

COMPARING THE RESULTS OF EARLY VERSUS PROLONGED EXTUBATION FOLLOWING CARDIAC SURGERY

*AMIN MUHAMMAD KHUWAJA, SANAYULLAH JUNEJO, RIZWANA SHEHZAD,
MUHAMMAD YOUNUS KHATRI*

Background: With the advancement of anesthesia and surgical procedures, early extubation has gained an increased interest, mainly based on the possibility of reducing health costs by decreasing ICU stay and total hospital stay apparently without compromising patient care.

Objective: To compare two groups of patients submitted to early extubation (<6 hrs) and late extubation (>6 hrs) with respect to ICU stay, total hospital stay and respiratory complications after cardiac surgery at National Institute of Cardiovascular Diseases, Karachi.

Methods: After taking permission from hospital ethical committee, we retrospectively analyzed data from one hundred and nineteen 119 patients who underwent open heart cardiac surgery procedures including CABG, Valve replacement, ASD & VSD repair performed at our institute during a 12-month period from 1st Jan 2012 to 31st December 2012.

They were divided in to two groups in early extubation group total no: of patients were seventy six 76 and in late extubation total no: of patients were forty six.

Results: Early extubation group had shorter ICU stay (36 + -12 versus 50 + - 20) and total hospital stay (7.2 + - 2.2 versus 10.4 + - 4.5) and respiratory complications were significantly lower (5 versus 14) in early extubation group.

Conclusion: Early extubation may predict accelerated recovery and better outcomes after cardiac surgery.

Key words: Arrhythmias, open heart surgery, extubation, anaesthesia.

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INTRODUCTION

Post operative ventilation of patients undergoing cardiac surgery has been the standard practice for the last three decades because of a relatively high risk of respiratory insufficiency and low cardiac output state due to universal use of high dose opioid anesthetic technique.¹ Routine overnight postoperative ventilation following cardiovascular surgery was adopted in the 1960, following a demonstration of frequent postoperative respiratory complications.² Advances in anesthesia³ and surgery, extracorporeal perfusion techniques and perioperative care medicine have been crucial in

improving postoperative outcome but the risk for respiratory complications after cardiac surgery remains high, mainly due to the thoracic surgical approach, complications of tracheal intubation^{4,5} and mechanical ventilation^{6,7,8} and other associated risk factors such as age.⁹ In the past decade, this approach has been challenged, and early extubation following cardiac surgery has been considered for many patients as safer and more cost effective. In the last years, published data have shown that early extubation (less than 8 h) after cardiac surgery is well documented,¹¹ and may be effective¹² and cost-effective.^{13,14} Lower costs in the postoperative period, mainly due to a reduction in intensive care (ICU) and hospital length of stay (LOS), could also be achieved.^{12,15} However,

different times for early extubation have been used depending on the author's own protocols and experiences and some lack of information or controversy still remains regarding the safety of a very early or immediate extubation just after surgery.¹⁶

METHODS

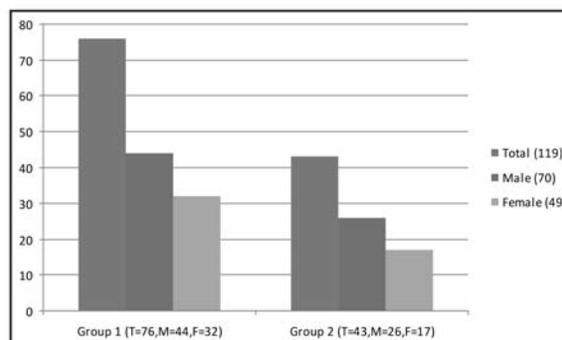
All patients aged more than eighteen years who underwent open heart surgery, including CABG, valve replacement, Atrial septals defect and Ventricular septal defect repair (Table:1) at the National Institute of Cardiovascular Diseases Karachi, from Jan 2012 through Dec 2012 were included in our study. Approval for the study was taken from institutional ethical committee. Total no of patients were one hundred and nineteen 119, they were divided into two groups: Early extubation group (Group 1: no 76): in which patients were extubated less than 6 hours after shifting to ICU, and late extubation group (Group 2: no 43) in which patients were extubated after 6 hours shifting to ICU (fig:1). Exclusion criteria included emergent surgery, redo surgery, double procedure at single operation, acute myocardial infarction less than seven days, reoperation for bleeding, preoperative use of mechanical (IABP) or inotropic support, ejection fraction less than 30% and patients with missing data were excluded.

Table 1:

variable	CABG	Valve repl:	ASD	VSD
No:	57 (47.8%)	39(32.7%)	14(11.7%)	09(7.5%)

Both groups were similar in terms of demographics and preoperative risk factors, same group of cardiac surgeons performed all procedures, all patients underwent surgery by median sternotomy and cardiopulmonary bypass was established (Table:2), Anesthesia was performed in the same fashion in all patients. Monitoring included electro cardio gram (ECG), pulse oximetry (SpO₂), end tidal carbon dioxide

FIG: 1



(EtCO₂), invasive blood pressure using a radial artery catheter in non dominant hand, central venous pressure using internal jugular venous access, arterial blood gas (ABG), core temperature. All the patients were premeditated with Tablet.1 orazipam 2mg at night about 10-11 pm and 60 minutes before shifting to the OT. Oxygen through face mask was given while transporting patient from ward. Induction was done with Propofol at dose range 1.5-2 mg/kg, muscle relaxant inj: Rocurronium used at dose of 0.9mg/kg, Inj: Nalbuphine used as analgesic at dose of 0.1mg/kg intravenously and Inj: Midazolam at dose of 0.1-0.5mg/kg intravenously used as sedative agent, additionally inhalational anesthesia was provided with Isoflurane (MAC 1.15%) for maintainance of anesthesia. Heparin was given intravenously at dose of 300 IU/kg, to maintain the activated clotting time more than 480 seconds throughout cardiopulmonary bypass (CPB) and antagonized with protamine at dose of 300 IU/kg after completion. Blood flow during CPB on pump was maintained at rate of 2.4 L and 2.8 L/min/body surface area (BSA). Perfusion pressure was kept within the range of 60-70 mm Hg. The CPB temperature was maintained between 28 and 34°C and complete rewarming to 37°C was achieved before weaning CPB, and Intermittent cold blood cardioplegia was given. After completion of operation, patients were transferred to the ICU and ventilated with 80% which was reduce to slowly to 40% of oxygen using SIMV mode. Post-operative in ICU

hemodynamic monitoring was done which include invasive Blood pressure, central venous pressure, ECG, ABGs temperature, urine output and volume of pericardial and pleural tube drainage, blood products transfusion were done as and per requirement of patients, and analgesics/sedation were given considering for early extubation. Standard protocol for weaning was: patient awake giving good response, calm and cooperative, hemodinamically stable, urine output 1-2 ml/hr, pericardial or pleural drainage less than 75–100 ml in the last hour, and rapid shallow breathing index (RSBI) less than 100.

Both groups of patients were compared submitted to early extubation (<6 hrs) and late extubation (>6 hrs) with respect to ICU stay, total hospital stay and respiratory complications (pneumonia, atelectasis), diagnosed by physical findings, X-ray chest and Blood C.P.

RESULTS

Preoperative characteristics of patients' between the early extubation group (n=76) and the late extubation group (n=43) are presented in table 2. No of smokers and diabetics were higher in late extubation group as compare to early extubation. Cross clamp time and cardiopulmonary bypass time was not much divergent between two groups. Late extubation group patients had more prolonged ICU and hospital length of stay. Respiratory complications were significantly less in early extubation group as compare to late extubation (Table: 3).

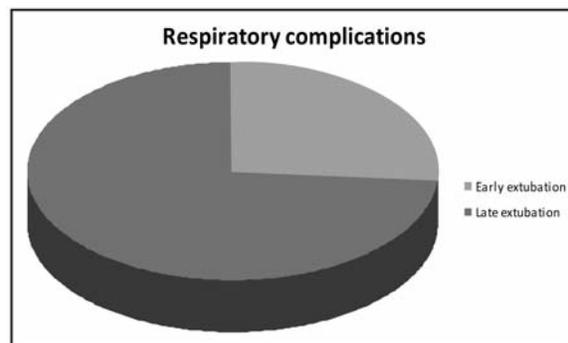
Table: 2 Patient demographics, clinical and operative data.

Variable	Group 1 (no=76)	Group 2 (no=43)
Age in years (range)	18-72	18-74
Sex (Male)(no)	44 (57%)	26 (60.4%)
Diabetes (no)	14 (18.4%)	10 (23.2%)
Hypertension (no)	10 (13%)	7 (16.2%)
Smoking (no)	12 (15.7%)	14(32.5%)
Obesity (BMI >28)(no)	07 (9.2%)	06 (13.9%)
CPB time (min)	52.5 + - 25.5	55.3+ -21.7
Cross clamp time (min)	76.8+ -35.2	81.7+ -29.8

Table: 3

Variable	Group 1	Group 2
Intubation (hours)	5.01 + - 0.9	9.4 + - 5.4
ICU stay (hours)	36 + - 12	50 + - 20
Hospital stay (days)	7.2 + - 2.2	10.4 + - 4.5
Complications	5 (6.5%)	14 (32.5%)

FIG: 2



DISCUSSION

In 1986 Millic-Emili¹⁷ suggested that the weaning process was more an art than a science. Over the last years, multiple attempts have been made to measure the Importance of matching ventilatory capacity and technological developments with multiple physiopathological syndromes (respiratory 'patients' needs'). Demling et al¹⁸ reported in patients undergoing elective cardiothoracic surgery a weaning failure rate of less than 5%. Still, the weaning process in cardiac patients can influence morbidity, mortality and costs. The timing of early extubation has varied in different reports, and exact timing has not been established yet, this study has defined early extubation as endotracheal tube removal within six hours of ICU admission. Multiple factors can influence postoperative ventilation and intubation times. In our study group, we extubated the patients immediately after criteria were achieved. In early extubated patients there is decreased ICU stay which is associated with decreased total hospital stay, decreased respiratory complications all these factors influence utilization of resources

and patient turnover is quicker, because the available slots in the ICU are limited if patient get discharged earlier from ICU there will be chance for newer patients to be admitted. There are several potential benefits to early extubation. It has been shown that earlier endotracheal tube removal hastens the return of ciliary function and improves respiratory dynamics and coughing.¹⁹ Infact, it has been proposed that early extubation should decrease the incidence of nosocomial pneumonia.¹⁹ The main purpose was to review the safety and efficacy of early extubation in the post operative cardiac patient at NICVD Karachi over a one year period. The main principal underlying the early extubation pioneered in 1990's and suggested that²⁰ it leads to shorter hospital stay and also has potential benefits to patient that includes quicker return to normal activity decrease rate of¹⁹⁻²¹ ventilator associated pneumonia and hospital associated infection such as surgical site infection, urinary tract, central line associated, blood stream infections²⁰⁻²¹ and complications of immobility like deep vein thrombosis and pulmonary embolism.

CONCLUSION

Early extubation is among the earliest postoperative predictors for those patients who are more likely to have a smooth post-operative course and decreased complications after cardiac surgery. Further studies are recommended to confirm the findings of this study and implement changes in clinical practice.

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