

INCIDENCE OF ACUTE KIDNEY INJURY AFTER CORONARY ARTERY BYPASS GRAFTING IN TAMILNADU REGION

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ABSTRACT

Acute kidney injury (AKI) following cardiac surgery occurs in 1 to 10% of patients. Patients who develop AKI have higher post operative mortality rates, than without it. This study was conducted to determine the frequency of acute kidney injury after coronary artery bypass grafting (CABG) and to find possible risks factors. We analyzed the data of 300 consecutive patients who survived the first 24 hours after open heart surgery as this is the minimum time to evaluate post-operative renal function, their morbidity, mortality and the main contributing risk factors, from September 2011 to June 2012. Adult patients who were scheduled for cardiac valve replacement surgery, coronary artery bypass grafting or both, with or without cardiopulmonary bypass (CPB) were included. Of the 300 consecutive patients, 36 (12 %) patients developed acute kidney injury (serum creatinine >1.5 mg/dl). Our analysis revealed that special considerations should be given to elderly with diabetes and hypertension when managing post cardiac surgery AKI.

Keywords: Acute renal failure, CABG, CPB, Serum creatinine

INTRODUCTION

Postoperative acute kidney injury (AKI) is a well-known complication of cardiac surgery (1). The incidence varies between 5 and 31% (2-9). AKI requiring dialysis, after open heart surgery, develops in 1-5% of patients and is strongly associated with postoperative morbidity and mortality (10). Patients who develop AKI have higher rates of mortality and resource utilization, with the worst values seen in dialyzed patients. Emerging evidence suggests that even small changes in creatinine after cardiac surgery are associated with significant effects on mortality (11). The aetiology of renal insufficiency following cardiac surgery is poorly understood, but it is believed that ischemic injury of the kidney, resulting from inadequate perfusion, as the major factor, although renal injury by exotoxins (e.g. antibiotics, anaesthetic agents, contrast media, diuretics) and endotoxins (e.g. myoglobin) may also be involved (12). This study was undertaken to evaluate the proportion of patients developing postoperative AKI, their mortality and morbidity with a view to aid in subsequent patient management.

MATERIALS AND METHODS

Patients

Between September 2011 to June 2012, 300 consecutive patients who underwent cardiac surgery in a single institute were retrospectively reviewed. The patients' age ranged from 52 to 76 years. We evaluated preoperative patient characteristics, operation-related variables, and postoperative outcome. Preoperative patient characteristics that were analyzed as predictive factors included common cardiovascular risk factors such as systemic hypertension, hyperlipidemia, diabetes mellitus, and family history of coronary artery disease as well as other co-morbidities including peripheral vascular or cerebrovascular disease, pulmonary disease, and arrhythmias. Furthermore, the past medical history was documented including previous cerebrovascular accident, previous cardiac interventions, and history of myocardial infarction or congestive heart failure. Operation-related variables included status and type of surgery and duration of aortic cross clamping and extracorporeal circulation as well as use of blood products. Preoperative mortality was defined as any death occurring within the first 30 days after surgery or within the time of hospitalization after surgery.

METHODS

We included adult patients (> 18 yr) who were scheduled for cardiac valvular surgery, coronary artery bypass grafting (CABG) or both,

with or without cardiopulmonary bypass (CPB). The following interventions were not included: transplant surgery, scheduled insertion of a cardiac assist device, operation on the descending aorta, thrombo endarterectomy of the pulmonary arteries, and congenital heart disease. Baseline variables included age, sex, ventricular dysfunction assessed by echocardiography. For the purposes of this analysis, AKI defined as a rise of more than 50% above baseline in serum creatinine on the postoperative day 3 or 5.

RESULTS

During the period of study, 300 patients included in this analysis underwent coronary artery bypass surgery and AKI developed in 36 patients (12%) undergoing CABG. Table 1 displays the clinical characteristics of patients. The serum creatinine levels have risen from post operative day one onwards (Table 2). It normalized within a week time without any dialysis support. The majority of the AKI developed in patients who are elderly (92 %), who had triple vessel disease (86 %) (Table 3), with hypertension & diabetes 80.5 % (29 patients with diabetes and hypertension out of 36).

TABLE 1: PATIENTS CHARACTERISTICS.

Parameters	
Age years	61.7 ± 6.59
Height cm	162.63 ± 7.89
Weight kg	61.6 ± 9.052
Hypertension (% of Patients)	270 (90 %)
Hemoglobin gm %	12.07 ± 2.82
Sugar mg/dl	198.9 ± 99.34
Urea mg/dl	33.3 ± 13.61
Creatinine mg/dl	1.2 ± 0.26
T. Protein mg/dl	6.95 ± 0.80
Albumin mg/dl	3.71 ± 0.54
Globulin mg/dl	3.27 ± 0.53
Total Cholesterol mg/dl	188.33 ± 45.21
Triglycerides mg/dl	198.88 ± 94
HDL mg/dl	38.88 ± 6.19
LDL mg/dl	101.8 ± 41.6
Ejection fraction %	58.72 ± 12.69
Types of vessel disease	258
Triple	25
Two Single	17

TABLE 2: DEVELOPMENT OF AKI REFERENCE WITH CREATININE LEVELS AT VARIOUS DAYS

Parameters	Day 1	Day 2	Day 3	Day 4	Day 5	At the time of Discharge
Creatinine mg/dl	1.67 ± 0.43	2.21 ± 0.51	3.16 ± 0.58	2.64 ± 0.85	1.92 ± 0.33	1.33 ± 0.33

TABLE 3: DETAILS OF VESSEL DISEASES

Types of Vessel Disease	Over all(N = 300)	AKI Development(N=36)
Single	17	02
Two Vessel	25	03
Triple Vessel	258	31

DISCUSSION

Post cardiac surgery acute kidney injury remains a leading cause of morbidity, mortality, prolonged hospital stay and increased hospital costs (13). Most of the previously reported studies have focused on predicting renal failure in patients with impaired renal function preoperatively as either mild moderate or moderate-severe (14,15). In this study, we have attempted to correlate and predict factors predisposing to AKI with preoperatively normal renal function. By doing so, one might be able to predict those with high risk and interventional measures might be planned ahead to improve outcome following such a complication (16). In patients undergoing CABG on cardiopulmonary bypass, the incidence of renal dysfunction (manifest as a postoperative increase in serum creatinine) varies between 1 and 15% (17-20). Similar results were found in the present study also (12 %). Age is still controversial risk factor; a number of studies reported that AKI is likely to develop more commonly in older patients (21), but some other studies did not confirm it (22). The present study revealed that AKI developed in older age patients. Effect of diabetes on post cardiac surgery AKI has been notorious. In the present study diabetic patients had higher incidence of postoperative AKI. Presence of hypertension does not seem to incur increased risk (23). But in our present study, hypertension has also one among the contributing factor for development of ARF.

In conclusion, older age, diabetes and hypertension are the identified some of the risk factors predisposing patients with normal preoperative renal function undergoing cardiac surgery to the risk of developing AKI. The findings of our study suggest the need for additional evaluation of these patients in order to understand the pathophysiology of the renal impairment and the design of renal protection strategies.

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