Use of short-term steroids in the prophylaxis of atrial fibrillation after cardiac surgery

Zeyad Al-Shawabkeh [a,*], Khalid Al-Nawaesah [a], Razi Abu Anzeh [a], Hael Al-Odwan [b], Wasfi Azyoud Bashar Al-Rawashdeh [a], Haetham Altaani [a]

[a] Department of Cardiac Surgery, Queen Alia Heart Institute, Amman
[b] Department of Cardiac Anaesthesia, Queen Alia Heart Institute, Amman

[a,b] Jordan

Objectives: **To assess the effectiveness of corticosteroids in the prophylaxis of postoperative atrial fibrillation (AF) in patients undergoing elective coronary artery bypass grafting or valvular heart surgery in terms of reducing its incidence and decreasing the length of hospital stay.**

Methods: **This prospective double blinded randomized study was conducted at Queen Alia Heart Institute (Amman, Jordan) from June 2014 to June 2015 on 340 patients who underwent their first on-pump elective coronary artery bypass grafting (CABG) alone or combined with valvular surgery. Inclusion criteria consisted of elective first time CABG or combined with valvular surgery, use of β-adrenergic blockade, and normal sinus rhythm. Exclusion criteria included a history of heart block, previous episodes of AF or flutter, uncontrolled diabetes mellitus, history of peptic ulcer disease, systemic bacterial or mycotic infection, permanent pacemaker, and any documented or suspected supraventricular or ventricular arrhythmias. Patients were randomized into two equal groups ($n = 170$ each), then each group was subdivided into patients who underwent CABG alone ($n = 120$), and patients underwent valvular heart surgery with or without CABG ($n = 50$). In the treatment group, patients were given 1 g of methylprednisolone before cardiopulmonary bypass then 100 mg of hydrocortisone every 8 hours for the first 3 days postoperatively. The primary endpoint was the overall occurrence of postoperative AF.**

Results: **AF developed in 21.1% (36 patients) in the treatment group in contrast to 38.2% (65 patients) in the control group ($p < 0.05$). In the subdivided groups (CABG only), approximately 20% (24 patients) developed AF in the treatment group in contrast to 35% (42 patients) in the control group ($p < 0.05$). In the other group, (CABG + VALVE) 24% (12 patients) developed AF compared with 46% (23 patients) in the control group ($p < 0.05$). The length of hospital stay was 6.02 þ 11.23 days in the treatment group while it was 5.98 þ 1.86 days in the control group, which was found to be statistically nonsignificant. No statistical significant difference in the rate of postoperative complications including mediastinitis as well superficial wound infections was observed between the two groups.**

Conclusion: **Prophylactic short-term use of steroids both intraoperatively and postoperatively proved to be safe and effective in reducing the incidence of postoperative AF in patients undergoing CABG alone or combined with valve surgery.**

Keywords: Atrial fibrillation, Complications, Corticosteroids, Postoperative, Prophylaxis

Disclosure: Authors have nothing to disclose with regard to commercial support.
Received 14 January 2016; revised 20 March 2016; accepted 30 March 2016.

* Corresponding author at: Department of Cardiac Surgery, Queen Alia Heart Institute, Aum saad almohadly street, Tlae Al Ali, Amman, zip code 11953, P.O. Box 5299, Jordan.
E-mail address: alshawabkahzeyad@yahoo.com (Z. Al-Shawabkeh).

P.O. Box 2925 Riyadh – 11461KSA
Tel: +966 1 2520088 ext 40151
Fax: +966 1 2520718
Email: sha@sha.org.sa
URL: www.sha.org.sa

Peer review under responsibility of King Saud University.
URL: www.ksu.edu.sa
http://dx.doi.org/10.1016/j.jsha.2016.03.005

Production and hosting by Elsevier

Introduction

Coronary artery bypass grafting (CABG) using cardiopulmonary bypass triggers generalized response characterized by leukocyte and complement activation, high levels of C-reactive protein (CRP) complexes, as well high levels of inflammatory mediators [1–3]. These mediators, such as interleukins-6 and -8, tumor necrosis factors, leukotriene B4, and tissue plasminogen activator, might contribute to many postoperative complications including atrial fibrillation (AF), myocardial ischemia, multiorgan dysfunction, and infections [1–4]. This is because those substances have known cardiodepressant effects [5].

AF is the most common postoperative complication with incidence of 20–50% following CABG [1,3] and even higher after CABG and valve surgery in up to 40–50% [1]. It commonly occurs at 0–4 days [6,7] with the peak incidence on the 2nd to 3rd postoperative day [7–9]. AF is associated with hemodynamic instability, increased risk of thromboembolism and stroke, prolonged hospitalization and increased morbidity with consequent high costs [1,2,10,11].

Many drugs have been used to decrease the likelihood of developing AF, including β-adrenergic blockers, amiodarone, and magnesium [3,12].

Because of the known physiologic effects of steroids to suppress the release of the above mentioned inflammatory mediators, steroids might have beneficial effects in decreasing postoperative AF, and inhibiting the inflammatory process post-cardiopulmonary bypass [1,3,5]. Moreover, they decrease capillary wall permeability, preventing migration of inflammatory mediators into the systemic circulation [5]. However, much debate exists regarding their protective effects in relation to the well-known side effects such as hyperglycemia, gastrointestinal disturbances, and postoperative infection [1,5].

The purpose of this study is to assess the use of short-term steroids in the prophylaxis of AF in patients undergoing elective CABG or combined CABG and valvular heart surgery.

Abbreviations

AF	atrial fibrillation
CABG	coronary artery bypass grafting
CPB	cardiopulmonary bypass
LA	left atrium
GIT	gastrointestinal
CRP	creactive protien
COPD	chronic obstructive lung disease
RCTs	randomized controlled trials

Methods

This was a prospective randomized controlled study that was conducted at Queen Alia Heart Institute (Amman, Jordan) between June 2014 and June 2015. The study protocol was approved by the Jordanian royal medical services local ethical committee. There were 340 consecutive patients scheduled to undergo their first on-pump CABG, or combined CABG and valvular surgery enrolled in this study. A total of 865 patients were screened with 516 excluded from the study as well nine patients who refused to be enrolled in the study.

Inclusion criteria consisted of elective first time CABG or combined with valvular surgery, use of β-adrenergic blockade, and normal sinus rhythm. Exclusion criteria included: a history of heart block; previous episodes of AF or flutter; uncontrolled diabetes mellitus; history of peptic ulcer disease; systemic bacterial or mycotic infection; permanent pacemaker; any documented or suspected supraventricular or ventricular arrhythmias; urgent or emergency surgery; if the patient underwent cardiac surgery without using cardiopulmonary bypass; and renal insufficiency (serum creatinine >20 mg/dL).

The study's primary end point was the occurrence of an episode of AF lasting ⩾30 minutes or hemodynamic instability due to AF regardless of episode duration during the first 96 hours after cardiac surgery. Secondary end points were the length of hospital stay and the adverse effects of steroids. We followed up the patients during the first 2–4 weeks after surgery to check for wound infection, therefore, patient charts were ordered for verification. In addition, the patient charts were checked 6 months after the surgery to assess the incidence of major postoperative complications (mediastinitis or other complications requiring hospitalizations).

All patients in the hydrocortisone and placebo groups underwent the complete protocol of the intended treatments until designated end points, so intention was the same as treatment. After the first episode of AF, the study protocol was discontinued.

Patients underwent cardiac surgery on standard cardiopulmonary bypass. Intermittent blood or cold cardioplegia solution was administered via the antegrade or retrograde route. The cardioplegia solution consisted of 32 meq/dL of magnesium

Please cite this article in press as: Al-Shawabkeh Z. et al., Use of short-term steroids in the prophylaxis of atrial fibrillation after cardiac surgery, J Saudi Heart Assoc (2016), http://dx.doi.org/10.1016/j.jsha.2016.03.005