



A Cross Sectional Study of Short Term Mortality Assessment of on Pump and Off Pump Cabg Groups with Left Main Coronary Artery Disease

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Abstract

Background: *The main aim of the study is to investigate the prevalence of different risk factors, angiographic patterns undergoing cabg, the within 30 day mortality among cabg groups with left main coronary artery disease incidences and correlating them between on pump cabg group and off pump cabg group*

Methods: *The present study is a retrospective cross sectional observational study with data from may 2016 to December 2021 undertaken in government general hospital Kurnool. The data considered includes the age, risk factors, echo reports, angiographic data, surgery details and post surgery status. Out of 108 CABG procedures done a total of 20 patients with LM disease were taken of which 10 on pump cabg group patients and 10 off pump cabg group patients were present eligible as per inclusion criteria and exclusion criteria*

Results: *The mean age of patients was 56.21 ± 10.2 years with maximum age of 85 years and minimum age of 35 years. The distribution of male population was male 17 (83.3%) and female population was 3 (16.7%) The persons with smoking as risk factor are 11(55.6%), alcohol as 6 (33.3%), diabetes as 5 (25.9%), hypertension as 4 (17.6%). Some of them have more than one risk factors. The mean ejection fraction of the patients were 43.66 ± 6.2 with highest ejection fraction noted was 63 and lowest was 30. The patients with left main coronary artery disease with single vessel disease are 3 (15%), double vessel disease are 13 (65%), triple vessel disease are 4 (20%). Of the 10 patients undergone on pump cabg 6 patients (60%) of patients died and of the 10 patients undergone off pump cabg 2 (20%) died*

Conclusion: *The patients with left main involvement with other vessels had higher mortality among on pump group in addition with triple vessel diseases. Smoking and alcohol and higher age are more contributing for mortality in on pump and off pump group more in on pump group.*

Introduction

Coronary artery bypass graft surgery (CABG) has become recognized as one of the principle therapies to prolong survival and improve the quality of life of patients suffering from coronary artery disease (CAD)⁽¹⁾

There are two basic ways of performing CABG: On pump CABG and off pump CABG. They both begin with the surgeon harvesting blood vessels from the leg, chest or the arm. The surgeon gains access to the heart using midline sternotomy.

In on-pump CABG the heart is stopped with the body's blood supply being maintained by the cardiopulmonary bypass (CPB) machine. While the heart is stopped the surgeon performs the graft procedure by sewing one end of a section of a blood vessel over a tiny opening made in the aorta and the other end over a tiny opening made in the blocked coronary vessel, distal to its blockage. With the grafting complete, the body is removed from the cardiopulmonary bypass machine and the heart is restarted⁽¹⁾

In off-pump CABG, the area around the blocked coronary artery is stabilized while the surgeon grafts the blood vessel on the pumping heart. Off pump CABG is relatively a newer procedure to On-pump CABG and doesn't require the use of the cardiopulmonary bypass machine⁽¹⁾

Many studies—observational and randomized controlled trials (RCTs)— have compared outcomes after off- and on pump CABG, with results ranging from equivalent outcomes to favoring off-pump or on-pump CABG⁽⁴⁾. The present study is an effort to compare on pump vs off pump short term outcomes among different sub groups

Methods

The present study is a retrospective cross sectional observational study with data from May 2016 to December 2021 undertaken in government general hospital Kurnool. The data considered includes the age, risk factors, echo reports, angiographic data, surgery details and post surgery status. Out of 108 CABG procedures done a total of 20

patients with LM disease were taken of which 10 on pump cabg group patients and 10 off pump cabg group patients were present eligible as per inclusion criteria and exclusion criteria

Inclusion criteria

- Age >20 years
- Patients angiographically established coronary artery disease with left main involvement

Exclusion criteria

- Age < 20 years
- Without left main involvement Pregnant women
- Mentally incompetent person
- With previous coronary artery diseases and treated

Data analysis

Data analysed using statistical package SPSS from IBM

Observation and Results

The study included total 109 patients undergone coronary artery bypass grafting. Of these patients 20 patients had left main involvement. The patients who were undergone on pump cabg surgery were 10 (50%) and patients who were undergone off pump cabg were 72(50 %). (figure 1)

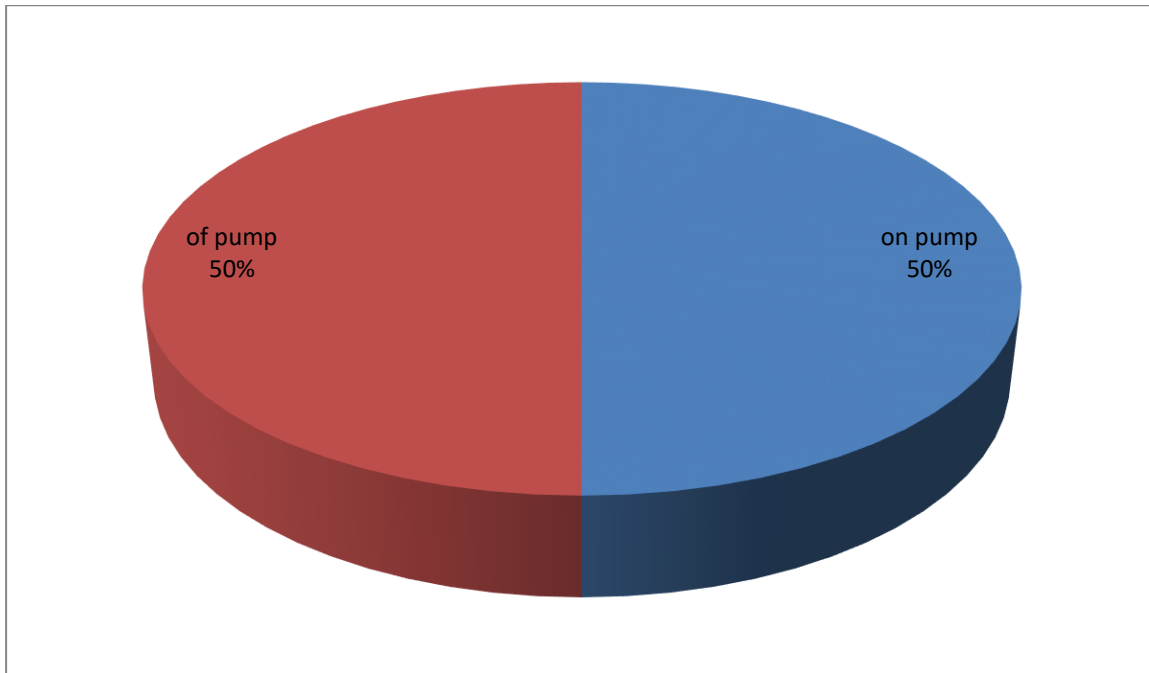


Figure 1 Distribution of number of on pump and off pump

The mean age of patients was 56.21 ± 10.2 years with maximum age of 85 years and minimum age of 35 years. The persons belonging to the age group of 30-39 years 2 (10.1%) , 40 to 49 years

3 (15.6%), 50 to 59 years 6 (29.4%) , 60 to 69 years 8 (40.4%), 70 to 79 years 1 (3.6%), (figure 2)

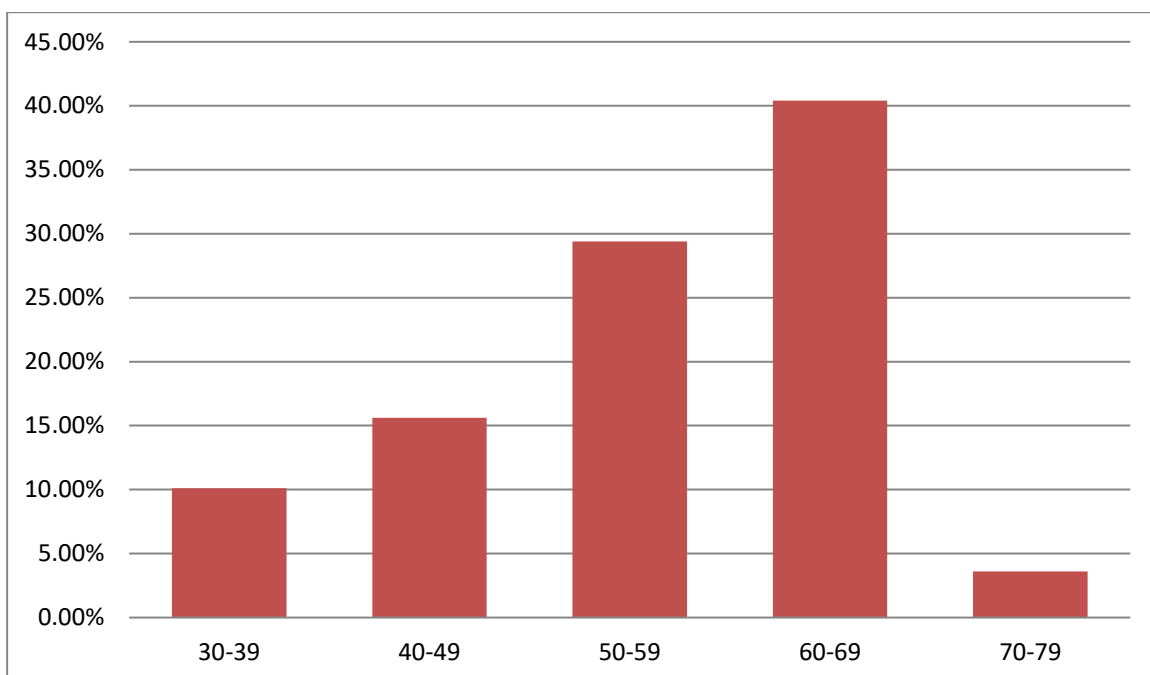


Figure 2 Distribution of different age groups

Gender

The distribution of male population was male 17 (83.3%) and female population was 3 (16.7%) (figure 3)

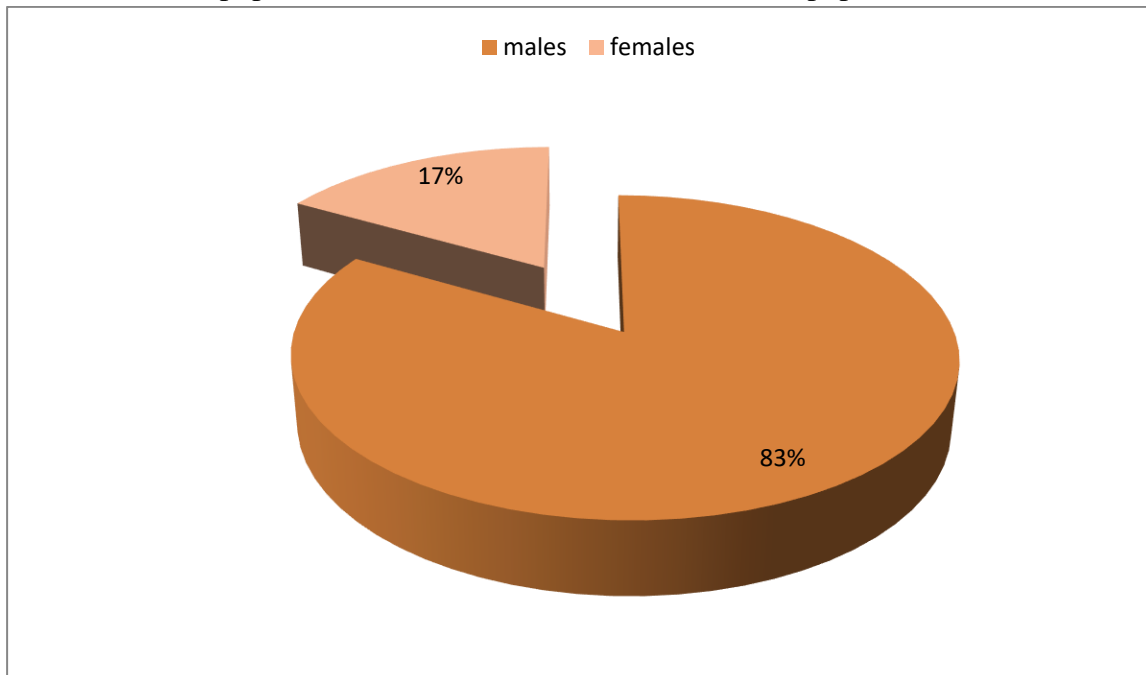


Figure 3 Distribution of gender

Risk Factors

The persons with smoking as risk factor are 11(55.6%), alcohol as 6 (33.3%),

diabetes as 5 (25.9 %), hypertension as 4 (17.6%)
Some of them have more than one risk factors (Figure 4)

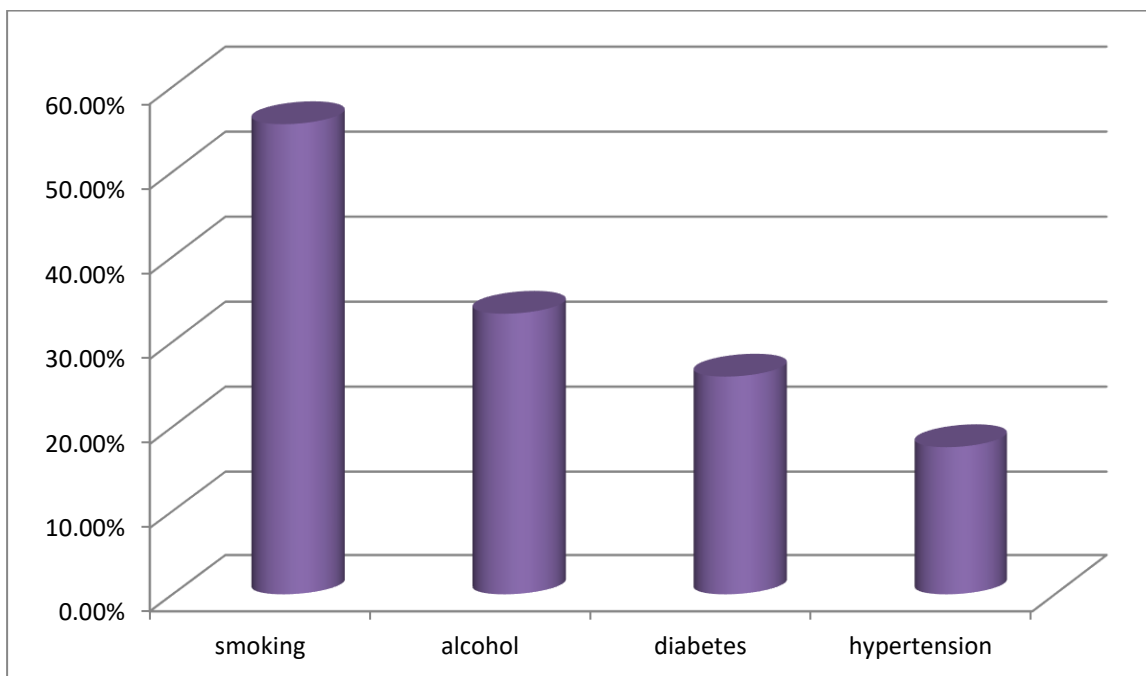


Figure 4 Distribution of risk factors

Coronary Angiogram Results

The patients with left main coronary artery disease with single vessel disease are 3 (15%), double

vessel disease are 13 (65%), triple vessel disease are 4 (20%). (Figure 5)

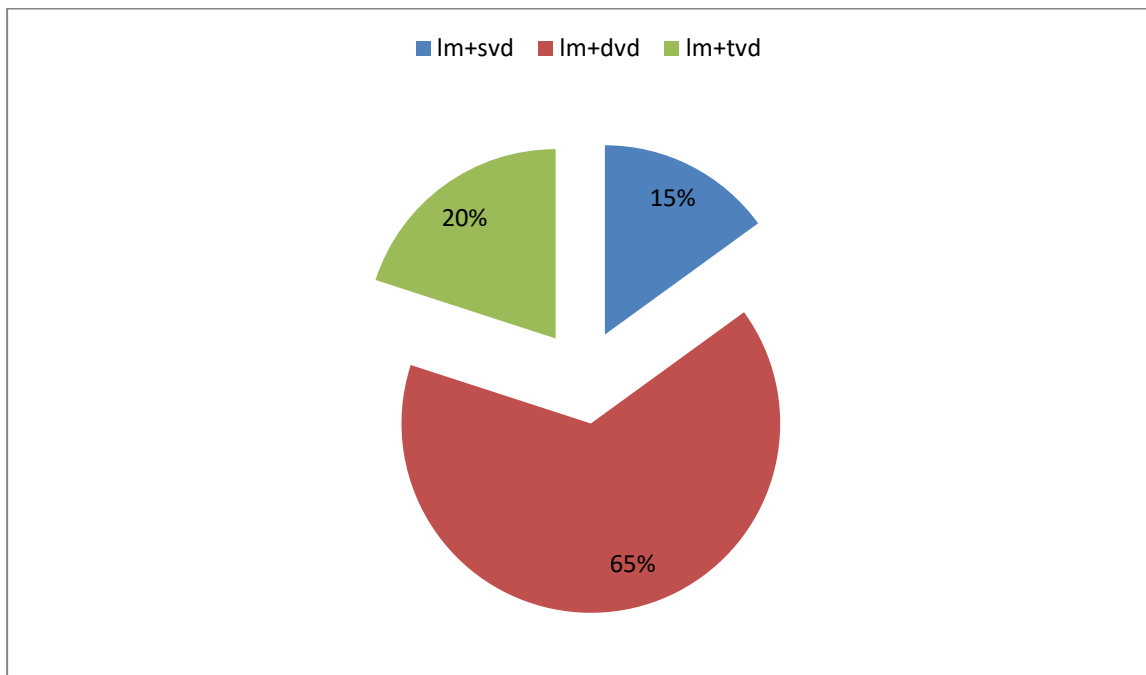


Figure 5 Distribution of coronary angiogram results

Ejection Fraction (EF)

The mean ejection fraction of the patients were 43.66 ± 6.2 with highest ejection fraction noted was 63 and lowest was 30. Patients with EF in

the range of > 50 are 3 (12.9%), 41- 50 11 (51.9%) , 31- 40 6 (33.4%), <30 1 cases (1.8%) (figure 6)

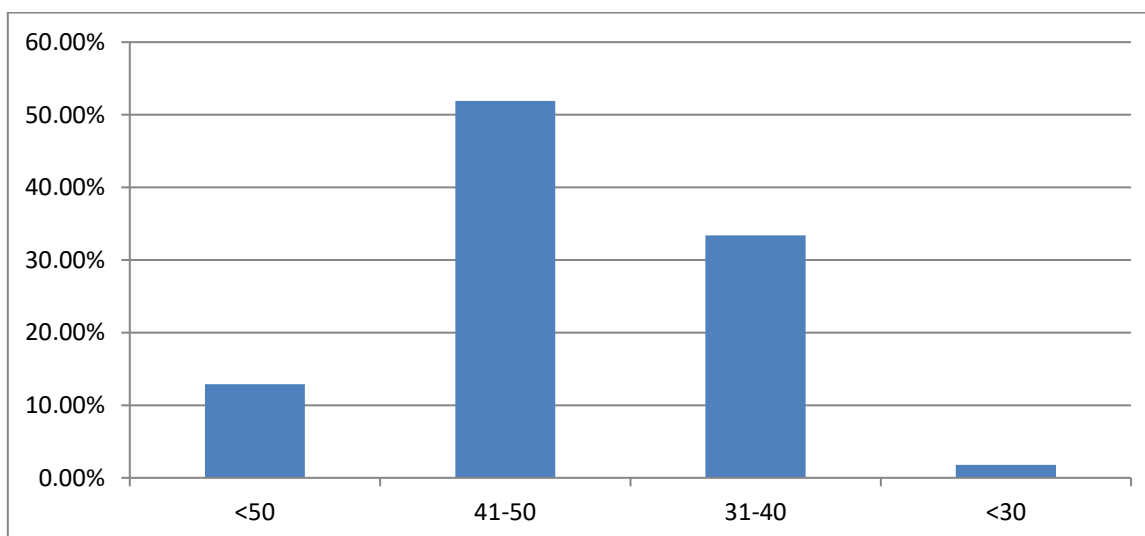
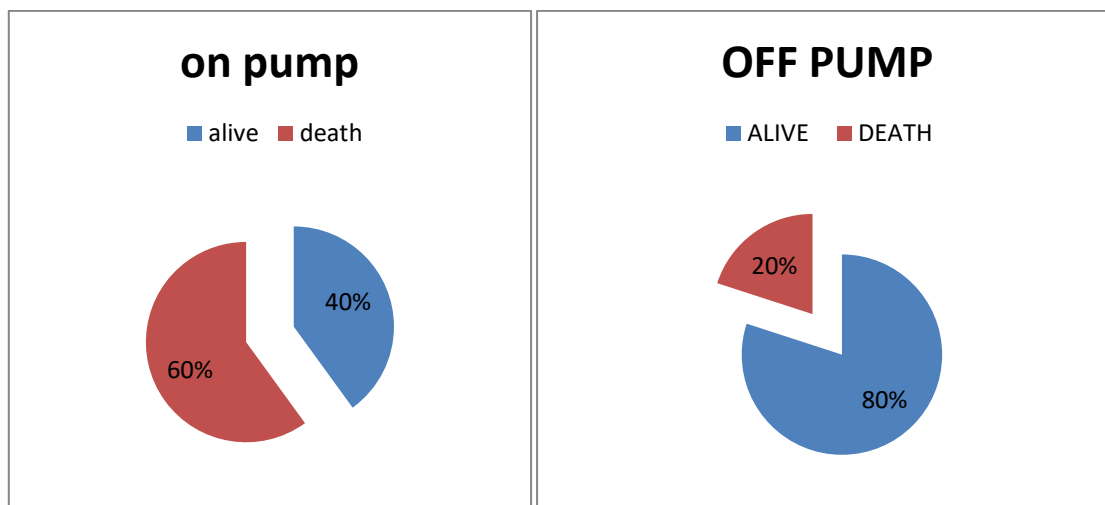


Figure 6 Distribution of different groups of ejection fractions

Comparison of Mortality of patients among on Pump vs Off Pump Cabg Groups

Among on pump group 6 patients (60%) died and among off pump group 2(20%) died showing

higher mortality among on pump group. (Figure 7)



Comparison of Mortality of Patients among on Pump Cabg Group and different Age Groups

Of 10 patients who underwent on pump cabg 6 patients died of then 1(16.6%) patients belong to

the age group of 40 – 49 years and 2 (33.4%) patients belong to the age group of 50-59 years and 3(50%) patients belong to the age group of 60-69 years (Figure 7)

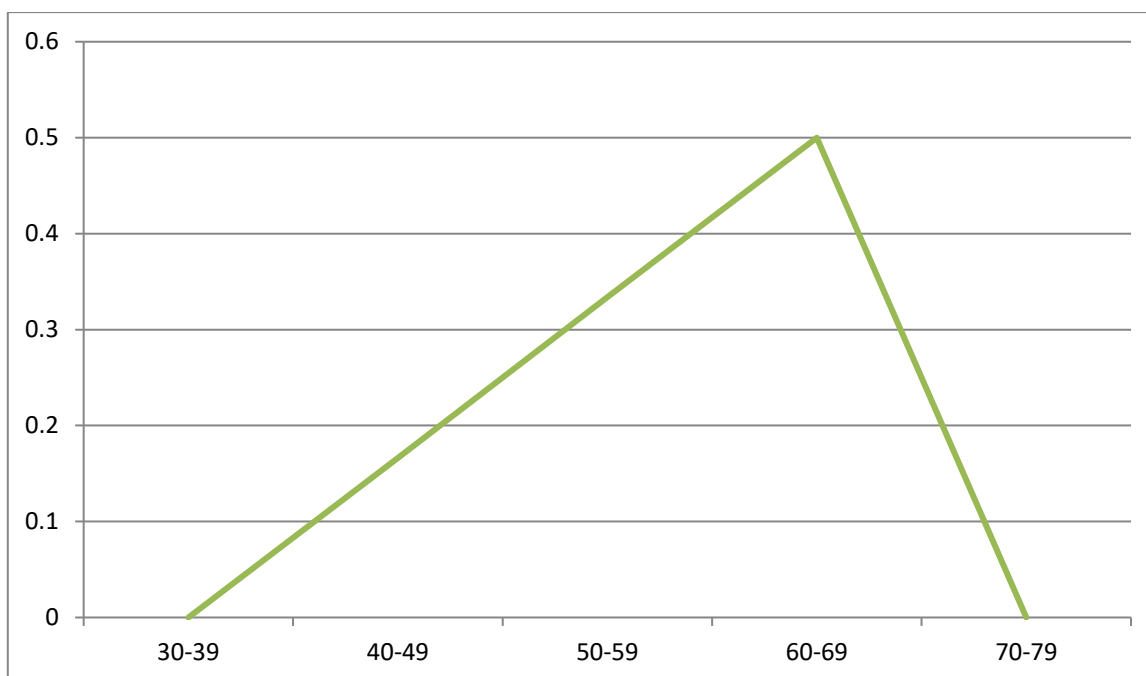


Figure 7 Graph showing on pump mortality among age groups

Comparison of Mortality of Patients among Off Pump Cabg Group and Different Age Groups

Of 10 patients who undergone off pump cabg

procedure 2 patients died of them 2 (100%) patients belong to 50 to 59 (figure 8)

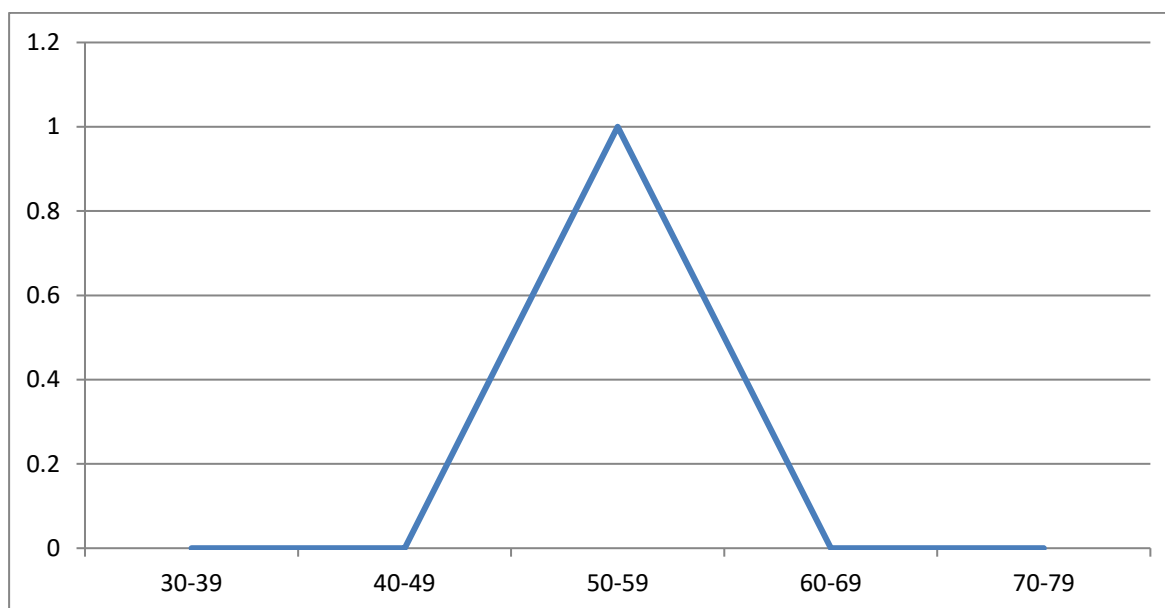


Figure 8 Graph showing off pump mortality among age groups

Comparison of Mortality among Patients in on Pump and Off Pump Cabg Group among Gender

Among 17 male patients 8 (45%) underwent on pump cabg and 9 (55%) patients underwent off

pump cabg. Among 3 female patients 2(66.6%) patients underwent on pump cabg and 1 (33.4%) of patients underwent off pump cabg. (Figure 9)

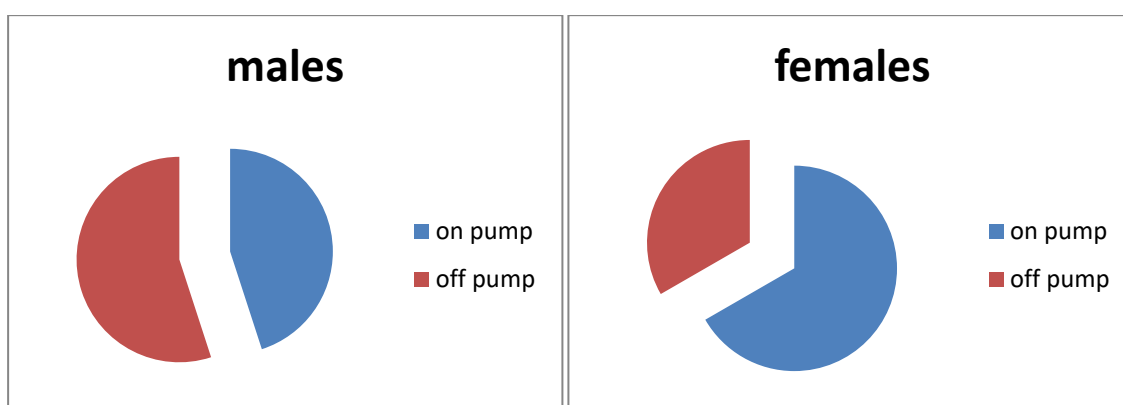


Figure 9 Distribution of on and off pump cabgs among genders

Among on pump group 4 male patients (66.6%) and 2 females (33.4%) patients died. Among off pump group 2 male patients died

Comparison of Mortality among On Pump and Off Pump Cabg Groups in Different

Angiographic Patterns along with Left Main Involvement of Coronary Artery Diseases

Among 3 patients SVD with LM disease 2 patients underwent off pump and 1 patient underwent on pump. Of the 13 patients of DVD with LM group 7 patients (54%) underwent on

pump cabg and 6(46%) patients underwent off pump cabg, of which 4 (57%) patients on on pump cabg died and 1 (14%) of off pump cabg died. Of the 4 patients with LM with TVD group 2 patients

(50%) underwent on pump cabg and 2(50%) patient underwent off pump cabg, of which 2(100%) patients of on pump group died and 1(50%) off pump group died (Figure 10)

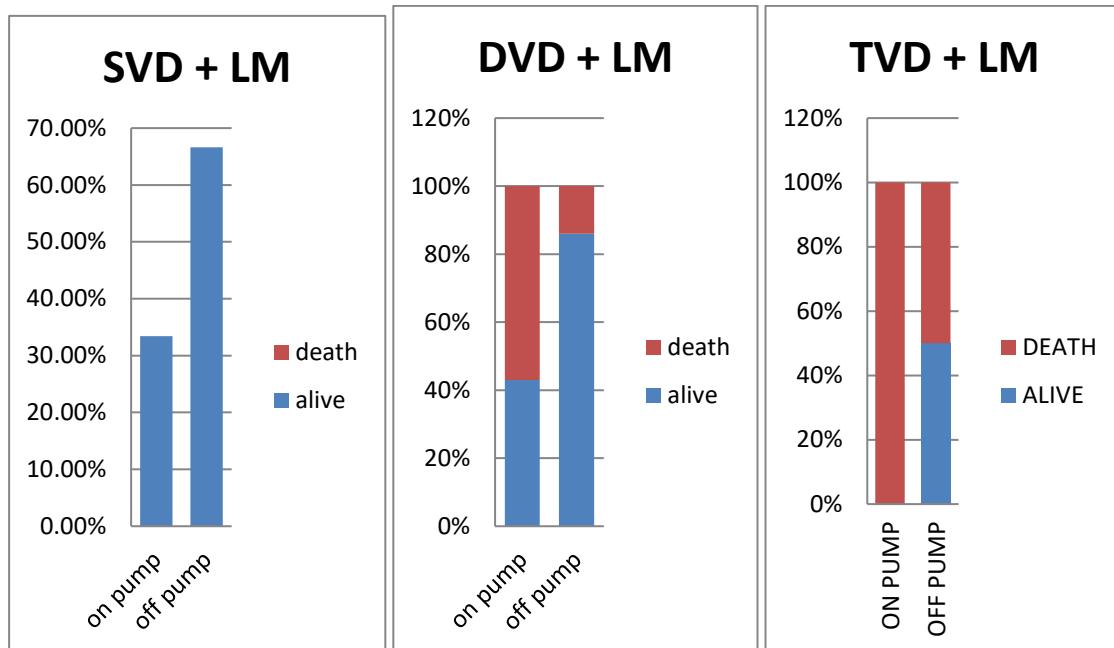


Figure 10 Mortality in on vs off pump among LM disease

Comparison of Mortality among Patients of on Pump and Off Pump Cabg Group with Ejection Fraction

Among patients with EF less than or equal to 30 1(100%) on pump cabg group patient died. Among

patients with EF 31-40 4(66.6%) patients of on pump cabg group and 1(33.3%) cases of off pump cabg group died. Among patients with 41-49 EF 1(10%) on pump cabg group and 1 patient of off pump group died patients died. (figure 11)

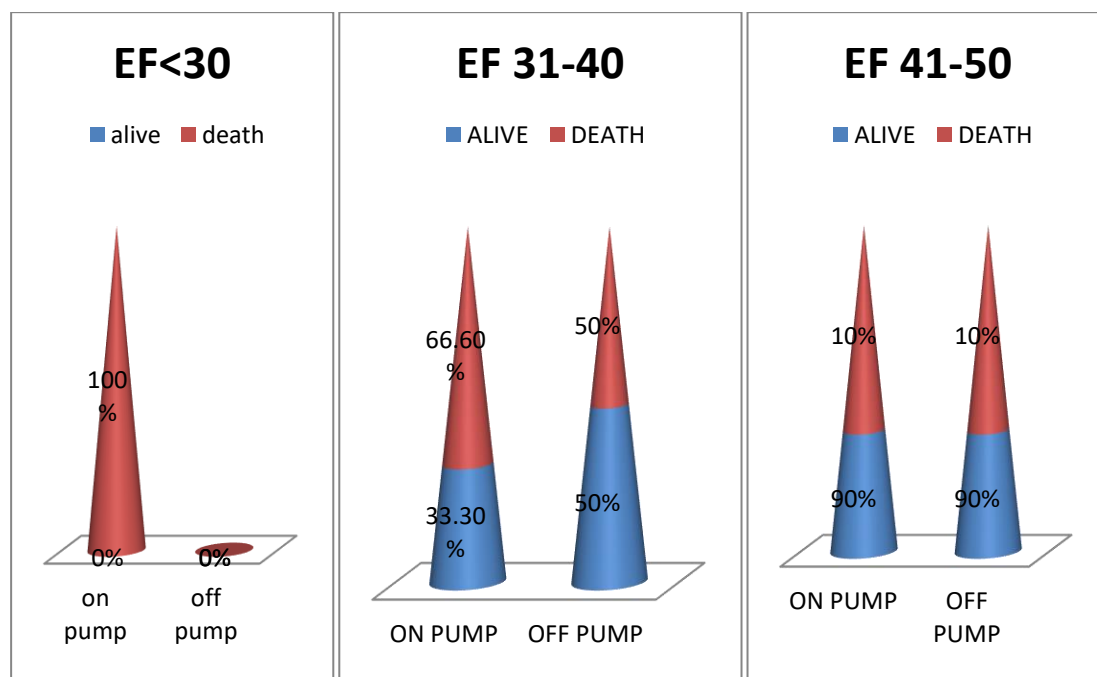


Figure 11 Mortality in on vs off pump among different range of EF

Discussion

The mean age of presentation of the cabg groups of our study is 56.21 ± 10.2 years which is far less than the other studies like Sattartabar *et al* 2021⁽²⁾, cornwell *et al* 2015⁽³⁾

The male population in the cabg groups of our study is 83.3% and female population is 16.7%. In comparison to Sattartabar *et al* 2021⁽²⁾, 73.6% males and 26.4% females, the male population is more and female population is less. In comparison to cornwell *et al* 2015⁽³⁾, males 99% and females 1%, the male population is less and female population more.

The persons with smoking as risk factor are 55.6%, alcohol 33.3% diabetes as 25.9% and hypertension as 17.6% being smoking as more frequently associated risk factor. In comparing to sattartabar *et al* 2021⁽²⁾ were hypertension is major risk factor than smoking and in comparison to cornwell *et al* 2021⁽³⁾ were diabetics is the most common risk factor.

In the present study the patients with $ef < 34$ are around 10 % which is similar to other studies sattartabar *et al* 2021⁽²⁾ and Cornwell *et al* 2015⁽³⁾.

The patients with left main coronary artery disease with single vessel disease are 3 (15%), double vessel disease are 13 (65%), triple vessel disease are 4 (20%). which is slightly near to that of study by benedetto *et al* 2019⁽¹¹⁾

It was found that the short term mortality was higher in on pump cabg of 60% and off pump of 20% but more on pump patients to be needed to equate. But the our present data correlates with kowalewski *et al* 2020⁽⁴⁾

Study and Giovanni *et al* 2017⁽⁵⁾. But Raja *et al* 2015⁽⁶⁾, Daniel *et al* 2016⁽⁷⁾, studies doesn't correlate with the present study as these studies finds no significant difference in short term mortality between on pump and off pump

The short term mortality was highest among age group of 50-69 years on patients undergone on pump cabg and 50 to 59 years for off pump cabg this is against to that of Nicolini *et al* 2017⁽⁸⁾ which shows highest mortality among 70-89 years

followed by 60 to 69 years which can explained as less number of patients above 70 years have undergone procedure in present study

The short term mortality was highest among on pump group patients with Ef less than 40 than off pump group correlating with Zhiyuan *et al*⁽⁹⁾ it was found in this study that the left main involvement in multivessel disease had some contribution to the mortality more in on pump group. This was against with Benedetto *et al* 2019⁽¹¹⁾ study and supported by yeatman *et al* 2001⁽¹⁰⁾

Limitations

The limitations of the present study is first this study is conducted in a single centred.

Second there is no significant number of on pump cabg group and off pump group patients to compare effectively.

Third the study involved very less number of Left main involved artery coronary artery disease so the power of the test is low to generalize it to the general population

Conclusion

The present study concludes that

- The on pump group had higher mortality than off pump group
- Higher age group above 60 are having higher mortality more in on pump group
- The patients with less Ejection fraction had higher mortality among on pump group than off pump group
- The patients with left main involvement with other vessels had higher mortality among on pump group when compared with off pump group
- Smoking and alcohol are more contributing for mortality in on pump group mortality

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