Original Article

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OUTCOMES OF FAST TRACKED AND NON FAST TRACKED PATIENTS IN ADULT CARDIAC SURGERY INTENSIVE CARE UNIT AFIC NIHD, RAWALPINDI

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ABSTRACT

Objective: The purpose of this study was to evaluate the status of fast tracking after open heart procedures and suitability of existing anesthetic technique for fast-track extubation, length of ICU stay, in hospital mortality in fast tracked patients and to evaluate the causes of delayed extubation.

Study Design: Descriptive comparative study.

Place and Duration of Study: Armed Forces Institute Cardiology and National Institute of Heart Diseases from January 2015 to June 2015

Material and Methods: The study was designed as a descriptive comparative study. The study participants were divided into two groups depending on their extubation time. Fast Track (FT) Group consisted of the patients who were extubated within 6 hours and Non Fast Track (NFT) group consisted of patients with extubation time greater than 6 hours. After standard anesthesia and surgical technique, we reviewed the duration of mechanical ventilation, length of intensive care unit stay, requirement of re-ventilation, and incidence of in-hospital mortality in patients undergoing open heart surgery during six months period.

Results: A total of 140 patients were enrolled in this study. FT group (<6 hours) comprised of 89 (64%) and NFT group (>6 hours) comprised of 51 (36%) patients each. Mean ventilation time in FT group was 4.2 ± 1.3 hours and in NFT group was 14.5 ± 13.4 (p value 0.03). Average length of stay in ICU was 28 ± 20 hours (median two days) in FT group patients and in NFT group it was 67 ± 49 (median four days) [*p* value 0.04]. Overall mortality was 8 (6%) i.e 3 (7%) in FT group and 6 (4%) in NFT group patients.

Conclusion: Fast track technique greatly minimizes the postoperative complications in patients, leading to benefits of early recovery and short ICU stay.

Keywords: Anesthesia, Airway extubation, Cardiac surgery, Fast tracking, Intensive care unit, Postoperative ventilation.

INTRODUCTION

Fast tracking after open cardiac surgery is achieved by extubation within 6 hours of the shifting of the patient to cardiac surgical intensive care unit (ICU)[1]. The safety of early extubation practice has been extensively reported in the last 20 years[2] and growing experience shows that early extubation is possible and safe in low risk cardiac surgery cases[3]. With the evolution of anesthesia and surgical procedures, fast track extubation (FTE) has gained an increased interest, mainly based on the possibility of reducing healthcare costs, seemingly without compromising patient safety and care[4]. As part of a comprehensive recovery plan, FTE has been shown to reduce health care costs by almost 50% after cardiac surgery. FTE is not only cost effective but also reduces length of stay in ICU and morbidity associated with respiratory and cardiac complications due to early mobilization of cardiac surgery patients[4,5]. The length of stay in ICU is one of the factors limiting utilization of operation theatre resources in any cardiac surgery center[5]. FTE helps in reducing the ICU stay and optimal use the operation theater resources in cardiac surgery. FTE protocols has gained increasing popularity mainly due to a greater rationalization of resource utilization, lowering hospital costs without increasing morbidity and mortality of the patients[4]. International studies report that extubation in fewer than 4 hours may offer accelerated recovery, suggesting that efforts to reduce extubation times further might be worthwhile[6]. FTE is being practiced in almost all cardiothoracic units of the world for

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its associated advantages. By using an appropriate intra operative anesthetic technique and post operative management plan, CABG patients can be extubated within six hours without major complications[7].

In our hospital setting, our goal of early recovery and shorter ICU stay was achieved by adopting a policy of fast tracking. 'The rapid recovery protocol', was applied which emphasized on preoperative education, low-dose opioids anesthesia, mild hypothermia, limited possible cross clamp and cardiopulmonary bypass (CPB) times, active respiratory and physical training from postoperative day one. Our plan was to establish the feasibility and applicability of fast track technique in adult cardiac surgery ICU (CICU) at our hospital and to provide all the anticipated advantageous uses of this technique to our patients. In this study we reviewed the extubation time and suitability of existing anesthetic technique for fast-track extubation in patients undergoing cardiac surgical procedures under cardiopulmonary bypass in a tertiary care cardiac centre.

Table-1: Difference in key variables between both the group.

Variables	FT Group	NFT Group	*p* - value
Age (years)	53 ± 13	55 ± 12	0.57
Weight (kg)	52.6 ± 18.4	53.8 ± 19.4	0.52
CPB time (mins)	109 ± 44	122 ± 46	0.63
Cross clamp Time (mins)	65 ± 27	73 ± 31	0.64
Average LOS of CICU stay (hours)	33 ± 26	70 ± 49	0.04
Ventilation time (hours)	4 ± 1	14 ± 13	0.03

Table-1: Shows that there was statistically significant difference between FT and NFT group with respect to Average length of CICU stay and ventilation time. However, there was no statistically significant difference in other parameters like age, weight, CPB time and cross clamp time. (FT group = Fast track group, NFT group = Non fast track group, LOS = Length of hospital stay, CICU = Cardiac surgical intensive care unit, CPB = cardiopulmonary bypass).

MATERIAL AND METHODS

The study was carried out after the approval from Institution Ethics and Review Board after thoroughly explaining objectives of the study and satisfying the board's concerns. The study was designed as a descriptive comparative study. Eligible patients were consecutive elective adult patients who underwent open heart surgery during six months period from January 2015 to June 2015 at Armed Forces Institute of Cardiology and National Institute of Heart Diseases (AFIC-NIHD). The study participants were divided into two groups depending on their extubation time. Fast Track (FT) Group consisted of the patients who were extubated within 6 hours and Non Fast Track (NFT) group consisted of participants with extubation time greater than 6 hours. Peri-operative anesthesia care was provided as per institution protocol which consisted of of midazolam – fantanyl supported sevoflurane induction, rocuronium for muscle relaxation, and maintence was done by propofol, atracurium and fentanyl infusion. Postoperatively patients were sedated with propofol until ready for tracheal extubation, and received intermittent injections of fentanyl (2.5 - 5 mcg/kg) / ketorolac (15-30mg) for rescue analgesia as per CICU protocol. Failure of fast track extubation was defined as extubation in greater than six to eight hours. Data was collected in (CICU) after completion of six hours. A research Officer of CICU /primary investigator was responsible for collection of data by filling a data collection tool. Data variables included total number of CABG surgeries performed, number of patients extubated within six hours scattering according to gender and age in relation to success or failure of FTE, number of patient who were extubated after six hours of arrival in CICU and causes of delayed extubation.

All elective CABG surgery patients (on pump or off pump) aged 35-75 years with LVEF > 40 percent were included in the study. Patients with IABP inserted preoperatively or intraoperatively, having serum creatinine >2.5

mg/dl, with recent major neurological deficit, having lung disease that may compromise respiratory function and BMI greater than 35, were excluded from the study. All data was entered in a proforma and results were incorporated in percentages, mean and standard deviation. Independent t test as well as chi square was used to compare the two groups to find out the statistical significance.

Data Collection

Clinical data (duration of mechanical ventilation,CICU length of stay (LOS), need for re-ventilation, and incidence of in-hospital mortality for the patients were collected from the hospital records. Final data was transferred into an IBMSPSS database, from which further analysis were performed.

RESULTS

A total of 140 patients were enrolled in this study. FT Group (<6 hours) comprised of 89 (64%) and NFT group (>6 hours) comprised of 51 (36%). There were 85 (66%) males and 4 (36%) females in FT group, while 44 (36%) males and 7 (64%) females in NFT group. Mean age of the patients was 53 ± 13 years in FT group and in NFT group was 55 ± 12 years (table 1). Mean ventilation time in FT group was 4.2 ± 1.3 hours and in NFT group was 14.5 ± 13.4 hours (p value 0.04, which statistically significant). Average length of stay in CICU was 28 ± 20 hours (median two days) in FT group patients while it was was 67 ± 49 hours (median four days) in NFT group (p value 0.03, which is statistically significant. Overall mortality was 9 (6%) i.e 3 (3%) in FT group and 6 (12%) in NFT group patients. There were no cases of respiratory failure, pleural effusion and confusion in FT group. The number and percentage of patients who failed FTE were 51 (36%). The reasons along with the percentages are enumerated in table 2. Fig-1 shows comparison of occurrence of life threatening events between FT Vs NFT groups. overall mortality was 8 (6%) i.e 3 (3%) in FT group and 6 (12%) in NFT group patients (fig-1).

Table-2: Reasons for delayed extubation in Non Fast Track (NFT) group

Reason	Total number of patients (n)	Percentages (%)
Excessive bleeding	4	7.9
Patients requiring reopening	7	13.7
Failure to meet ventilatory criterion of extubation	3	5.8
Severe acidosis	5	9.8
Haemodynamic instability	9	17.7
Pulmonary hypertension	4	7.8
Atrial fibrillation	8	15.7
Other Arrythmias	2	3.9
Patients requiring high ionotropic support	9	17.7

DISCUSSION

FTE after cardiac surgery decreases the total duration of post operative ventilation and the CICU LOS. It is a cost-effective strategy compared with conventional recovery protocols; however, it does not reduce the total hospital LOS or the incidence of complications[8]. We have found that by carefully selecting the patients who can be fast tracked and by providing meticulous balanced anesthesia care during the intra-operative period, FTE is possible resulting not only in reducing the length of CICU stay significantly but also reducing the cost of surgery. As CICU is considered the most resource intense area in the hospital thus decreasing the LOS improves the economy of healthcare provision. A local study carried out in PIMS, Islamabad concludes that FTE after cardiac surgery within 6 hours is feasible approach which minimizes the post-operative complications significantly in adult cardiac surgical patients[9]. However, it must be kept in mind that inappropriate selection of FTE patients not only increases their LOS but also in hospital mortality. This corresponds to an international study which found that among a

homogeneous group of patients targeted for fast-track management after cardiac surgery, re-ventilation although uncommon is associated with a longer second CICU stay and significant mortality[10]. This entails great importance to the careful selection of patient and identification or recognition of specific risk factors which should allow for appropriate modification of the postoperative course.

It is important to realize that early extubation does not necessarily mean earlier would be at the weekend, when the CICU tends to be quieter [11]. Hence the patients who are unfit for FTE protocol can have a longer time for the optimal post operative recovery, maximizing the CICU resources.

In our study we have found that peri-operative management of the patient is a single most important contributor to FTE. To achieve maximum cost benefit from FTE, decreasing CICU LOS and in hospital mortality in cardiac patients, the perioperative management of these

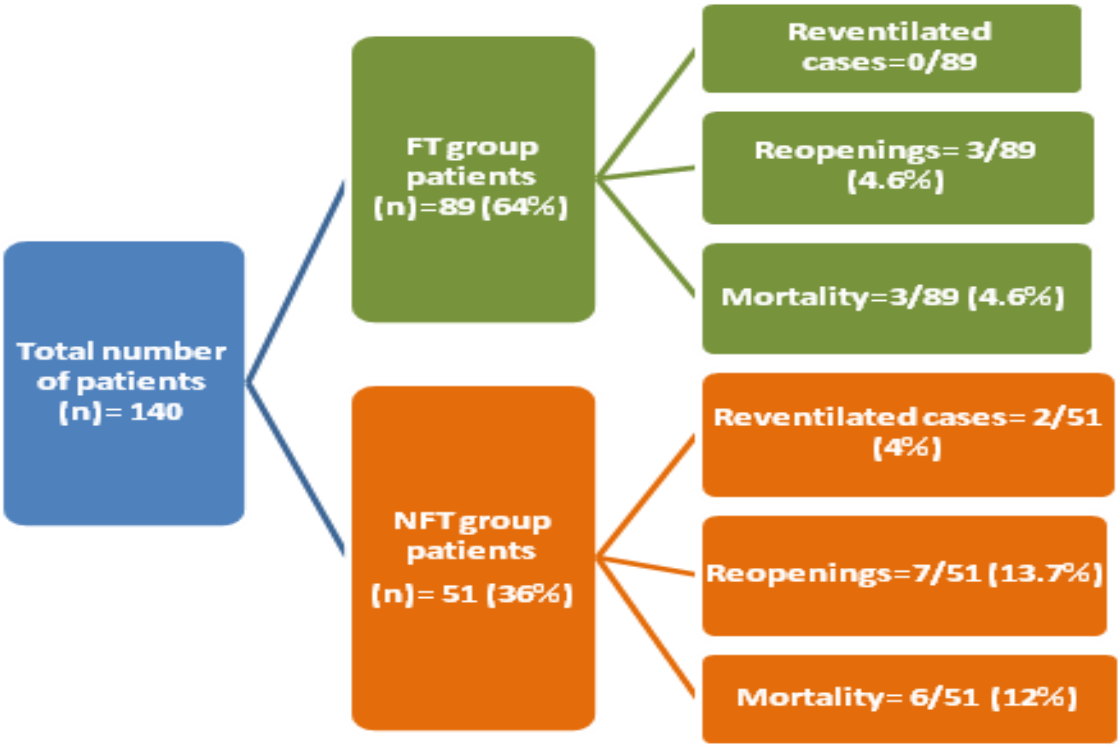

Fig-1: Flowchart diagram showing the of life threatening adverse events in fast track (FT) group vs non-fast track (NFT) group patients. Mortality was approximately 3 times (12%) in NFT group than that (4.6%) of FT group.

CICU or hospital discharge. Identifying the risk factors which will delay the FTE can be very important in the management of cardiac surgical patients. Table 2 shows the causes of delayed extubation in our study group which include . This signifies selecting patients who are unlikely to be fast tracked towards the later part of the week. Since routine cardiac surgery is performed over five days week, if poor risk patients had surgery towards the end of the week, then the extra time they would require will be likely to spend on the intensive care unit patients must be optimized. This process of care includes intraoperative anesthetic modification; organization of CICU and staff expertise; early postoperative FTE and management; acute pain service; CICU discharge policy; utilization of step-down unit and surgical ward; and communication among cardiac patient management teams (cardiovascular surgeon, cardiac anesthesiologist, CICU staff, nurses, respiratory therapists, physiotherapists, and social workers), which are all vital to the success of such a program[12].

Literature review came up with some intriguing and innovative models and techniques to ensure FTE. One is by a study of Rodriguez Blanco YF et al who have developed an innovative mathematical model which they found to be quite accurate in identifying select group of cardiac surgery patients who could be safely extubated in the OR without any increase in postoperative morbidity or mortality[13]. Another recently published article by Elgebaly and Eldabaa have concluded that the use of I-gel airway is well-tolerated by adult patients undergoing cardiac surgery, and requires lower total doses of anesthetics than endotracheal intubation with hemodynamic control and helps in fast-tracking[14]. However this is an advanced use of a supraglottic device; and some clinicians may raise the safety concerns.

In our study overall mortality was 8 (6%) i.e 3 (3%) in FT group and 6 (12%) in NFT group patients (fig-1). This finding puts great emphasis on identifying the risk factors like poor LVEF after CABG surgery, escalating requirements of inotropic supports in immediate post op period, excessive bleeding or any developing respiratory compromise. These events require meticulous and careful tailoring the immediate post-operative course to avoid untoward outcomes. As an inappropriate trial of fast tracking will result in increasing CICU LOS and in hospital mortality.

CONCLUSION

FTE has been widely implemented and acceptable standard of care in CICU. The existing anesthetic technique is suitable for fast-track cardiac anesthesia in our institute. Fast tracking with extubation within 6 hours is a feasible approach in adult cardiac surgical patients in our setup. It greatly minimizes the postoperative complications in patients, leading to benefits of early recovery and short CICU stay. Further studies are needed to monitor efforts at reducing extubation time as these efforts might be worthwhile in benefiting patients.

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CONFLICT OF INTEREST

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest in the subject matter or materials discussed in this manuscript.

AUTHORS CONTRIBUTION

Rehan Masroor, study design, result interpretation and manuscript writing, Syed Muzaffar Hassan, data collection and manuscript writing; Safdar Ali Khan, overall supervision, Safdar Abbas, result interpretation and literature review, Rehana Javaid and Umair Younus, data analysis.

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