Case Report

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Tracheoesophageal Fistula Complicated by Iatrogenic Gastric Perforation in a Low Birth Weight Neonate

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ABSTRACT

Type-III tracheoesophageal fistula is the commonest type of fistula where upper pouch is blind and distal oesophageal pouch communicates with trachea. In this condition, gastric distension is a common manifestation which can be worsened by positive pressure ventilation. Pulmonary pathology may necessitate ventilation with high peak airway pressures which may rarely lead to gastric perforation with serious consequences. We are reporting such a case of gastric perforation during ventilatory management for fistula repair which needed surgical repair.

Keywords: Airway management; esophageal atresia; gastric perforation; tracheo-oesophageal fistula.

INTRODUCTION

Tracheoesophageal fistula (TEF) results from a congenital fistulous communication between oesophagus and trachea or main bronchi. In the commonest variety, the distal oesophageal pouch communicates with the trachea, while the upper pouch is blind.[1] Ventilatory management in such neonates can be complicated by poor lung compliance coupled with the loss of ventilation through the fistula.[2]With increasing airway pressures, the distal fistula may act as a preferential low-pressure outlet, causing massive gastric dilatation and subsequent perforation. The exact incidence is unknown, but a single center series has reported an incidence of 1% in their limited series of six cases of gastric perforation out of 623 TEF cases. But these were cases of spontaneous perforation which were diagnosed preoperatively. GP occurring intraoperatively due to high pulmonary pressures consequent upon mechanical ventilation has not been described previously to the best of our knowledge.

CASE REPORT

A 2-day old, term, small for gestational age female baby weighing 1.7 kg, diagnosed as oesophageal atresia with TEF was referred from a peripheral hospital for surgical management. At birth, child had copious oral secretions, drooling of saliva, poor spontaneous respiratory efforts and weak cry. She developed severe respiratory distress and cyanosis. Therefore she was intubated soon after birth with 2.5mm ID uncuffed endotracheal tube (ETT). Chest x-ray done at that time showed consolidation of left lung with grossly dilated stomach (Figure 1).

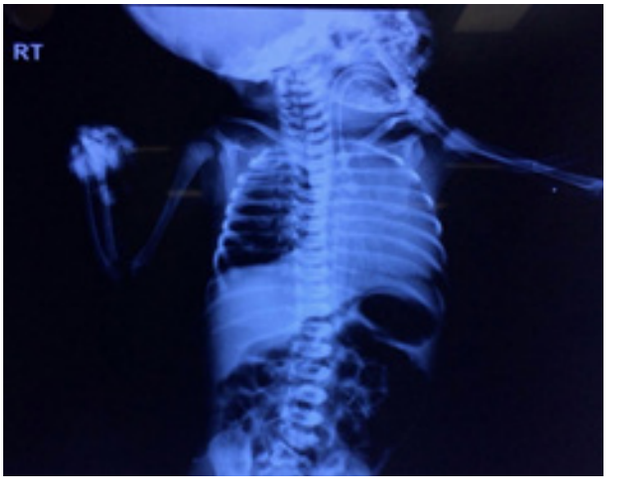

Figure 1. Preoperative Chest X-Ray (Endotracheal tube in situ).

There was no gas under diaphragm. Abdominal ultrasonography had revealed obstruction of pelvi-ureteric junction leading to right hydronephrosis. The baby was shifted to our hospital with ongoing positive pressure ventilation using manual resuscitator by her attendants. Auscultation of lungs revealed bilateral

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rhonchi and crepitations. Abdomen was grossly distended. She was posted for posterolateral thoracotomy for TEF repair. The baby was maintaining arterial oxygen saturation of 95-97% on mechanical ventilatory support. In the operating room, ETT was connected to circle system for mechanical ventilation and anaesthesia was induced using inj. thiopental sodium and neuromuscular blockade was achieved with atracurium. Once the child was placed in lateral decubitus position for surgery and lung was retracted, the child started desaturating despite use of 100% oxygen. The surgery had to be interrupted multiple times for allowing bilateral lung ventilation. Positive end expiratory pressure had to be provided and peak pressures reached very high during surgery (35-45mmHg). In view of the poor condition of the child, a decision to proceed for oesophagostomy and gastrostomy was taken after ligation of fistula. The child was shifted to neonatal intensive care unit for mechanical ventilation and supportive care. His condition progressively worsened and he died on day 4 of life due to severe sepsis and multi organ failure.

DISCUSSION

Esophageal atresia (EA) with a distal tracheoesophageal fistula (TEF) may lead to excessive gastric distention due to inhaled air passing through the distal fistula.[2,3] Gastric distention and subsequent perforation has been described as a complication in patients with type-III TEF patients who need preoperative assisted mechanical ventilation prior to surgical correction of the pathology.[3,4] The risk of gastric perforation is further increased in patients with extreme prematurity and hyaline membrane disease.[5,6] The presentation is usually sudden and may lead to further deterioration in respiratory function because of increasing abdominal distension from pneumoperitoneum and splinting of the diaphragm.[3,4] Unrelieved, the infant becomes increasingly hypoxic and may die.[3]

In a previous series of four TEF neonates with gastric perforation by Jones et al.,[4] all the babies were low birth weight (LBW), premature and had required preoperative mechanical ventilation. They were also managed by gastrostomy and gastric perforation repair, and only one out of the 4 had survived. Kimble et al.[7] had hypothesized that the stomach in patients with esophageal atresia is embryologically weak due to the absence of the trophic effects of the amniotic fluid. Thus, it is vulnerable to perforation due to excessive distention.[7]

Since this neonate was also low birth weight, she required preoperative assisted ventilation which was provided by manual resuscitator. Presumably use of uncontrolled high pressures at that time increased the gastric distension, which further worsened the already poor lung compliance due to pneumonitis. Intraoperatively, the combination of pulmonary pathology, gastric distention and lung retraction resulted in a malicious cycle where increasing gastric distention further worsened the lung compliance and resulted in need for increasing airway pressures during mechanical ventilation and frequent desaturation. Eventually, gastric perforation and pneumoperitoneum with pulmonary decompensation led to abandonment of the procedure in favor of gastrostomy.

In cases of preoperative diagnosis of gastric perforation, occlusion of the fistula can be used as a temporizing measure before surgical ligation of fistula to prevent air leakage and further worsening of the gastric distension. FIlston and team in 1982 reported the use of a Foley catheter through the gastric perforation into the distal esophageal segment to occlude it.[8] Alternatively, simple peritoneal drainage using needle paracentesis can relieve abdominal distention, prevent splinting of the diaphragm, reduce respiratory distress and may even avert the need for preoperative assisted ventilation. Rathod et al[9] described a report of TEF patients with GP where peritoneal drainage was performed by making a small incision in the abdomen under local anesthesia and inserting flank drains. Patient showed improvement in oxygen saturation after the procedure and peritoneal drainage averted the need for preoperative assisted ventilation.

If the infant's condition permits, thoracotomy for fistula repair is done followed by esophageal anastomosis and in the end, repair of the gastric perforation and gastrostomy is done.

In our patient, the preoperative chest x-ray did not reveal any gas under diaphragm and his oxygenation was satisfactory prior to surgery. During surgical management, due to the lung retraction and his lung pathology, very high airway pressures were required which resulted in gastric perforation and further worsening of clinical parameters. In all such cases the surgeon should be present during induction of anaesthesia for urgent percutaneous/ultrasound-guided needle decompression of the distended stomach whenever required to improve pulmonary compliance and ventilator parameters.[2,10] Pnumoperitoneum can be treated by emergent needle decompression of the left upper quadrant of the abdomen.

CONCLUSIONS

A high index of suspicion for GP should be kept in TEF neonates with sudden deterioration in ventilator parameters especially in LBW babies with pulmonary pathology requiring preoperative assisted ventilation. Uncontrolled positive pressure ventilation with manual

resuscitator should be avoided. Emergent needle decompression of stomach or peritoneal drainage should be contemplated as a lifesaving measure in patients with imminent/obvious gastric rupture.

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