Surgical Internal Fixation Versus Conservative Treatment By Mechanical Ventilation For Management Of Flail Chest

Thesis

Submitted in partial fulfillment of M.Sc. degree in

General surgery

By

Tamer Eid Sayed Fouda

M.B.B.Ch., Faculty of medicine, Cairo University

Under Supervision of

Prof. Dr. Ahmed Farag
Prof. of General surgery, Faculty of medicine, Cairo University

Prof. Dr. Ashraf Helal
Prof. of Cardiothoracic surgery, Faculty of medicine, Cairo University

Dr. Ahmed Mohamed Hashem
Lecturer of General surgery, Faculty of medicine, Cairo University

Faculty of Medicine
Cairo University
2010

ACKNOLEDGEMENT

First and foremost, thanks God the most gracious and merciful.

I would like to express my deep thanks to Professor Dr. Ashraf Helal, Professor of Cardiothoracic Surgery, Faculty of Medicine, Cairo University for his generous aid and supervision.

I would also like to express my gratitude and respect towards Professor Dr. Ahmed Farag, Professor of General Surgery, Faculty of Medicine, Cairo University for his continuous encouragement in completing this work.

Special thanks to Dr. Ahmed Hashem, Lecturer of General Surgery, Faculty of Medicine, Cairo University for his generous support and help.

I wish to express my continuous appreciation and gratitude for Dr. Mohammed Aboeldahab, Assistant Professor of Cardiothoracic Surgery, Faculty of Medicine, Cairo University for his step by step guidance, generous aid and supervision. His advices were illuminating the way for this work. There are no words enough that can express my gratitude to him.

I am also very grateful to Dr. Tarek Mohsen, Assistant Professor of Cardiothoracic Surgery, Faculty of Medicine, Cairo University for his generous heartily cooperation. His advices were the corner stone in the building up of this study.

For a love, unconditional.....

For a support, undeterred.....

And for a trust, unfailing.....

This work is dedicated to

my Mother and Father.

In gratitude beyond limits and affection beyond words.....

CONTENTS

LIST OF ABBREVIATIONS

ICU	: Intensive Care Unit
O_2	: Oxygen
CO_2	: Carbon Dioxide
C.T.	: Computed Tomography
3D	: 3 Dimension
PO_2	: Partial Pressure Of Oxygen
PCO_2	: Partial Pressure Of Carbon Dioxide
T	: Thoracic
mm	: Millimeter
ml	: Milliliter
IPPV	: Intermittent Positive Pressure Ventilation
IMV	: Intermittent Mandatory Ventilation
NIPPV	: Non Invasive Positive Pressure Ventilation
PEEP	: Positive End Expiratory Pressure
CPAP	: Continuous Positive Airway Pressure
BiPAP	: Biphasic Positive Airway Pressure
ARDS	: Adult Respiratory Distress Syndrome
K-wire	: Kirschner Wire
RR	: Respiratory Rate

ER : Emergency Room

CVP : Central Venous Pressure

DVT : Deep Venous Thrombosis

ABGs : Arterial Blood Gases

P-value : Probability Value

N.S : Non Significant

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The strategy for treatment of flail chest remains controversial. Debate between MV and surgical fixation persisted for years. Methodology: Twenty patients were randomized into two groups, group I: was managed by MV. Group II was treated by surgical internal fixation. In group I, age ranged from 18-65 with mean 34.4 ± 13.38, while in group II age ranged from 21-69 with mean 44.2 ± 19.46. We used plates for fixation together with screws and stainless steel wires with which we observed more stability than the mere use of wires or absorbable sutures alone. Results: There was no statistical significant difference as regards the age, sex, associated injuries in both groups, the stability gained one month after the trauma, but there was significant difference regarding the mean duration of mechanical ventilation, ICU stay and incidence of chest infection in both groups. There was no statistical significant difference between both groups regarding hospital stay, morbidity and mortality although it is lower in the surgical group. Conclusion: Surgical fixation is a successful treatment modality in patients with traumatic flail chest as it avoids long term mechanical ventilation, resulting chest infection and allows early discharge from ICU with less mortality.

Key words: flail chest, mechanical ventilation, surgical internal fixation.

INTRODUCTION
AND
AIM OF WORK

Introduction:

Flail chest complicates about 10% to 20% of patients with blunt chest trauma and is associated with a mortality rate ranging from 10% to 35% [1, 2]. Decelerational thoracic injuries occur when an individual is moving forward and stops suddenly striking some part of the thorax against an obstacle that is either immobile or moving at a much lower velocity. Flail chest is included to the major, often life-threatening decelerational injuries along with sternal fracture serving as a marker of significant intrathoracic injury. It is generally agreed that the most common cause is traffic accidents [3].

The management of severe flail chest has gradually changed over years, as a consequence of improved ventilatory techniques and better understanding of the pathophysiology of the complex traumatic acute respiratory failure syndrome. Internal pneumatic stabilization with mechanical ventilation is the standard treatment for patients with flail chest and respiratory failure, or when associated head and/or abdomen injuries require mechanical ventilation [1, 2]. Even though volume-limited ventilation has reduced mortality of patients with severe flail chest, ventilator-associated pneumonia often occurs after prolonged ventilation [2].

The treatment of flail chest injuries has evolved over the last 4 decades from immediate endotracheal intubation for at least 7–10 days with a mandatory tracheostomy until there was no movement of the flail segment, to the present when every effort is made to provide good analgesia and avoid intubation [4]. In patients with isolated blunt chest trauma who have severe flail chest without significant pulmonary contusion, prolonged internal pneumatic stabilization is not suitable because of the risk of ventilator-related infectious complications. Moreover, mechanical ventilation is not always successful in preventing chest wall deformities that may result in a subsequent respiratory restrictive dysfunction [2, 5].

In patients with mild or no pulmonary contusions, early surgical stabilization (within few days of internal pneumatic stabilization) may result in shorter intensive care unit stay with lower morbidity and prevention of pulmonary restrictive complications resulting in working incapacity [2, 5]. Moreover, prolonged paradoxical motion of the chest wall before spontaneous stabilization occurs can lead to additional mechanical impact on the contused lung area by the flail segment. Furthermore, the broken rib tips may disrupt the lung parenchyma [6]. This is because fractured ribs treated conservatively undergo progressive displacement during the healing phase, which results in considerable deformity, volume loss, and atelectasis.

Endotracheal intubation and ventilation may not be able to prevent rib cage distortion [6]. Early surgical stabilization can prevent additional injury as well as promote earlier weaning from the ventilator [4].

The primary end point for this clinical situation is the prevention of late chest restriction due to an anatomically deformed spontaneous stabilization. Surgical stabilization of a flail chest is also mandatory when the trauma patient is undergoing a thoracotomy for associated thoracic lesions. In this situation, chest wall stabilization does not add significant surgical morbidity [2].

Aim of work:

Although surgical management of patients with severe flail chest is at present controversial, we think that surgical stabilization is strongly indicated in specific clinical situations regarding reduction in morbidity and mortality, ICU stay, hospital stay, and the early return of the patient to work. The aim of this study is to compare two methods used for stabilization of the chest wall: the conservative method by mechanical ventilation and the method of surgical fixation of the flail segment. Through a prospective comparative study, the early results and the results at one month after trauma of both modalities of treatment will be compared together with their effect on morbidity and mortality.