Original Article

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TRENDS OF SERUM CREATININE LEVELS IN POST-OPERATIVE CORONARY ARTERIAL BYPASS GRAFT (CABG) PATIENTS; A CROSS SECTIONAL STUDY AT AFIC/NIHD RAWALPINDI

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ABSTRACT

Objective: To assess levels of serum creatinine pre and post operatively in CABG patients.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: This study was conducted at AFIC / NIHD Rawalpindi from June 2014 to Dec 2014.

Material and Methods: Retrospective data of Forty three consecutive patients between age group of 25-70 years, who had undergone CABG surgery in AFIC were enrolled in this study for investigation of serum creatinine levels. To asses trends of Serum creatinine levels, serum creatinine values were taken both preoperatively and post-operatively after every 24 hrs, 48 hrs, 72 hrs, 96 hrs.

Results: A general trend of rise in serum creatinine is observed in post CABG patients with every 0.1 unit rise in every 24 hours. Similarly a fall in GFR is also seen in all post CABG patients.

Conclusion: Serum levels of creatinine are found raised in post CABG patients with a fall in glomerular filtration rate (GFR).

Keywords: Creatinine levels, Coronary arterial bypass graft (CABG), Post-operative.

INTRODUCTION

Coronary artery bypass graft has become the most commonly performed surgery in the world[1]. Coronary artery bypass surgery, like other surgeries is associated with many other complications. The major complications connected with CABG are death, myocardial infarction, stroke, wound infection, prolonged requirement for mechanical ventilation, renal dysfunction, and bleeding requiring transfusion or reoperation[2-5].

There isn't a good relationship between serum creatinine and glomerular filtration rate. At the point that the level of serum creatinine goes up, the glomerular filtration rate is reduced by as much as half[6].

One of these complications is renal dysfunction. Present study will evaluate trends of serum creatinine levels in post CABG patients by measuring pre and post operative values of creatinine in serum. This study will be conducted on 150 patients. Data will be collected retrospectively and by using serum creatinine, GFR will be measured for each patient both pre and post operatively.

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MATERIALS AND METHODS

So far, data of forty three consecutive patients who underwent CABG between the months of June 2014 to December 2014 have been retrospectively enrolled in this study. This is to notify that it is an on-going type of study and only preliminary results are being shared at present time. Patients of both genders and all age groups were considered, except for those Patients with previous nephroctomy, severe renal insufficiency with SCr 2.26 mg / dl were excluded from this study. Methodology of this study has been approved by Institutional Review Board of AFIC / NIHD for administrative and ethical issues. All patients were operated using standard median sternotomy, cardiopulmonary bypass and cardioplegia. All patients underwent CABG in moderate hypothermia upto 32°C and perfusion pressure was kept between 60 and 70 mmHg.

We assessed early postoperative mortality and outcomes in all patients. Variables were analyzed by using descriptive statistics including hypertension, diabetes, ejection fraction, cardiopulmonary bypass time, cross clamp time, preop urea levels and post op high

urea levels, reventilation and tracheostomy. Outcomes included operative mortality and 30-day mortality, mechanical ventilation, and ICU stay.

Statistical analysis

The data were entered in IBM SPSS Statistics software (version 19). Continuous data expressed as median and mean along with standard deviation values. Proportions expressed as percentages with confidence intervals of 95%. Paired t-test was applied to compare means of creatinine and GFR in males and females.

RESULTS

Out of 43 patients, there were 39 (90.7%) males and 4 (9.3%) females. Average age was calculated to be 44.26 ± 14.85 years. The study sample comprised of 5% of diabetic patients, 40% hypertensive patients and slightly reduced left ventricular ejection fraction (>55 %) was observed in 40% (2 males) of the patients while <30 EF was found in 16 % of study population. The demographic and electrocardiographic characteristics are summarized in table-1.

A rise of 0.1 in serum creatinine values is observed in all patients after every 24 hours. So a general trend of rise in serum creatinine is observed in post CABG patients. Measured and calculated values of serum creatinine and GFR are given in Fig-1,2 .

Paired t-test was applied to compare means of serum creatinine in males and females both pre and post operatively. Statistical results of this test were found significantly different with a *p*-values greater then $p = 0.05$.

With the help of serum creatinine, GFR is calculated for each and every patient using Cockcroft-Gault formula[6]. Similarly a fall in GFR is observed in all patients. Clinical and calculated values of GFR.

Paired t-test was applied to Compare means of GFR in males and females both pre and post operatively. Statistical results of this test were found significantly different with a *p*-values greater then $p = 0.05$.

DISCUSSION

Slightly high preoperative Cr level without

Table-1: Demographics, Pre and post operative characteristics of patients (n = 43).

Charactristics	Values
Gender	
Males (%)	90.7%(39)
Females (%)	9.3%(4)
Age (years)	59±11 years
Weight (kg)	73±13 kg
Height (cm)	166±7 cm
BMI	1.9±0.15
Diabetic (%)	5%(10)
Hypertensive (%)	40%(26)
Smoking (%)	35%(15)
LVEF	
<30	16%
(31-45%)	21%
(46-55%)	23%
(55+)	40%
CPB time (mean ± SD)	125±61 min
x-clamp time (mean ± SD)	69±34min
Preop urea(mean ± SD)	37±23
Post-op high urea (mean ± SD)	67±39
Reventilation (%)	9%(4)
Ventilation (mean ± SD)	13±10
Tracheostomy (%)	12%(5)
Post op Furosemide infusion (%)	26%(11)
ICU stay hrs	96±48 hrs
Outcome	
Dead	16.3%(7)

Table 2: Clinical values of serum creatinine levels in study subjects (n=43).

Preop serum creatinine level	
Mean ± SD	1.12 ± 0.38
S creatinine after 24 hours	
Mean ± SD	1.13 ± 0.24
S creatinine after 48 hours	
Mean ± SD	1.28 ± 0.34
S creatinine after 72 hours	
Mean ± SD	1.41 ± 0.48
S creatinine after 96 hours	
Mean ± SD	1.5 ± 0.68

Normal values of S creatinine men=0.5-1.2 mg/dl, normal values of s creatinine for women=0.5-1.1 mg/dl

renal failure was common among patients underwent CABG in our study (n=43). The

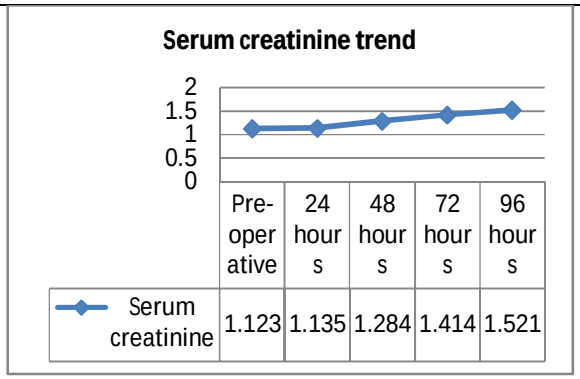

Figure-1: Trend of rise of serum creatinine in post-CABG patients.

A trend of rise in serum creatinine and a fall in GFR is observed in study population

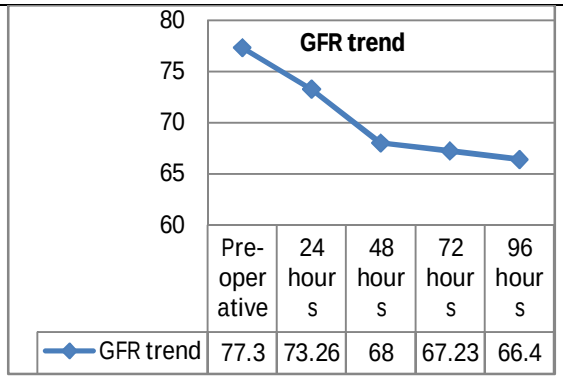

Figure-2: Trend of decrease in GFR in post-CABG patients.

incidence of patients with impaired renal function among the CABG candidates is increasing due to rising prevalence of diabetes, hypertension, smoking and congestive heart failure[7].

Previous studies have shown that preoperative mild renal failure has significant impact on early and late outcomes in patients undergoing CABG surgery[8-11].

Measurement of serum Cr is readily available and is a sensitive indicator for renal impairment. However, serum Cr level does not assess renal failure due to age and gender and other issues. Previous studies showed that patients with preoperative renal failure have higher mortality compared with patients with normal renal function[12-13].

In our study CPB time, prolonged ICU stay, prolonged mechanical ventilation, were more common in study population. LVEF was also lower in patients with higher Cr levels. We assume that impaired cardiac function may predispose patients to renal dysfunction and increase in preoperative serum Cr level. Patients with mild renal impairment and elevated serum Cr level have a much higher incidence of hypertension as risk factor and may have an impact on renal function and increase in the likelihood of late renal failure.

with every 24 hours and it is related with severe morbidity and mortality. Mild renal dysfunction is an important predictor of outcome in terms of in-hospital mortality, morbidity, and survival in patients undergoing CABG[14].

Conflict of Interest

This study has no conflict of interest to declare by any author.

REFERENCES

1. Coronary artery bypass surgery. http://www.sciencedirect.com/science/article/pii/S1357303914001868?np=y
2. Estafanous FG, Loop FD, Higgins TL. Increased risk and decreased morbidity of coronary artery bypass grafting between 1986 and 1994. Ann Thorac Surg 1998; 65:383.
3. Hammermeister KE, Burchfiel C, Johnson R, Grover FL. Identification of patients at greatest risk for developing major complications at cardiac surgery. Circulation 1990; 82:380.
4. Magovern JA, Sakert T, Magovern GJ. A model that predicts morbidity and mortality after coronary artery bypass graft surgery. J Am Coll Cardiol 1996; 28:1147.
5. Fortescue EB, Kahn K, Bates DW. Development and validation of a clinical prediction rule for major adverse outcomes in coronary bypass grafting. Am J Cardiol 2001; 88:1251.
6. Serum creatinine overview. http://health.howstuffworks.com/human-body/systems/circulatory/serum-creatinine.htm.
7. Renal function. http://en.wikipedia.org/wiki/Renal_function.
8. Jyralaa A, Weissb RE, Jeffriesb RA, Kaya GL. Effect of mild renal dysfunction (s-crea 1.2–2.2 mg/dl) on presentation characteristics and short- and long-term outcomes of on-pump cardiac surgery patients. Interact CardioVasc Thorac Surg 2010;10:777-82.
9. Simon C, Luciani R, Capuano F, Miceli A, Roscitano A,Tonelli E, Sinatra R. Mild and moderate renal dysfunction:impact on short-term outcome. Eur J Cardiothorac Surg 2007;32(2):286-90.
10. Zakeri R, Freemantle N, Barnett V, Lipkin GW, Bonser RS, Graham TR, Rooney SJ, Wilson IC, Cramb R, Keogh BE, Pagano D. Relation between mild renal dysfunction and outcomes after coronary artery bypass grafting. Circulation 2005;112(9):I270-5.
11. Filsoufi F, Rahmanian PB, Castillo JG, Chikwe J, Carpentier A, Adams DH. Early and late outcomes of cardiac surgery in patients with moderate to severe preoperative renal dysfunction without dialysis. Interact Cardiovasc Thorac Surg 2008;7(1):90-5.

12. Cooper WA, O'Brien SM, Thourani VH, Guyton RA, Bridges CR, Szczech LA, Petersen R, Peterson ED. Impact of renal dysfunction on outcomes of coronary artery bypass surgery: results from the Society of Thoracic Surgeons National Adult Cardiac Database. Circulation 2006;113(8):1063-70.
13. Howell NJ, Keogh BE, Bonser RS, Graham TR, Mascaro J, Rooney SJ, Wilson IC, Pagano D. Mild renal dysfunction predicts in-hospital mortality and postdischarge survival following cardiac surgery. Eur J Cardiothorac Surg 2008;34(2):390-5.
14. Zakeri R, Freemantle N, Barnett V, Lipkin WG, Bonser R, Graham TR, Stephen J. Rooney, Ian C. Wilson, Cramb R, E. Keogh B, Pagano D. Surgery for Coronary Artery Disease Relation Between Mild Renal Dysfunction and Outcomes After Coronary Artery Bypass Grafting. Circulation. 2005; 112: 270-5.