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## A prospective study outcome of surgical intervention of EA and TOF in neonate coming to paediatric surgery division of general surgery at my hospital, Indore

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### Abstract

**Background:** Esophageal atresia (EA) with or without Tracheoesophageal fistula (TEF) is most common congenital anomalies encountered in pediatric surgery and the management of these neonates require high degree of skill, manpower and tertiary care. This clinical study was undertaken to evaluate the outcome and postoperative complication of Esophageal atresia (EA) with or without Tracheoesophageal fistula (TEF) admitted in pediatrics surgery in M.Y. Hospital Indore.

**Objective:** The aims of this study cases of EA and TEF regarding management and outcome.

**Methods:** This prospective study included 220 patients of EA with TEF were enrolled in this study from Sep. 2016 to august 2018 who underwent surgical intervention. Their clinical profile, time of presentation, sex distribution, birth weight, type of EA and TEF and their effect on mortality and morbidity were observed.

**Results:** Mortality was high (68.42%) among patients who reached the tertiary centre late i.e. >24 hours. The incidence of low birth weight babies is approximately 74% and mortality rate increased with low birth weight. EA with or without TEF More common in male then female but survival rate was high in female (71.60%). Type C was the most common (71.42) followed by type A. Septicemia and leak were most common complication. The mortality in septicemia patients is high 90.66%. Early surgical intervention improved the survival of EA and TEF. The overall survival rate was 48.63% and mortality was 51.36%.

**Conclusions:** Esophageal atresia (EA) with Tracheoesophageal fistula (TEF) is the most common type of anomaly. Maturity, birth weight, early diagnosis are the most important factors that affect the outcome. Remarkable success has been achieved based on improvement in neonatal anesthesia & surgical technique, ventilator support & neonatal intensive care.

**Keywords:** Esophageal atresia, tracheoesophageal fistula neonates, mortality

### Introduction

The treatment of esophageal atresia (EA) and Tracheoesophageal fistula (TEF), although still a challenge, represents one of the true successes of newborn surgery<sup>[1]</sup>. Management of EA and TEF require high degree of skill, manpower and tertiary care. EA encompasses a group of congenital anomalies comprising an interruption in the continuity of the esophagus combined with or without a persistent communication with the trachea<sup>[2, 3]</sup>. The survival of these newborns depends not only in excellent preoperative, intra operative and post-operative care but also on adequate weight of the patient, early diagnosis, prompt referral, good care in transport, and condition of the lungs (Pneumonia).

Due to the tremendous advancement in the care of newborns viz, neonatal ICU, highly trained nursing, neonatal ventilators, newer antibiotics, advancement in neonatal anesthesia, the survival in EA with TEF is approaching about 100% especially in Western countries. But in our country mortality is still very high, due to many factors.

Hence this clinical study was undertaken to identify the cases of EA and TEF in our hospital, and evaluate the outcome of surgical intervention of EA and TEF in neonate coming to Paediatric Surgery Division of General Surgery M.Y. hospital Indore.

### Methods

This prospective study was carried out in the Paediatric Surgery, under division of department of

surgery in M.Y. Hospital Indore, from September 1016 to August 1018. A total 220 neonates were included in the study. A total of 220 patients of EA-TEF and pure EA without TEF were admitted. Surgery on the basis of congenital anomalies of esophagus (Type of EA and TEF). In this study 199 patients who underwent end to end anastomosis of proximal and distal pouch of esophagus with fistula closure and 21 patients of pure esophageal atresia in whom cervical esophagostomy and abdominal esophagostomy were performed is included and 10 patients of esophageal atresia and trachea esophageal fistula died before any surgical intervention is exclude.

A detailed history was taken, clinical examination and necessary investigation were carried out and recorded in a printed proforma. Time of presentation, sex wise distribution, Birth weight, type of esophageal anomalies on the basis of X-Ray. Post-operative complication were noted.

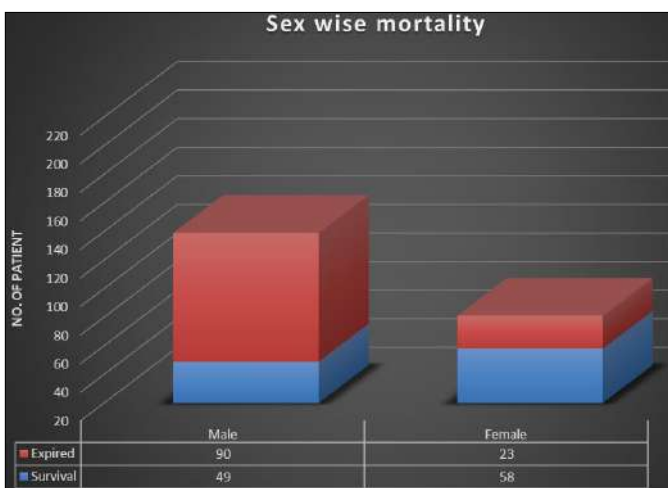
The diagnosis was based on history and clinical examination, aided by radiological examination through plain X-Ray after inserting a nasogastric (NG) tube. All patients admitted, were managed and resuscitated by putting them in incubators with continuous oxygenation. Intravenous fluid, antibiotics, suctioning of upper esophageal pouch and mouth, and vitamin K administration.

**Results**

There were 139 males (63.18%) and 81 females (36.81%) in the present study. The Male: Female ratio being >2:1.

**Table 1: Sex wise mortality among patients**

	No.	Survival	%	Expired	%
Male	139	49	35.25	90	64.75
Female	81	58	71.60	23	23.39
Total	220	107	48.63	113	51.36

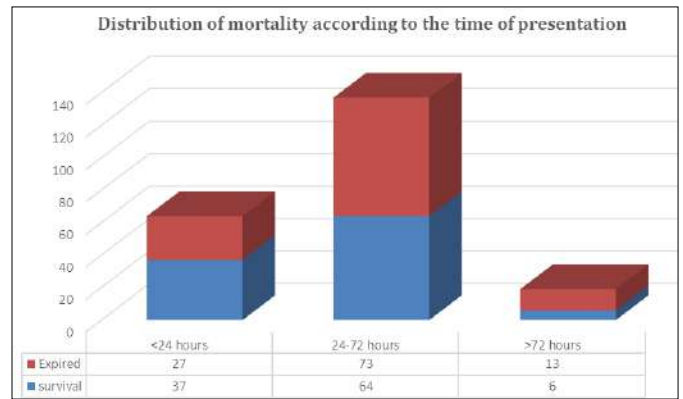


**Fig 1: Sex wise mortality among patients**

**Table 2: Distribution of cases according to the time of presentation**

Age	No.	Survival	%	Expired	%
< 24 Hours	64	37	57.81	27	42.18
24-72 Hours	137	64	46.71	73	53.28
>72 Hours	19	6	31.56	30	68.42
Total	220	107	48.63	113	51.36

Only 64 (29.0 %) patients arrived within 24 hr, 137 (62.27 %) came within 24-72 hr and 19 (8.63 %) cases came after 72 hr.

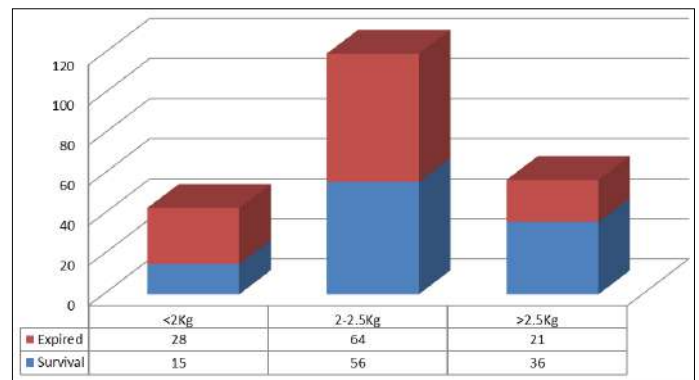


**Fig 2: Distribution of cases according to the time of presentation**

**Table 3: Relation between birth weight survival**

Weight	No	Survival	%	Expired	%
< 2 Kg	43	15	34.88	28	65.11
2-2.5 Kg	120	56	46.66	64	53.33
> 2.5 Kg	57	36	63.15	21	36.84
Total	220	107	48.63	113	51.36

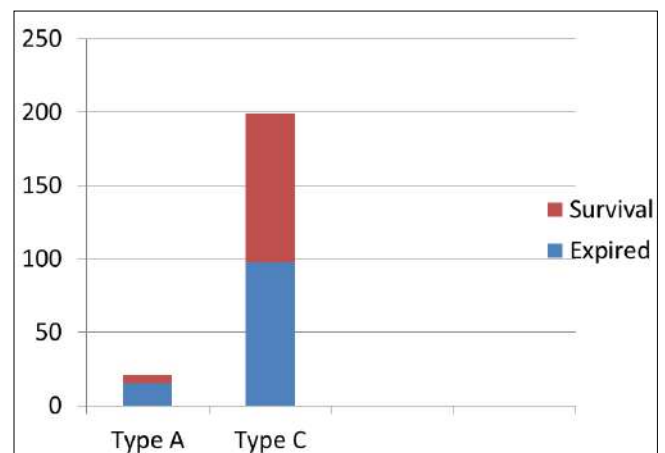
Only 43 (19.5%) patients were <2 kg birth weight and 57 (25%) patients with normal birth weight.



**Fig 3: Relation between birth weight survival**

**Table 4: Distribution of the cases according to the anatomical type**

Type	No	Survival	%	Expired	%
A	21	06	28.57	15	71.42
B	199	101	50.75	98	49.24
Total	221	160	48.63	113	51.36

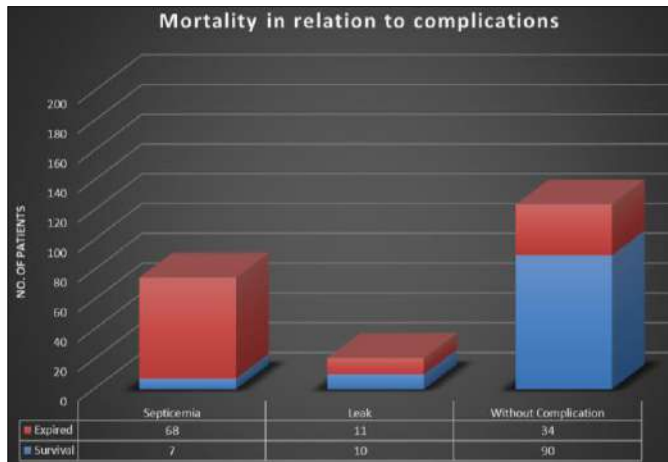


**Fig 3: Distribution of the cases according to the anatomical type**

Out of 220 patients, 199 (90.45%) cases had proximal atresia with distal fistula (type C) and 21 (9.54%) cases had pure atresia

**Table 5:** Mortality according to complication

Complication	No	Survival	%	Expired	%
Septicemia	75	7	9.33	68	90.66
Leak	21	10	47.61	11	52.38
Without complication	124	90	72.58	34	27.41
	220	107	48.63	113	51.36



**Fig 5:** Mortality according to complication

Septicemia was seen in 75 cases and leak was seen in 21 cases. Regarding the distribution of the case according to the survival and death, among 220 recorded cases, only 107 (48.63 %) cases lived and 113 cases (51.36%) died post-operative. Mortality was very high in the septicemia group 99.66 % as compared anastomotic leak 52.38 %.

## Discussion

Remarkable success has been achieved in management of esophageal atresia in modern times. This has been achieved based on improvements in surgical technique, neonatal anesthesia, ventilator support; effective suctioning of upper pouch to eliminate the risk of aspiration pneumonia and modern sophisticated neonatal intensive care. Technical advances to have a role to play in the success story, with a better choice of suture material, use of elective mechanical ventilation postoperatively; early recognition and treatment of anastomotic complications.

Survival of esophageal atresia patients, however, has not shown such a remarkable improvement in developing countries. Various reasons have been cited for this higher mortality rate. These include late presentation of patients at centers, managing this problem, poor transportation facilities for sick neonates, concentration of trained manpower in the major metropolitan cities and lack of the adequate infrastructure at most of the centers in India.

In our study, out of 220 patients of esophageal atresia and tracheo-esophageal fistula, the sex distribution showed that male patients were more than the female patients. Similar male predominance has been reported by Kronemer *et al* and Arora M *et al* [4, 5] and Bode *et al* [6] in which 56% were male and 44% were female with male to female ratio 1.2:1 and Tendon *et al* [7] 66% were male and 34% were female. This may be due to the reason that in our society male child's health is given preference over the female child's health.

Only 29.9 % of our patients reached the tertiary centre within 24

hours. Arora *et al*, reported similar kind of data i.e. 40.7% cases reached within first 24 hours in spite of 75% deliveries at hospital [8]. Agarwal *et al* in AIIMS hospital reported that the patients presenting within 24 hours were 44% and similar data (46%) was also obtained by Sharma AK *et al* [9, 10]. Traveling long distance, poor transport system and poverty are also the contributory factors.

Mortality was high among patients who reached the tertiary centre late i.e. >24 hours. This is similar to the observations reported by Arora M *et al* [8]. In our setup, there is no facility of ultrasonography in primary health centre, sub-center or in antenatal clinic and lack of awareness of this anomaly in medical and paramedical workers. The early diagnosis of EA with TEF is possible if obstetrician suspect the anomaly in antenatal period in the pregnancy associated with polyhydramnios (Incidence is 0.5-1% in normal pregnancies). These pregnancies should be taken as high-risk pregnancies and should be kept under observation and regular follow up throughout the pregnancy to facilitate early diagnosis and early referral of EA with TEF patient to the better centre.

In the present study, the incidence of low birth weight babies was approximately 74% according to the WHO definition but in normal Indian population, the incidence of low birth rate (<2.5 kg) is 33% of all live births (World health report, 1995) [11]. The incidence of <2 kg babies was 5.5% in normal population and 19.54% in the present study which is comparable with Arora M *et al* they reported the incidence of less than 1.8 kg as 15% [8].

The reasons for the high incidence of 75% of low birth weight found in the present study are many, such as rural background population, adolescent pregnancies, higher incidence of severe anemia, maternal malnutrition, multiple pregnancies and antenatal infections which are mostly related to poverty. The mortality in the low birth weight patients is quite high than the babies weighted more than 2.5 kg but it was statistically not significant. The results are comparable with those reported by Arora M *et al* [8].

Esophageal atresia (EA) with or Tracheoesophageal fistula (type C according to gross classification) is most common type in all literature and studies Tendon RK *et al* [6]. In this study 199 (90.45 %) cases had a common type (type C), pure type (type A) in 21 cases (21 %). These results are compatible with most studies.

In the present study, the patient having septicemia at the time of admission or developed post operatively contributes 34% of patients and anastomotic leak was present in only 10% of cases. 56.36% of these cases remain without above complications. The complication rates vary from 18 to 50% in various study [12, 13]. Different factor were responsible for these poor outcomes [14, 15] the general condition of patient, the amount of gap between the segments, the kind of fistula, the nature of suture materials used and the type of anastomosis performed all have implicated [16]. In comparison to the Arora M *et al* where they reported the leak rate of 27% on the basis of presence of saliva in chest drain in 59% of patients and respiratory distress in 41% patients but in the present study the leak was considered when the presence of saliva in chest drain. Moreover, in our setup the autopsy was not performed to look for the cause of death or confirmation of leak.

## Conclusion

The mortality is still very high in cases of EA with TEF (51.36%) with survival being 48.63%). Esophageal atresia with tracheoesophageal fistula most frequently encountered form of esophageal anomalies. The mortality is high in case of pure esophageal atresia as compared to EA & TAF. Less no of patient

arrived within 24 hours. Low birth weight patient having more motility. Female has better survival than male. Earlier diagnosis of neonate by paediatrician. Early neonate transport in tertiary centre. Strict infection control measures for prevention of septicemia, deployment of sufficient resources and investigation for other associated anomalies are recommended to improve the outcome of EA with or without TEF. Remarkable success has been achieved based on improvement in neonatal anesthesia & surgical technique, ventilator support & neonatal intensive care.

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