrobial therapy for 2 weeks<br>3. Conventional ventilatory support | 4000/mm$^3$ (18% segment, 76% lymphocyte, 3% monocyte) | survived | RDS,<br>Intraventricular hemorrhage,<br>ROP,<br>*Escherichia coli* bacteremia |

GA = gestational age; BBW = birth body weight; TPN = total parenteral nutrition; HFVS = high frequency ventilatory support; RDS = respiratory distress syndrome; RDS = retinopathy of prematurity.

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