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# Fast Tracking after Repair of Tetralogy of Fallot —A Retrospective Analysis in a Govt Hospital

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## Abstract

**Introduction:** In many centers like ours specific paediatric post cardiac surgery ICU with dedicated and trained manpower for paediatric ICU care is not available after all paediatric cardiac surgeries. As a result, patients in those centers develop more post op morbidity and mortality due to complications related to prolonged ventilation, sedation, analgesia, and nasogastric feeding. To get rid of such problems and reduce morbidy and mortality the early extubation and fast track protocol has become a treatment of choice in many centers**. Method:** This retrospective observational study was done at the department of cardiothoracic surgery NRS Medical College on the basis of data recorded over a period of 4 years (from Jan 2022 to Dec 2025). This study was based on all isolated Tetralogy of Fallot cases operated consecutively at this department during that period and their data was retrieved from departmental and hospital records including RBSK Excel data sheet, records from OT, perfusion data, central records and personal communications with patient's families. This data retrieval and analysis was done during a period of 2 months (April and May 2026). So such analysis was purely retrospective, post facto, and observational. During analysis we have considered discharge of the patients as early when it is less or equal to 7 days and late when it is more than 7 days. Mortality was considered as in hospital mortality after surgery within 30 days. **Results:** Total 60 isolated TOF patients were operated consecutively during 4 years (Jan 2022 to Dec 2025). Of them 3 patients, were excluded as their extubation time was more than 24 hours. We have considered only 57 patients who were extubated within 24 hours after operation and classified them into 2 groups, accepting the terminology defined by Schmidt and Malec in 2019, (Page 491, Ref 1). 43 patients were categorised in group I as fast track protocol group who had undergone extubation within 6 hours of the end of surgery and 14 patients in group II as Early extubation (Traditional) protocol who were extubated within 6 to 24 hours after operation. The different variables and outcomes between those two groups has been compared by Fisher's exact Test

(Odds ratio and p-value analysis). **Conclusion:** In this study outcome between two groups has been compared and the patients of fast track protocol group (group I**)** had significantly low in hospital mortality and early hospital discharge (less or equal to 7 days) in comparison to traditional early extubation protocol (group II).

## Keywords

Tetralogy of Fallot (TOF), Early Extubation, Fast Track Protocol, Mortality, Discharge

## 1. Introduction

During the beginning years in the 1970s children were regularly extubated immediately after paediatric cardiac surgerical procedures with remarkably good results. This was due to avoidance of adverse cardiodepressive sedative, hypnotic, analgesic and muscle relaxant drugs avallable that time. Also the primitive ventilators and lack of knowledge of related respiratory pathophysiology resulted in on-table extubation more safer than postop mechanical ventilation during that period [1].

But in the beginning of 1990 with the advent of the fentanyl group of drugs and progress in the field of ventilator technology, postop management with high dose opiod analgesia and prolonged overnight mechanical ventilation was universally observed [2].

Again during recent years resurgence of early extubation appeared as mainstay of fast track protocol based on the critical evaluation of the potential risk of mechanical ventilation. Moreover, some recent studies also showed that surgical repair of Tetralogy of Fallot is safe without the need of continuous opiod analgesia postoperatively [3].

Fast tracking after repair of TOF is the process involving the reduction of perioperative period by proper admission, correct surgery, early post op extubation, short ICU stay, early mobilisation, quick hospital discharge. In the last two decades many centres have adopted the fast tracking strategy in paediatric cardiac surgery by safely and successfully extubating the patient within 6 hours after surgery with reported benefits in terms of reduced morbidity and mortality and ICU/hospitay stay and related costs [4] [5].

## 2. Materials and Methods

This retrospective observational study was conducted on consecutive total surgical repair of isolated Tetralogy of Fallot done at the department of Cardiothoracic Surgery, NRS Medical College for a period from January 2022 to December 2025. The ethical clearance for this study was obtained and the analysis of the recorded data done over 2 months (April and May 2026).

The study was based on the data retrieved from 1) O T register 2) Perfusionist's

data 3) Admission and Death register maintained in the department 4) RBSK Excel data sheet 5) Individual patient's record maintained in central record 6) personal communication with those specific patients and their relatives.

Total 60 patients were operated. Of them 3 patients were excluded from this study as they were extubated 24 hours after surgery. We considered only 57 patients in the present study who were extubated within 24 hours after operation. They were all seen by paediatric cardiologist and investigated by X ray chest, ECG, Echocardiography (Phillips EPIC 7 machine) and cardiac CT with pulmonary angiography. All cases were operated under cardiopulmonary bypass, moderate hypothermia, and heart arrested by Del Nido antegrade cardioplegia. Modified ultrafiltration was used in all cases. All cases were operated by median sternotomy. VSD was closed with Dacron patch through trans atrial route. Infundibular obstruction was released and when necessary pulmonary valvotomy and augmentation of pulmonary annulus and pulmonary artery done with autologous pericardium. Mean Cardiopulmonary Bypass time was 113 minutes and cross clamp time was 79.8 minutes.

43 of the above patients got fully rewarmed and became awake within 2-3 hours in ICU after surgery. Depending on their satisfactory haemodynamic stability, control of bleeding, mental alertness and adequate respiration with normal ABG, all those patients were extubated within 6 hours following fast track protocol. Subsequently chest drains, urinary catheter, arterial and central venous lines and pacing wires removed within 1 - 4 postop days and patient discharged. Actually choice of this group of fast track protocol was dependent on some surgeon's personal preferences.

14 patients however followed the traditional/Early Extubation protocol (Extubation in 6 to 24 hours) which was commonly practised in our department and also universally accepted since 1990 for routine open heart surgeries.

The patients in the above two protocols were not selected preoperatively, rather chosen post facto on the basis of extubation time as recorded.

## 3. Results and Analysis

We had categorised the cases under fast track protocol as Group I, when extubation was done within 6 hours after surgery [1]. The number of cases under that protocol (Group I) was 43 and their average duration of artificial ventilation was 3 hours. The patients who were extubated between 6 to 24 hours after operation following traditional/early extubation protocol were categorised as Group II. The no of patients in that group was 14 and their average duration of artificial ventilation was 15 hours.

The patients under fast track protocol (Group I) and traditional protocol (Group II) were compared in terms of their preoperative (demographic) and operative variables. (**Table 1**) and statistically analysed by Fisher's exact test using the social science statistics software. A p value of less than 0.05 was considered statistically significant. Demographic variables like sex, body weight less than 10

kg, age less than 5 years did not show any significant differences amongst two groups. But when operative variables are concerned, the cross clamp time less than 60 minutes and Bypass time less than 90 minutes had significant prediction favouring fast track protocol group (Table 1).

In the category of fast track protocol as patients recovered smoothly their hospital stay is less with an average duration of 6.7 days, however in the other group the average duration of hospital stay was 11.2 days. We have further analysed statistically by Odds ratio and p value, where early discharge was considered as discharge less than 7 days and late discharge as discharge after 7 days. In this study, fast track protocol was found having significant positive relationship with hospital stay of less duration (Less than 7 days) (Table 2).

Table 1. Comparison of preoperative and operative variables between fast track and traditional protocol.

| Category | No of patients in type I category (fast track protocol) ET (extubation time) <6 hours | No of patients in type II category (traditional/early extubation protocol ET (extubation time) 6 - 24 hours | Fisher's exact test | | |
|---|---|---|---|---|---|
| | | | Odds ratio & 95% CI | P value | Significance |
| | 43 | 14 | | | |
| Body Wt. | | | | | |
| <10 kg | 17 | 4 | 1.6346 [0.4407 - 6.0632] | 0.537631 | No significance |
| >10 kg | 26 | 10 | | | |
| Sex | | | | | |
| Male | 21 | 6 | 1.2727 [0.3774, 4.2926] | 0.765051 | No significance |
| Female | 22 | 8 | | | |
| Age | | | | | |
| <5 years | 25 | 4 | 3.4722 [0.9385 - 12.8468] | 0.069 | No significance |
| >5 years | 18 | 10 | | | |
| X-clamp time | | | | | |
| <60 mins | 21 | 1 | 12.409 [1.4894 - 103.3882] | 0.0052 | Significant |
| >60 mins | 22 | 13 | | | |
| Bypass time | | | | | |
| <90 mins | 17 | 1 | 8.500 [1.0163, 71.0895] | 0.0436 | Significant |
| >90 mins | 26 | 13 | | | |

Table 2. Comparison of outcome between fast track and traditional protocol.

| | Fasttrack protocol | Traditional protocol | Odds ratio | 95% CI | P value | Significance |
|---|---|---|---|---|---|---|
| Mortality | 1 | 4 | 0.0595 | 0.00602 to 0.5921 | 0.0161 | Significant |
| Recovery | 42 | 10 | | | | |
| Hospital stay | | | | | | |
| >7 days | 31 | 4 | 0.1548 | 0.0406 to 0.5818 | 0.0063 | Significant |
| <7 days | 12 | 10 | | | | |

The mortality in both the groups were noted and analyzed statistically by Odds ratio and it has been found that fast track protocol has significant lower risk of mortality and therefore has a protective effect (Table 2). Odds ratio and p values in Table 2 were calculated using Medcalc version 23.6.1 software.

## 4. Discussion & Conclusion

In the present study, it is noted that shorter aortic cross clamp time (<60 mins) and bypass time (< 90 mins) had significant predictive value in favour of fast track protocol. This is also supported by Mahle W T. *et al*. in STS data analysis [6]. It is established in several studies that early extubation and fast track protocol is safe, feasible and with low mortality and less complication rates after paediatric cardiac surgery [4] [6]-[8].

Early hospital discharge is desirable because it is associated with low cost and environmental stress. Fast tracking rapidly restores normal physiological conditions like enteral nutrition, early mobilisation and discharge. [1] [7]. It also reduces complications of lung including those related to ET tube, use of IV analgesics, need of invasive monitoring and its cost. [1] [4]. The present study also supported that after Tetraligy of Fallot operation the patients who followed fast track protocol showed significantly less mortality and early (<7 days) discharge in comparison to the traditional protocol of 6 - 24 hours post op ventilation (Table 2).

## Limitations

This study is a retrospective analysis of recorded data from small number of patients of a single centre. The allocation of the group depending on extubation time is also non randomised and to some extent biased by physician's preference. Other pre operative and operative variables which might confound extubation time are also not included.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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