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CORONARY ARTERY BYPASS SURGERY IN ACUTE CORONARY SYNDROME: SINGLE CENTRE ANALYSIS

Radiodiagnosis

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ABSTRACT

BACKGROUND: Emergency coronary artery bypass surgery is a high risk procedure and we aimed to evaluate its results, morbidity and mortality in this single centered retrospective analysis.

METHODS: One hundred eighty two patients who underwent coronary artery bypass surgery in a setting of ACS during 2008-2009 were analyzed retrospectively. 74 patients underwent emergency CABG while remaining 108 patients had elective procedure. Patients who underwent emergency CABG only were considered for analysis. All patients were followed for 30 days after surgery, both clinically and echocardiographically.

Results: 62 male and 12 female patients were taken up for the emergency CABG. 52% patients were in cardiogenic shock. IABP support was required in 39 (52.7%) patients. One patient was managed on ECMO. Mortality rate was 27% in cardiogenic shock sub group. No mortality was observed in patients without cardiogenic shock. Incidence of ARF requiring dialysis was 9.45% in shock subgroup. Mean ejection fraction on follow up was 48.5 + 10.11 %. Re-exploration was conducted in 8/74 (10.8%) patients. Length of hospital stay was 11.4 +4.96 days.

Conclusion: Emergency CABG in patients presented with cardiogenic shock increases the risk of morbidity and mortality as compared to stable patients.

KEYWORDS

INTRODUCTION:

Acute coronary syndrome (ACS) occurs due to reduced blood flow in the coronary arteries which leads to myocardial ischemia. It can present with ST-elevation myocardial infarction (STEMI), non ST-elevation myocardial infarction (NSTEMI) or unstable angina.[1,2] Treatment includes percutaneous coronary intervention, thrombolysis and surgical revascularization.[3] Surgical modality offers a survival advantage in cases of unstable angina and left ventricular (LV) dysfunction.[4] Literature suggests that surgical treatment is beneficial in triple vessel disease and reduces the risk of myocardial infarction (MI), stroke and all cause mortality compared to PCI with drug-eluting stents.[5,6]

According to the Society of Thoracic Surgeons (STS), urgent CABG is performed to minimize the further chance of myocardial ischemic damage and resultant congestive heart failure. This study evaluated clinical characteristics and outcome of patients presented with ACS who underwent CABG.

METHODS:

Hospital database was searched and patients who underwent CABG in a setting of ACS during 2008-09 period were analyzed. Total 74 patients were studied. These patients were classified into two categories viz. those who presented with cardiogenic shock and others with acute MI without shock. After primary stabilization and standard treatment with nitroglycerine, aspirin, beta blockers; all were subjected to coronary angiography. Those who persisted with ongoing ischemia, triple vessel disease, left main coronary involvement were treated with emergency CABG. Patients with cardiogenic shock who had unsuitable coronary anatomy and contraindication for PCI also underwent CABG. Mechanical circulatory support (MCS) in the form of Intra- aortic balloon pump and ECMO was instituted whenever needed. Patients were by default underwent surgery under influence of aspirin and clopidogrel. Informed consent was obtained from all patients. General anesthesia was instituted with standard narcotic induction; Inj. fentanyl 10-20 mcg/kg, titrated doses of etomidate, midazolam 0.1 mg/kg and vecuronium 0.1mg/kg. Surgical technique included left internal mammary artery to Left anterior coronary artery and saphenous vein grafts to braches of circumflex and right coronary arteries. All patients were operated initially with off pump CABG. Patients with refractory arrhythmia, dilated left ventricle with poor ejection fraction less than 20 % were proceeded with OPCAB with IABP in situ. Titrated dose of Heparin upto2 mg /kg was given to maintain ACT 300-350 seconds which was neutralized by protamine at the end of surgery. Packed RBC transfusion was given to maintain Hb> 10 gm%. Fresh frozen plasma (FFP) was transfused in case of diffuse bleeding with INR > 1.5. Platelets were transfused to keep > 100000/mm^3. Surgical re-exploration criteria included chest tube drainage > 400 mL/h in the first 2 postoperative hours or >200 mL/h for 4 consecutive hours.

Patients were analyzed for all cause mortality, incidence of MCS requirement, incidence of re-exploration, complications such as acute renal failure requiring dialysis, bleeding and stroke.

RESULTS:

Total 74 patients were analyzed. Male predominance was observed with 62 (83.7%) male and 12 (16.3%) female patients. Clinical characteristic of patients is highlighted in table 1. Mean APACHE score 11.75 $\pm$ 6.34. 39 (52%) patients presented with cardiogenic shock. Mean left ventricular ejection fraction was 48.56 $\pm$ 10.11 %. Mean intra-operative blood loss was 882 $\pm$ 225.5 ml. Total postoperative chest drainage was 521$\pm$126.56 ml. Thirty five patients (47.29%) required packed RBC transfusion while 41 (57.7%) needed FFP transfusion. Twenty two (29.7%) required platelets transfusion. Twenty (27%) patients died and all were in the cardiogenic shock subgroup. Seven (9.45%) patients needed dialysis. We did not encounter any peri-operative stroke. 39 (52.7%) required intra-aortic balloon pump (IABP) and one was put on ECMO as it was available at the end of 2009 year. 9 patients were converted onto cardio pulmonary bypass intraoperatively. Eight patients were taken up for re-exploration. Mean hospital stay was 11.43 $\pm$ 4.96 days.

TABLE 1. Characteristics And Outcomes Of Patients

Parameter	Mean $\pm$ SD
Age	60.9 $\pm$ 7.96
Sex	62 males 12 females
HTN	25 (33.78%)
DM	40 (54.05%)
Both DM & HTN	23 (31.08%)
STEMI	44 (59.45%)
NSTEMI	19 (25.67%)
Left main	13 (17.56%)
TVD	46 (62.16%)
Left main equivalent	9 (12.16%)
Ongoing angina	12 (16.2%)
Ejection fraction (%)	37.28 $\pm$ 10.37
APACHE score	11.75 $\pm$ 6.38
Cardiogenic shock	39 (52.7%)

TABLE 2. Complications and outcome

Parameters	n
IABP requirement	39 (52.7%)
ECMO	1
Dialysis	7
Stroke	0
Blood loss	882 ± 225.5 ml
Chest tube drains	521±126.56 ml
PRBC transfusion	35 (47.29%)
FFP transfusion	41 (57.7%)
Platelet transfusion	22 (29.7%)
Re-exploration	8 (10.8%)
Length of hospital stay	11.43 ± 4.96 days
Follow up EF	48.56 ± 10.11
Mortality	20 (27%)

TABLE 3 : Subgroup comparison

Parameter	ACS with Cardiogenic shock group (n= 39)	ACS without shock group (n=35)	P value
Age	60 7.59	60.9 8.34	-
Sex	31 MALE 8 FEMALE	31 MALE 4 FEMALE	-
APACHE score	15.41 6.41	7.68 3.04	<0.01
Intraop blood loss	1035.9 136.66	712.3 178.5	0.1
Post op chest tube drain	580.5 129.59	455.7 84.68	0.01
Mechanical support	30 IABP 1 ECMO	0	0.01
CPB conversion	7	2	0.1
ARF requiring dialysis	7	0	0.01
Stroke	0	0	-
Re-exploration	5	3	0.58
Blood product transfusion	34	18	0.01
Mortality	20	0	-
Length of hospital stay	11.79 6.08	11.03 3.29	0.2

DISCUSSION:

Emergency CABG is indicated for patients with left main coronary stenosis, triple vessel disease, a history of failed PCI or an anatomy unsuitable for PCI, ongoing ischemia despite maximal nonsurgical therapy, angiographic accident, or cardiogenic shock with unsuitability for PCI.[3] Present study analyzed the outcome of urgent CABG in ACS patients. This study has a potential to add valuable evidence to the existing literature on emergency CABG. This study is unique in its sub group analysis in which it compared patients with cardiogenic shock and those without shock. Salient finding of this study is increased mortality in shock subgroup. We found 27% mortality overall while it increased to near 50% in shock subgroup. None of the patient in without shock subgroup died. Rastan and colleagues, reported 20% mortality in patients with ACS.[3] Similar retrospective study reported in-hospital mortality rate of 12.2% along with prolonged postoperative intensive-care-unit, mechanical ventilation, and length of hospital stay.[7] Recent study found 8.7% mortality in their 10 year analysis.[8]

Overall all cause mortality in these patient ranges from 6-20%.[9] Our high mortality can be attributed to higher number of cardiogenic shock patients and unavailability of ECMO facility during the study period.

Refractory cardiogenic shock was present in 52.7% patients with ACS. According to STS variables, emergency CABG carries 8.1% mortality and depends upon co-morbidities and indications for revascularization.[10]

Proportion of male patients in our study is higher in contrast to other study.[8] However, females exhibit atypical clinical picture of ACS, which can delay diagnosis and surgical intervention is often necessary in those patients.[11,12] Glaser et al. conducted a prospective study to assess whether gender affects the outcomes of early invasive management.

However, their results showed no significant difference between both genders in terms of mortality and MI rates at six months.[13]

These patients by default were put on antiplatelet drugs and so, they present unique challenge in the peri-operative period. Avoiding cardiopulmonary bypass is one of the strategies to minimize further blood loss. We therefore operated these patients with off pump CABG as a first choice. OPCAB also requires reduced heparinization which can prevent blood loss further. All these resulted in increased usage of blood products transfusion intra-operatively. We found higher use of plasma transfusion in this subset of patients. Particularly, those patients with cardiogenic shock required significant blood transfusion. This may contribute to increased rate of re-exploration in these patients.

ACS patients are critically ill and often require IABP support to the failing heart. In this study, 52% patients required IABP support. One patient was managed on ECMO when it was made available in the center. Literature suggests 12.6% mortality in patients supported with preoperative IABP.[14]

Acute renal failure is common in patients with cardiogenic shock. IABP by virtue of its ability to increase cardiac output; can mitigate incidence of AKI. We found significant difference in the incidence of AKI requiring dialysis in the postoperative period in patients with shock. Overall, all cause mortality tend to increase in ACS patients especially those who presented with a shock. Correct patient selection and the timing of surgery are essential to reduce death from emergency CABG. Lazar et al reported respiratory insufficiency, atrial fibrillation, infection, stroke, and MI as common causes of prolonged hospital stay.[15] One study showed similar results of emergency, urgent and elective surgical revascularization after MI.[16] DANAMI trial concluded beneficial effect of CABG after MI in reducing recurrent infarction and unstable angina in post-MI patients with inducible ischemia.[17] Similar meta-analysis proved mortality benefit in the early invasive group than the conservative group.[18]

Our study is limited by its retrospective nature and a single institution data. We also did not compare our results with the control group who underwent elective surgeries. This study reinforces the finding of increased complications and all cause mortality in ACS patients undergoing CABG.

CONCLUSION:

Urgent CABG in ACS patients with cardiogenic shock increases peri-operative mortality and morbidity.

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