# Factors Affecting Anaesthetic Management And Early Post-Operative Outcome In Patients With Esophageal Atresia And Tracheo-Esophageal Fistula – A Prospective Study

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#### Abstract

Esophageal atresia (EA), with or without trachea-esophageal fistula, is a fairly common congenital disorder with an incidence of 18000 per year in India. In Western countries, associated congenital anomaly is the main factor which affects the prognosis. But in India the preoperative condition, intraoperative and postoperative condition and socioeconomic status along with congenital anomaly affects the prognosis. 55 neonates after evaluation for congenital anomalies and routine investigation were operated for TEF and were classified on the basis of Age, Sex, Birth weight, Maturity; presence of pneumonitis, and other associated congenital anomalies. Epidural catheter was passed through L3-L4 interspace in 24 patients after giving GA to provide postoperative analgesia. 3ml of 0.0625% bupivacaine was given for introperative and postoperative analgesia. It was noted the best survival was in babies who were operated in the first two days. Infants weighing greater than 2.5 kg showed 76% survival. Both sexes had the similar results. Patients with severe chest infection showed only survival of 16.6%. Infants with epidural showed 100 % survival. 33.33% of neonates survived after postoperative ventilation, and there is 77.50% survival in neonates who did not require postoperative ventilation. 17 cases had reported congenital anomalies, which showed 41.17% survival and 76.31% survival was noted in neonates who don't have congenital anomalies. Neonates with preoperative saturation >95% had 86.36% survival but neonates with <85% saturation showed only 33.33% survival. We observed that epidural analgesia would provide got postoperative outcome in TEF neonates, by reducing mortality in these infants.

#### INTRODUCTION

Esophageal atresia (EA), with or without trachea-esophageal fistula, is a fairly common congenital disorder with an incidence of 18000 per year in India<sup>1</sup>. EA is a condition in which there is incomplete formation of the esophagus, and is usually associated with a fistula between the trachea and the esophagus. Every neonate who develops feeding difficulties and respiratory distress in the first few days of life should be thought of this condition and requires early diagnosis. In western countries, associated congenital anomaly is the main factor which affects the prognosis<sup>2</sup>. But in India the preoperative condition, intraoperative and postoperative condition and socioeconomic status along with congenital anomaly affects the prognosis<sup>3</sup>. Early diagnosis and improvement in neonatal intensive care and anaesthesia, led to decrease in mortality in patients with tracheo-esophageal fistula. Placement of epidural catheter has been advocated to improve respiration and decrease the requirement of ventilatory support and also provides good postoperative

analgesia<sup>4</sup>. In our study we have prospectively studied all the cases taken up in the year 2008 in our university. The factors which could be instrumental in deciding the prognosis of the patient have also been studied.

#### MATERIAL AND METHOD

62 cases of EA with TEF admitted in the department of paediatric surgery, CSMMU from 1 <sup>st</sup> January 2008 to 31 <sup>st</sup> December 2008, were evaluated. These neonates were classified on the basis of Age (less than 24 hours to 13 days after birth), Sex, Birth weight, Maturity, presence of pneumonitis, and other associated congenital anomalies Routine investigations including Hemoglobin, Bleeding time, Clotting time, Birth weight, Serum electrolytes (Na+, K+, Ca++), HIV, HbsAg, Blood sugar were performed. Because congenital anomalies are more common in these neonates, ECHO, Chest and abdominal radiographs and ultrasound is done to rule out congenital anomalies.

Measures were taken to reduce the risk of aspiration. The

oropharynx was cleared by gentle suction, and an 8 French feeding tube placed to allow for continuous suctioning of the upper pouch. The infant's head was elevated. Intravenous fluids (10 percent dextrose in water) were started. Broad spectrum antibiotics (such as ampicillin plus gentamicin) were administered for prophylaxis of pulmonary infection and sepsis. In winters effective measures to raise the temperature of the operating room to above 26 ° C and to keep the body temperature of infant isothermic (infant warmer) were adopted.

All these neonates were preoxygenated with 100% oxygen for 2 to 3 minutes. Inj Atropine (0.01 mg/kg i.v.) is used for premedication. Induction was done with Halothane from 0.25% to 2.5% in slow incremental concentration, after adequate relaxation and stabilization of heart rate, Endotracheal intubation was done using tube size 2.5 to 3.0 mm ID and endotracheal tube was carefully passed beyond the fistula and bilateral air entry was confirmed. Maintenance was done using oxygen and nitrous oxide anaesthesia and Inj Fentanyl (1 lg /kg i.v.) was used for analgesia; relaxation was achieved with Inj Atracurium (0.5mg/kg loading dose). At the end of surgery after adequate respiratory effort was present, reversal was done with standard techniques. Neonates were oxygenated for 5 to 10 minutes after extubation and follow up was done for the next 48 hours for any respiratory distress, gastric distension and post op vomiting. Epidural catheter was passed through lumbar route<sup>5</sup> (L3-L4 interspace) in 24 patients after giving general anaesthesia to provide postoperative analgesia. 3ml of 0.0625% bupivacaine was given for introperative and postoperative analgesia. Infants weighing <1.8kg, and those with poor general condition (severe pneumonitis), and with congenital anomalies were not given epidural analgesia. We classified pneumonia clinically as with clear chest, mild crepts (crepitations), moderate crepts, and severe crepts all over the chest.

## RESULTS

In all 62 cases of EA with TEF reported to our hospital during the period Jan 2008 to Dec 2008. Five of them expired and two left the hospital against medical advice even before they were operated. Thus 55 cases underwent definitive correction for EA with TEF. The statistical analysis was made with fisher's exact test and chi – square test.

It was noted the best survival was in babies who were operated in the first two days (table1) If weight was taken as a prognostic factor, then the best results were seen in infants with weight greater than 2.5 kg<sup>6</sup> (table 1) i.e., 76% survival on compared to 20% survival in neonates with weight < 1.8kg.

Both sexes had the similar results (table 1)

#### Figure 1

#### TABLE 1 – DEMOGRAPHIC DETAILS

		TOTAL		SURVIVAI		
		NUMBER	%	NUMBER	%	
AGE	1 DAY	20	36.36%	16	80%	P=0.01
	1TO2 DAYS	15	27.27%	11	73.33%	A*=5.418
	>2 DAYS	20	36.36%	9	45%	
WEIGHT	<1.8 KG	5	9%	1	20%	P=0.03 X <sup>2</sup> =4.689
	1.8TO2.5 KG	25	45.45%	16	64%	
	>2.5 KG	25	45.45%	19	76%	
SEX	MALE	35	63.63%	23	65.71%	P=0.01 X <sup>2</sup> =5.418
	FEMALE	20	36.36%	13	65%	

Patients with clear chests had the best prognosis(85.71%). Between mild to moderate chest infections the survival rate was similar. There was no statistical difference between the two groups (table 2). However the patients with severe chest infection<sup>7</sup> had only survival of 16.6%.

#### Figure 2

# TABLE 2 – COMPARISION BETWEEN CHEST INFECTIONS

	TOTAL NUM	%	SURVIVAL	%
Clear	7	12.72%	6	85.71%
Mild	22	39.99%	15	68.18%
Moderate	20	36.367%	14	70%
Severe	6	10.9%	1	16.66%

P = 0.03 X<sup>2</sup> = 4.518

Out of the 37 infants who fitted our criteria for epidural analgesia, 8 did not give consent, in 5 we could not successfully carry out the procedure, in the rest 24 patients epidural analgesia was given. Of these 15 belonged to >2.5KG group and the rest to 1.8 to 2.5 KG group. These patients had 100 % survival (table 3)

#### Figure 3

# TABLE 3 – DETAILS REGARDING EPIDURAL CATHETERISATION

	TOTAL NUM	%	SURVIVAL	%
YES	24	43.63%	24	100%
NO	31	56.36%	12	38.70%

P = <0.001

Patients who were shifted to NICU had a worse prognosis as they were more sick (table 4). In our study we observed that 33.33% of neonates survived after postoperative ventilation, and there is 77.50% survival in neonates who did not required postoperative ventilation (p = 0.03). This shows that postoperative ventilation affects the mortality of these neonates. Out of the five who survived two patients had epidural catheter in situ

#### Figure 4

#### TABLE 4 – NICU ADMISSION

	TOTAL NUM	%	SURVIVAL	%
YES	15	27.27%	5	33.33%
NO	40	72.72%	31	77.5%

P = 0.03

Cases with congenital anomalies had a worse prognosis as compared to those with no anomalies. Out of these 55 cases operated there were 17 cases which reported congenital anomalies, which showed 41.17% survival and 76.31% survival was noted in neonates who don't have congenital anamolies<sup>8</sup> (P = 0.02,  $X^2$  = 4.954). The most significant anomaly which was associated with our infants was ARM (Table 5).

### Figure 5

TABLE 5 – DISTRIBUTION OF VARIOUS CONGENITAL ANOMALIES

Congenital Anomaly	Number of cases		
Ventricular Septal Defect	2		
Patent ductus Arteriosus	1		
Hydrocephalus	0		
Ano-rectal malformation	8		
Dextrocardia	0		
Down's syndrome	1		
Cleft lip/palate	2		
Duodenal atresia	3		

There is significant mortality seen in neonates with preoperative saturation <85%. Preoperative saturation has significance in respect to mortality<sup>9</sup>. In our study we observed that neonates with preoperative saturation >95% had 86.36% survival but neonates with <85% saturation showed only 33.33% survival (P = 0.02).

There was no statistical difference in neonatological analysis of the various patients.

### DISCUSSION

In our study (n=55) we found the incidence to be higher among males (63.63%) but postoperative survival was equal among both the sexes. In most studies incidence is equal in both sexes. The reason of the difference perhaps lies in the social realm, given the strong anti-female bias existing in north India from where our patients come.

We made an attempt to employ Waterston's criteria<sup>10</sup> to classify risk factors and evaluate the prognosis and therapeutic problems.

Birth weight was also an important prognostic factor as was to respiratory infection

These findings led to the conclusion that neonates with severe respiratory problem in EA and TEF had a poor prognosis.

The patients of EA with TEF are prone to have other associated congenital anomalies-the presence of which adversely affects the outcome. A particular combination of anomalies called VATER association consists of vertebral defect, Anal defect, Esophageal atresia and Radial anomalies (V also indicate Ventricular septal defect whereas R may also indicate Renal anomalies). We observed incidences of associated ventricular septal defect, hydrocephalus, anorectal malformation dextrocardia and Down's syndrome (Trisomy-21) and ileal atresia in our patients.

Incidence of survival of cases with epidural catheter showed a better prognosis (p<0.001). 22 neonates out of 24 to whom epidural catheter was placed did not required any postoperative ventilation<sup>11</sup>. There was 100% survival; even two went on a ventilator and survived. This result showed that placement of epidural catheter reduced requirement of postoperative ventilation.

With this study we would like to emphasise the importance of putting an epidural catheter, so as to decrease our dependency for postoperative ventilator support, which is short in supply and also has its own morbidity and mortality.

Epidural catheter insertion in infants requires a certain degree of competence and also a change in the mind set of our colleagues. But the results achieved are very satisfactory and should be encouraged further.

We understand that the sample of the study was too small to come to any definite conclusion. Moreover, our study suffers from an important shortcoming in not being able to follow up the cases which have survived. But the time has come to routinely get such cases operated with a combined technique of regional with general anaesthesia.

#### References

1. Upadhayaya P. esophageal atresia in india. In: Willital GH, Nichol-Fekete C, myers NA, editors, management of esophageal atresia : Diagnosis, Theraphy, Complications and Late results, munich: Urban and Schwarzenberg; 1990 P.28 – 32.

2. Spitz L, Kiely EM, Morecroft JA, Drake DP. Oesophageal atresia: at risk groups for the 1990s. J Pediatr Surg 1994; 29: 723-5.

3. Agarwal S, bhatnagar V, Bajpai M, Gupta DK, Mitra DK. Factors contributing to poor results of esophageal atresia in developing countries. Pediatr Surg Int 1989; 4: 76-9 4. Schulte-Steinberg O. Neural Blockade for paediatric surgery, neural blockade in clinical anaesthesia andmanagement of pain. Cousins MJ, Bridenhaugh PO, editors. S. B. Lippincott Co. 1980, pg 503-523. 5. Blanco D, Llamazares J, Rincon R, et al. Thoracic epidural anesthesia via the lumbar approach in infants and children. Anesthesiology 1996;84:1312-6. 6. Budhiraja S: Rattan K.N., Gupta S, Pandit S. K. Tracheosephageal fistula with hydrocephalous. Indian J Paediatr 1997; 64 (5): 727-9. 7. Holmes SJK., Kiely E. M., Spitz L., Tracheoesophageal and respiratory distress syndrome. Paed. Surg. International, 1987; 2: 16-20. 8. Chittmittrapap S, Spitz L, Kiely EM, Brereton RJ. Oesophageal atresia and associated anomalies. Arch Dis Child 1989; 64: 364-8. Chittmittrapap S, Spitz L, Kiely EM, Brereton RJ. Oesophageal atresia and associated anomalies. Arch Dis Child 1989; 64: 364-8. 9. Poenaru D, Laberge JM, Neilson IR, Guttman FM. A new prognostic classification for esophageal atresia. Surgery 1993; 113: 426-32. 10. Waterston DJ, Bonham Carter RE, Aberdeen E (1962) Oesophageal atresia: tracheo-oesophageal fistula: a study of survival in 218 infants. Lancet I: 819-822 11. Biisenberg A. T., Hadley G. P., and Wiersma R. Oesophageal atresia: caudo-thoracic epidural anaesthesia reduces the need for post-operative ventilatory support.

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