Iatrogenic Esophageal Perforation: An Occurrence from Feeding Tube Placement in a Premature Infant with a Pneumothorax

Yeong Uk Jang, M.D., Woo Jung Jang, M.D., Hye Jung Cho, M.D., Duk Young Choi, M.D., So Yeon Shim, M.D. and Dong Woo Son, M.D.

Department of Pediatrics, Graduate School of Medicine, Gachon University of Medicine and Science, Incheon, Korea

Spontaneous neonatal esophageal perforation (EP) is a rare condition. However, iatrogenic EP due to a feeding tube is not uncommon, particularly in premature infants. Iatrogenic EP can result in serious complications, such as a pneumothorax, and can be fatal. Usually a pneumothorax develops as a result of EP. However, we experienced an EP in a patient with a pneumothorax. The EP occurred after inserting a feeding tube while the patient was suffering from a pneumothorax. Thus care is needed when inserting the feeding tube in a patient with a pneumothorax.

**Key Words:** Esophageal perforation, Feeding tube, Premature

**Introduction**

In newborns, particularly premature infants, an esophageal perforation (EP) occurs when inserting a feeding tube, probably more frequently than reported in the literature1-3. The common symptom of EP is sudden respiratory distress, due to the pneumothorax originating from the EP3-9.

However, we experienced an EP induced by the traumatic insertion of a feeding tube into an extremely low birthweight infant, who had been suffering from a pneumothorax. Here we present the case.

**Case report**

A female newborn weighing 660 g was delivered by Cesarean section at 26 weeks and 5 days of gestation. Her Apgar scores were 6 at 1 minute and 9 at 5 minutes. The newborn received surfactant replacement therapy for respiratory distress syndrome, and was on mechanical ventilation.

On day 6 of life, she deteriorated rapidly and pneumothorax was found on the right side of a chest radiogram (Fig. 1A). The feeding tube was in the proper position at that time. Needle aspiration of the pneumothorax was performed immediately. During the procedure, the endotracheal tube was extubated accidentally along with the feeding tube. Reintubation of the endotracheal tube and reinsertion of feeding tube were carried out without delay in the presence of the pneumothorax.

The pneumothorax disappeared with the needle aspiration. The follow-up chest radiogram revealed a misplaced feeding tube in the right hemithorax. The feeding tube...
exited the esophagus and tracked inferiorly to below the right hemidiaphragm (Fig. 1B). Contrast radiography using Gastrograffin was conducted to confirm the EP. The majority of contrast media injected through the feeding tube was visible in the right hemithorax (Fig. 1C). The feeding tube was removed. Several trials of reinserting the feeding tube failed, because the tube repeatedly went into the established abnormal fistula track. Another attempt at tube insertion into the stomach was successful with the malpositioned tube was in place.

A hydrothorax developed after the contrast study due to the EP, and was cured by placing the chest tube in the right pleural cavity for 3 days. The patient was managed with a 2 week course of intravenous antibiotics, during which nothing was given through the feeding tube. The EP was treated without any further complications.

Discussion

A spontaneous EP in a neonate is a rare condition. However, an iatrogenic EP due to a feeding tube is not uncommon, particularly in premature infants. The estimated incidence of iatrogenic EP is 0.8% in preterm infants, This incidence reaches 4% in newborns weighing <750 g. There has been only one case report in Korea. However, the exact incidence of EP in Korea is unknown.

The pathogenesis of neonatal EP can be summarized as a result of two conditions. First, trauma during placement of a feeding or endotracheal tube or suctioning of the upper airway can cause EP. The second cause is related to pressure necrosis caused by chest drain placement. The predisposing factors are prematurity and the presence of congenital structural abnormalities in the esophagus.

The clinical presentations of neonatal EP can be summarized in three scenarios. The first, and least common, is that of a pharyngeal or esophageal pseudodiverticulum, secondary to a contained cervical perforation. The second is an esophageal obstruction, resulting from compression of the lumen by the mass effect created by a false passage. The third is sudden respiratory distress secondary to a pneumothorax, originating from free perforation into the thoracic cavity. The second scenario, esophageal obstruction, was suggested to be the most common in one report. However, the majority of studies have suggested that sudden respiratory distress, secondary to a pneumothorax or hydrothorax is the most common presentation. The most common site of perforation is the cervical esophagus, although no part is immune. The site of perforation in this report involved the thoracic esophagus, which is unusual. Perhaps the preceding pneumothorax made the esophagus...
deviate to the left so that the feeding tube inserted thereafter would make a hole in the right side of the wall of the thoracic esophagus. Additionally, the presenting symptoms of EP in our case were minimal.

The diagnosis of EP is made by identifying a malpositioned feeding tube. Plain chest radiography suffices in usual EP cases. A lateral view taken at the same time is also helpful for the diagnosis. The need for contrast radiography for a diagnosis has been questioned by several authors. In our case, a Gastrograffin contrast radiogram confirmed the diagnosis, but this may have been a causative factor for the hydrothorax that developed thereafter. Sonography can be a good diagnostic tool, if the findings are not evident on plain radiography.

Iatrogenic EP can be fatal. Overall, EP is fatal in as many as 29% of cases. The most important prognostic factor is the time that has passed between acquiring the injury and the initiation of therapy. The choice of treatment varies according to the cause and specific location of the perforation and the time to recognition. However, controversy exists as to the appropriateness of conservative management (prophylactic antibiotics, parenteral nutrition and chest drainage) versus surgical correction, with the former being more advocated. In our case, conservative management was successful. But, the correct insertion of the feeding tube was troublesome. The feeding tube repeatedly went into the established abnormal fistula track. Inserting another feeding tube while the first remained in place was effective to prevent repeat passage through the iatrogenic injury site.

In conclusion, EP is a rare complication in the modern neonatal intensive care setting, but is associated with significant morbidity or mortality. A high index of suspicion is warranted in infants with sudden deterioration of respiratory status, following procedures involving the pharyngeal region. Radiological investigation is required for the diagnosis. Furthermore, we must be cautious when a feeding tube is inserted in the presence of a pneumothorax. After this experience of EP, we decided not to insert the feeding tube while a patient has a pneumothorax in our neonatal intensive care unit. Prevention of iatrogenic EP is the most important.

한글요약
식도천공은 신생아에서 드문 질환이다. 그러나 영양관 삽관으로 인한 의인성 식도천공은 미숙아에서는 특히 드물지 않게 나타난다. 의인성 식도천공은 기흉같은 심한 합병증을 유발하며 사망을 일으킬 수 있다. 일반적으로 식도천공의 결과로 기흉이 발생하는 것으로 알려져있다. 반면에, 저작들은 기흉이 먼저 발생하고 이 후 의인적으로 발생한 식도천공을 경험하였다. 증례의 식도천공은 환아에게 기흉이 발생한 채로 영양관을 삽관하여 야기되었다. 기흉이 있는 상태에서 영양관 삽관을 고려할 때는 더 심사숙고 하여야 할 것이다.

References

13) Hutchinson R, Ahmed AR, Menzies D. A case of intramural oeso-


