Impact of immediate versus delayed tracheal extubation on length of ICU stay of cardiac surgical patients

Thesis

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By

Moataz Salah Khalil
M.B.B.Ch, M.Sc. Anesthesia

Supervised by

Prof. Dr. Hoda Saad El-din Hafez
Professor of Anesthesiology
Faculty of Medicine
Cairo University

Prof. Dr. Maged Salah Mohamed
Professor of Anesthesiology
Faculty of Medicine
Cairo University

Prof. Dr. Hisham Hosny Abdel Wahab
Assistant Professor of Anesthesiology
Faculty of Medicine
Cairo University

Faculty of Medicine
Cairo University
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Abstract

Ultra-fast track anesthesia aims at immediate extubation of cardiac surgical patients at the end of the operation. In the current study, we compared the effect of performing ultra-fast track anesthesia versus continued postoperative mechanical ventilation on the length of ICU stay. Fifty two patients were divided into 2 groups, ultra-fast group and conventional group.There was a significant reduction in the length of ICU stay in the ultra-fast group, without increasing postoperative complications.

Key words:

Ultra-fast track anesthesia, immediate extubation, cardiac surgery, ICU, mechanical ventilation

List of Abbreviations

ABG	arterial blood gas
AF	atrial fibrillation
ANOVA	analysis of variance
ARDS	acute respiratory distress syndrome
ASD	atrial septal defect
AVR	aortic valve replacement
AXC	aortic cross clamp
BIS	bispectral index
CABG	coronary artery bypass graft
CC	creatinine clearance
CHD	congenital heart disease
CI	confidence interval
CK	creatinine kinase
CK-MB	creatinine kinase myocardial band
COPD	chronic obstructive lung disease
CPB	cardiopulmonary bypass
CVP	central venous pressure
DM	diabetes mellitus
ECG	electrocardiogram
EF	ejection fraction
EuroSCORE	European System for Cardiac Operative Risk Evaluation
FiO_2	fraction of inspired oxygen
FTCA	fast-track cardiac anesthesia
FTE	fast track extubation

Hb	hemoglobin
HCO_3	bicarbonate
HR	heart rate
HTN	hypertension
IABP	intra-aortic balloon pump
ICU	intensive care unit
IE	immediate extubation
IHD	ischemic heart disease
INR	international normalized ratio
LOS	length of stay
MAC	minimal alveolar concentration
MAP	mean arterial pressure
MVR	mitral valve replacement
NFTE	non-fast track extubation
NSAID	non-steroidal anti-inflammatory drug
OP	operative
OPCAB	off pump coronary artery bypass
OR	odd's ratio
$PaCO_2$	arterial carbon dioxide tension
PaO_2	arterial oxygen tension
PASP	pulmonary artery systolic pressure
pH	power of hydrogen
PHT	pulmonary hypertension
RHD	rheumatic heart disease
RR	relative risk
SD	standard deviation

SpO_2	arterial oxygen saturation
STS	society of thoracic surgeons
TEA	thoracic epidural analgesia
TOF	train of four
TVR	tricuspid valve replacement
UFTA	ultra-fast track anesthesia
VAS	visual analogue score
VSD	ventricular septal defect

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Introduction

Since open heart surgery became established in the 1950s,the sedation and prolonged ventilatory support of this patient population has been the standard practice.Prolonged ventilatory support was maintained at leastuntil the morning of the first postoperative day until thehemodynamic, respiratory and coagulation physiologicalsystems had stabilized completely(1,2)

Particularly the first fewhours after cardiac surgical interventions are regarded as acritical period for the occurrence of myocardial ischemia(3), which are frequently triggered by the hypothermicand hemodilution as a consequence of the extracorporealcirculation and the consecutive activation of the sympatheticnervous system(4). Moreover, the extracorporealcirculation itself caused transient functional and metabolicdamage to the myocardium, which consequently becameeven more susceptible to new onset ischemia(5).

More importantly,it was anesthesiological management with high-doseopioid anesthetics which made prolonged ventilatorysupport of heart surgery patients necessary per se, and thetime of extubation was already established intraoperatively(2).

The indications commonly cited for mechanical ventilation after cardiac surgery are significant hemodynamic instability that would require control of respiration, anticipated respiratory failure, central nervous system abnormalities anddepressed level of consciousness that would affect the

ventilatorydrive or airway maintenance, anticipated continuingblood loss that may require a return to the operating room, andknown difficult airway that would make emergency reintubationhazardous(6).

The care of the cardiac surgical patient has undergoneextensive changes in the past decade. Previously, postoperativeventilation was routine because of the relatively highincidence of pulmonary insufficiency and low cardiac outputstates, as well as the popularity of high-dose narcotic anesthetictechniques. Recent advances in cardiac anesthesia and surgeryhave reduced the necessity for postoperative ventilation(7).

Early tracheal extubation after cardiac surgery has proven to be safe, cost-effective(8), and improves resource utilization(9).Early tracheal extubation after conventional coronary artery bypass grafting (CABG) has become feasible due to improvement in perioperative anesthetic management, advanced surgical techniques, myocardial protection and tepid cardiopulmonary bypass techniques(10).

Fast track cardiac anesthesia (FTCA) aims at tracheal extubation within 1 to 6 hours after arrival in the cardiac surgery recovery unit. It has not been found to increase postoperative cardiorespiratory morbidity, sympathoadrenal stress, or mortality. On the other hand, it significantly reduces costs and improves resource utilization(11). Improvement in diastolic compliance and overall cardiac performance were also described as potential benefits of early extubation(12).

Ultra-fast track anesthesia (UFTA) aims at immediate extubation of cardiac surgical patients at the end of the operation. There are few contrain-

dications to the adoption of early extubation protocols. Generally most cardiac surgical patients, presenting for either elective or emergent surgery, have adequate ventilatory function. If patients were not intubated and ventilated preoperatively, they are not likely to require prolonged mechanical ventilation(7).

Patients do not like to remain intubated postoperatively.Before surgery, patients are very concerned and often frightenedof the idea of remaining intubated after surgery, despiteunderstanding its value. After surgery, many patients find intubationthe worst experience of their hospital stay. As few as 4 more hours of postoperative ventilation results in patients with more mental depression measured on the third postoperative day.If immediate tracheal extubation is safe, at a minimum, patients will besaved psychological trauma(13).

Feasibility of ultra-fast track anesthesia has been studied for different cardiac operations and with different anesthetic techniques. Nevertheless, questions remain regarding the significance of various perioperative anesthetic techniques on fast-track management of earlier tracheal extubation(14).

Aim of the work

In the current prospective comparative study, we aim to compare the effect of performing ultra-fast track anesthesia (UFTA) versus conventional continued postoperative ventilation on the length of ICU stay. This technique will be achieved through the application of a balanced anesthetic technique using low dose opioids, inhalational anesthetics, and paracetamol.