ROLE OF HYDROCORTISONE IN PREVENTION OF POSTOPERATIVE ATRIAL FIBRILLATION

Thesis

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Abstract

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- **Introduction:** Atrial fibrillation (AF) is the most common arrhythmia to occur after cardiac surgery. An exaggerated systemic inflammatory response has been proposed to be one etiological factor.
- **Aim of the study:** This study was done to test whether perioperative intravenous corticosteroid administration -as a potent antiinflammatory- after cardiac surgery prevents AF.
- **Patients and methods:** The study involved 100 consecutive patients without prior AF who had done their first on-pump coronary artery bypass graft (CABG) surgery, aortic valve replacement (AVR), or combined CABG and AVR surgery from April 2009 to January 2010 in Cairo university hospitals and National Heart Institute. Patients were divided into two groups, group 1 (50 patients) who received 100-mg hydrocortisone in the evening of the operative day, then every 8 hours during the next 3 days and group 2 (50 patients) who did not given hydrocortisone. All patients received oral bisoprolol in dose titrated to heart rate. Main outcome measure was the occurrence of AF during the first 72 hours after cardiac surgery.
- **Results:** The incidence of postoperative AF was significantly lower in the hydrocortisone group (14/50 [28%]) than in the other group (24/50 [48%], despite incidence of DM was statistically significant higher in the hydrocortisone group (30/50 vs 20/50 patients, ***P***=0.046). The hydrocortisone Group patients had 0.583 (95% CI 0.184 - 0.966) probabilities compared to other group patients to develop AF in the 1st three postoperative days; ***P***=0.039). TLC was significantly lower in the hydrocortisone group than the other group during the first three postoperative days (***P***<0.05). Patients received hydrocortisone did not have higher rates of superficial or deep wound infections, or other major complications.
- **Conclusion:** Intravenous hydrocortisone was effective and safe in reducing the incidence of AF after cardiac surgery.

Key words:
Atrial fibrillation
AVR
CABG
Corticosteroids
Systemic inflammatory response

بسم الله الرحمن الرحيم

"ويسئلونك عن الروح قل الروح من أمر ربي
وما أوتيتم من العلم إلا قليلا"

صدق الله العظيم
(سورة الإسراء، الآية: 85)

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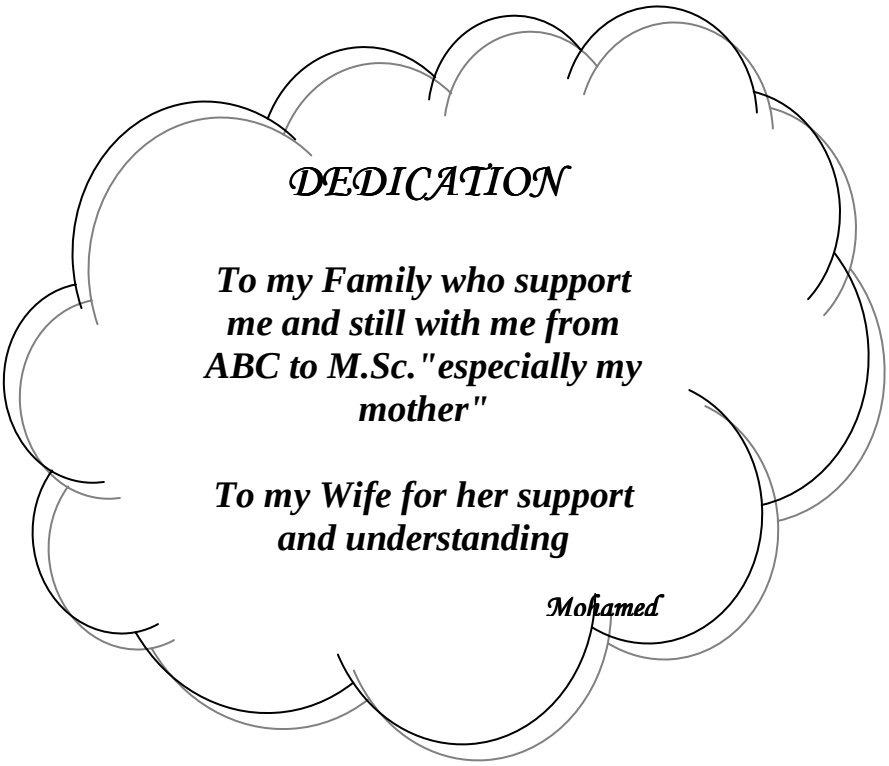
DEDICATION
To my Family who support me and still with me from ABC to M.Sc."especially my mother"
To my Wife for her support and understanding
Mohamed

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ABBREVIATIONS

AF	:	Atrial fibrillation
ABGs	:	Arterial blood gases
AV	:	Atrioventricular
AVR	:	Aortic valve replacement
CABG	:	Coronary artery bypass grafting
CAD	:	Coronary artery disease
CXR	:	Chest X-ray
CPB	:	Cardiopulmonary bypass
IQR	:	Inter quartile range
PCO_2	:	Partial carbon dioxide tension
PDA	:	Posterior descending artery
PMNL	:	Polymorphnuclear leucocytes
PUFAs	:	Polyunsaturated fatty acids
RCA	:	Right coronary artery
RCTs	:	Randomized controlled trials
SC	:	Subcutaneous
SD	:	Standard deviation
TLC	:	Total leukocytic count
TEE	:	Transesophageal echocardiography
TGF	:	Transforming growth factor
TNF	:	Tumor necrotic factor
vs	:	Versus

INTRODUCTION
&
AIM OF THE WORK

Introduction

The incidence of atrial fibrillation (AF) after cardiac surgery is high[1,2], and although often transient, it is associated with increased hospital costs, length of stay, post-operative complications, and increased short- and long-term mortality.[1,2,5-8]

The **pathophysiology** of POAF after heart surgery is not precisely known, but the mechanisms are thought to be multifactorial.[3] Cardiac surgery with extracorporeal circulation is associated with severe systemic inflammatory response[3] that may contribute to postoperative complications including AF.

Different risk factors have been reported [3], and many studies have evaluated the prophylactic effect of different pharmacologic or physical interventions.[4]

Different forms of potent anti-inflammatory agents (including corticosteroids) can reduce the occurrence of atrial fibrillation after cardiac surgery.[4-8]

The purpose of this study is to asses the Role of corticosteroids in preventing Atrial Fibrillation after cardic surgery.

AIM OF THE WORK

To assess:

- Efficacy of corticosteroids in prevention of Atrial Fibrillation occurrence in post-CABG, aortic valve replacement (AVR) or CABG and AVR patients during their ICU stay.

- Effects of corticosteroids on morbidity post-CABG, aortic valve replacement (AVR) or CABG and AVR surgery.

- Effects of corticosteroids on survival of postoperative CABG, AVR or CABG and AVR patients.

REVIEW OF LITERATURE

- **Post-Operative Atrial Fibrillation**

- **Inflammatory Response to Cardiopulmonary Bypass (CPB)**

- **Corticosteroids**

Post-Operative Atrial Fibrillation

(POAF)

Post-Operative Atrial Fibrillation (POAF) is the most common complication encountered after cardiac surgery. The incidence of POAF reported in previous studies varies between 20% and 50%, depending on definitions and methods of detection [1,2]. The incidence of POAF has increased continuously over the past decades, and this is believed to be due to the aging of the population undergoing heart surgery. The pathophysiology of POAF after heart surgery is not precisely known, but the mechanisms are thought to be multifactorial. Different risk factors have been reported, and many studies have evaluated the prophylactic effect of different pharmacologic or physical interventions.

Incidence and Clinical Impact:

The incidence of POAF is approximately 30% after isolated coronary artery bypass grafting (CABG) surgery, 40% after valve replacements or repair, and increases to approximately 50% after combined procedures.[1] Furthermore, these figures are expected to rise in the future, given that the population undergoing cardiac surgery is getting older and that the incidence of AF in the general population is strongly age-dependent.

Post-operative AF tends to occur within 2 to 4 days after the procedure, with a peak incidence on postoperative day 2. Seventy percent of patients develop this Arrhythmia before the end of post-operative day 4 and 94% before the end of post-operative day 6 [3].

Although generally well tolerated and seen as a temporary problem related to surgery, POAF can be life threatening, particularly in elderly patients and those with left ventricular dysfunction in whom it is associated with significant morbidity [4] and mortality [5]. Post-operative AF was reported as a major morbid event [6], associated with increased post-operative thromboembolic risk and stroke [7], hemodynamic compromise [8], ventricular dysrhythmias [1], and iatrogenic complications associated with therapeutic interventions. Importantly, the risk for perioperative stroke is approximately 3-fold higher for patients with POAF [1,5]. Moreover, in a series of 3,855 patients undergoing cardiac surgery, Almassi et al. [6] found that hospital mortality (6% vs. 3%) and 6-month mortality (9% vs. 4%) were significantly higher in patients in whom POAF occurred. Furthermore, the impact of POAF on hospital resources is substantial and was estimated to lengthen hospital stay by 4.9 days, with an extra cost of $10,000 to $11,500 in hospital stay costs in the U.S. [3]. Knowing that there are at least 640,000 open heart surgeries/year in the U.S. according to the American Heart Association (AHA) statistics in 2004 [9] and assuming an incidence of 30% of POAF, the extra cost related to this post-operative complication could be conservatively estimated at approximately $2 billion/year.