PERI-ANESTHETIC MANAGEMENT OF TRACHEO-ESOPHAGEAL FISTULA

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ABSTRACT

During a 3-year period 11 neonates underwent general anesthesia for primary repair of tracheo-esophageal fistula (TEF). The age ranged from 1-10 days. Out of these patients, 8 (72.7%) had atresia of the esophagus with a blind upper pouch and lower segment communicating with a trachea. A total of 7 patients (63.6%) had aspiration pneumonitis pre-operatively. Intubation was difficult in 3 (27.3%). There was no intra-operative mortality. However, the incidence of post-operative mortality was 27.3% (3 cases). The cause of death in all these cases was severe non-resolving pneumonia.

Key words: *Tracheo-esophageal fistula, Congenital anomaly, Aspiration pneumonitis.*

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The overall incidence of esophageal atresia (EA) with or without fistula is 1 in 300 live births(1). Tracheo-esophageal fistula (TEF) is a great challenge for surgeons and anesthesiologists because of the underlying problems, such as (*i*) age of the patient, (*ii*) low birth weight, (*iii*) dehydration, (*iv*) aspiration pneumonia, and (*v*) other associated congenital anomalies. This study highlights our experience in the management of EA and TEF over a 3-year period.

Material and Methods

The material for this study comprised of 11 consecutive cases of TEF reporting in the surgical unit from 1987 to 1989. The ages of these patients at the time of surgical and anesthetic intervention ranged from 1-10 days with maximum number (n=8) between 1-3 days. All babies underwent either a primary repair or a delayed primary repair under general anesthesia after resolution of the pneumonia by chest physiotherapy, frequent upper pouch suction and antibiotics. Of the 11 patients, 8 (72.7%) had Type C, 2 (18.2%) Type A and 1 (9.1%) Type D variety of TEF as per anatomical classification of this anomaly(2).

All neonates were premedicated with injection atropine 0.2 mg IM 30 minutes before operation. Endotracheal intubation with plain endotracheal tube was done either after induction with oxygen and halothane without relaxant or as simple awake intubation. In all the patients the endotracheal tube was passed beyond the fistulous opening with meticulous care. Anesthesia was maintained with oxygen, nitrous oxide (50:50) and halothane (0.5-2%) and they were kept on assisted/controlled ventilation using Jackson-Rees

modified 'T' piece system. In patients with prior gastrostomy, anesthetic gases were prevented from passing out of the lungs to the stomach during IPPV by partial clamping of the gastrostomy tube. In almost all patients, repeated suction of the endotracheal tube was done to clear secretions during the intraoperative period. Recovery from anesthesia was uneventful in all neonates.

Intra-operative Monitoring

Heart rate was continuously monitored by a precordial chest stethoscope, blood pressure by neonatal pneumatic cuff, and body temperature by a clinical thermometer.

Post-anesthetic Management

This comprised of (*i*) moist O_2 by nasal catheter or oxygen hood, (*ii*) oropharyngeal suction every ½-1 h for 24-48 h post-operatively, (*iii*) frequent gastrostomy suction for 3-4 days post-operatively, (*iv*) IV fluid administration (Isolyte P, 4-5 ml/kg/h), (*v*) continuous bedside monitoring of heart rate, blood pressure and respiration by the operating surgeon assisted by the anesthetist, (*vi*) maintenance of body temperature by wrapping the babies in cotton pads in winter months, and (*vii*) appropriate antibiotics.

Results

Waterston, Bonhan-Carter and Aberdeen classified TEF patients on the basis of body weight, severity of pneumonia and congenital anomaly into five groups(3) as shown in *Table I.* Majority of our patients belonged to Group C_2 (45.4%). Eight of 11 patients (72.7%) in this series underwent gastrostomy prior to repair of TEF. Incidence of preoperative pneumonia was 63.6%.

Discussion

The prediction of a successful outcome in cases of TEF can be made fairly accurately using Waterston's criteria(3). In Calverley's 10 year report(4) all children in Groups A, B, and B_2 survived. Survival rate was 22% in Group C_1 and 59 in C_2. In the present series also, all patients of Groups A and B survived. But we did not have any significant difference in the survival rate between Groups C_1 and C_2. The survival rate in these groups were 66.7 and 60%, respectively. This could be a chance finding because of the small number of cases in this series. The better survival rate in the present series (8 out of 11, *i.e.*, 72.7%) could be attributed to rigorous preoperative chest-physiotherapy supported by upper pouch suction, antibiotics and continuous bedside monitoring of vital parameters utilizing the facilities available in our institution by the operating surgeon and the anesthetist. Fortunately, there were no major associated congenital anomalies in any of our patients. Only one patient (9.9%) had imperforate anus. None of the patients had any congenital cardiovascular anomaly associated with TEF. Others have reported a 30-50% incidence of associated anomalies(5) and 14-15% incidence of cardiac anomalies(6).

In this series, all our patients could be intubated, but in 3 out of 11 patients (27.3%), fistular placement of the tube occurred during intubation as was evident by mild cyanosis, bradycardia, increased resistance to ventilation and sudden gastric dilatation. This was quickly rectified by extubation, oxygenation and re-intubation by

TABLE I—*Incidence According to Waterston et al. Classification (3)*

Group	Characteristics	No.	%
A	>2500 g, well	—	—
B_1	1880-2500 g, well	2	18.2
B_2	>2500 g, moderate pneumonia, and congenital anomaly	1	9.1
C_1	<1800 g	3	27.3
C_2	>2500 g, severe pneumonia and or severe congenital anomaly.	5	45.4

a more experienced anesthetist.

In this small series of patients, 2 cases developed anastomotic leak, 1 esophageal stricture and 1 recurrent fistula in the post-operative period. All responded to conservative treatment except for the recurrent fistula case who ultimately died. The cause of death in all 3 patients was severe fulminating pneumonia not responding to antibiotics and respiratory therapy.

The use of Foleys catheter or Fogarty ballon catheter from the gastrostomy site and inflation at the site of communication with the trachea certainly has a place in the poor prognostic groups babies (Waterston's C_2 group) who are awaiting ligation of TEF and possible esophageal anastomosis. This procedure was not resorted to any of our patient. In our opinion, once the TEF has been ligated, the baby kept in 45° proped up position and frequent oropharyngeal suction done in the post-operative period, the use of Foleys catheter or the Fogarty ballon catheter to tamponade the esophagus can disrupt the healing of the anastomosed esophagus.

During the peri-operative period we were handicapped by the non-availability of sophisticated monitoring equipment like pulse oximetry, incubator, pediatric ventilator and cardiac monitor. However, our results indicate that this surgery should not be denied in centres which lack these facilities. Close, personal supervision can offset many of the above deficiencies.

Thus, although anesthesia for TEF patients is a challenge, it can be overcome by careful perianesthetic management.

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