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ORIGINAL ARTICLE

Establishment of off-pump coronary artery bypass surgery services in newly established tertiary care cardiac center.

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ABSTRACT… Objective: To present our early results and share our experience in establishing this service in newly build tertiary care cardiac center. **Study Design:** Retrospective Observational study. **Setting:** Peshawar Institute of Cardiology. **Period:** 2020-2023. **Methods:** We included a number of (n=75) patients who underwent for off-pump coronary artery bypass grafting surgery. Ethical consideration was taken from institutional review board committee. Data was extracted from Electronic Medical Record, entered and analyzed in SPSS version 23.0. **Results:** The mean age of the patients was (57.67±10.058), mean weight (74.24±12.514), mean Intensive Care Unit stay (32±12.683), mean hospital stay (3.79±1.189) and mean number of grafts (1.73±.890) was assessed in our study. 88% patient's shows with no post-operative complications, Arrhythmia 2.6%, wound infection 4%, re-exploration for bleeding 4% and pneumonia 1.3%. **Conclusion:** Our early result shows safety and feasibility of off pump coronary artery bypass surgery at newly build tertiary care cardiac center, Peshawar Institute of Cardiology (PIC) with comparable early outcomes in terms of morbidity with other well-established OPCAB Centre.

Key words: Coronary Artery Bypass Grafting Surgery, Myocardial Revascularization, On-pump, Off-pump.

INTRODUCTION

The development of Off Pump myocardial revascularization, which is successfully carried out worldwide, is one of the most significant innovations in cardiac surgery. Although cardiac anastomosis on halted hearts was common for many years, there is still significant worry about the side effects of cardiopulmonary bypass (CPB) circuits. Hence myocardial revascularization on beating heart without exposing patient to detrimental effects of CPB made possible by pioneer surgeons showing excellent results.[1] Numerous studies have demonstrated that OFF-Pump coronary artery bypass grafting (CABG) has lower mortality and morbidity than ON-PUMP CABG, particularly in high-risk populations.[2]

In spite of good results in OFF Pump CABG Cardiac Surgeons were reluctant to adopt this new method of Revascularization because of natural resistance barrier to change an already existed safe method despite of its harmful effects with new methods which is technically challenging.[3] But many technical innovations allowed for the safe and successful implementation of off-pump CABG surgery, soft silicone snares, and use of medication to decrease heart rate and demand of oxygen and surgical techniques to stabilize heart, making cardiac surgeons to perform OPCAB as an alternative way of revascularization.[3]

There are two major concerns in cardiac surgeons regarding OPCABG incomplete revascularization and early graft patency.[4] Now it is well established fact that complete vascularization can be performed with OPCAB.[5] In many randomized control trials based on angiographic follow-up it's been proven that there is no difference in term of graft patency between OFF-Pump and ON-PUMP CABG.[5] In many studies OFF-PUMP CABG appear to be better in terms of myocardial. These outcomes are more significant in high-risk population with no significant difference in mortality.[6]

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Number of coronary operations in Europe by OPCAB is 15%-20% while in Asia its 60%-100% specially in India where it is 95%.[7] The cost effectiveness of OPCAB is well established because of reducing the need for prolonged mechanical ventilation, blood transfusions, ICU care and decrease in hospital stay and avoidance of CPB without increasing risk due to this fact OPCAB is important modality of surgical revascularization in developing countries where cost of traditional CABG is big concern.[8]

The current ESC/EACTS guidelines for coronary revascularization only recommend OFF-PUMP CABG in high volume off pump centers in high-risk patient groups.[9] OPCAB surgeries were started by single experienced OPCAB surgeon in Peshawar institute of cardiology a newly established cardiac center in Peshawar Pakistan where there is big concern to afford high cost of traditional ON-PUMP CABG leaving majority of patient untreated. Early outcomes of this study can establish safety of establishing OPCAB services in new cardiac centers and motivate cardiac surgeons to adopt this new method of cardiac revascularization.

METHODS

This retrospective observational study was carried out at Peshawar Institute of cardiology from 2020-2023. We included a number of (n=75) who were undergone for off-pump CABG surgery. Data was extracted from Electronic Medical Record (EMR). Ethical approval was taken from Institutional Review board committee (IRC/23/44 on 22-08-23) of Peshawar Institute of Cardiology. The trail was conducted in compliance with the international on harmonization guidelines for the good clinical practices and according to the declaration of Helsinki.[10]

Statistical Analysis

Data was entered in SPSS version 23.00. Descriptive statistics was applied to calculate mean and SD. Frequency and percentage was calculated for qualitative variables e.g., gender, clinical presentations, vessels involvement etc.

Inclusion Criteria

Patient's undergone off-pump CABG.

Exclusion Criteria

Patient's undergone on-pump CABG.

RESULTS

A total of (n=75) patients were enrolled in our study after meeting the inclusion criteria.

Characteristics	Mean	±SD
Age of the patients (years)	57.67	±10.058
Weight (kg)	74.24	±12.514
Height (cm)	161.97	±9.372
Pulse	79.44	±10.976
Systolic BP (mmHG)	139.57	±18.389
Diastolic BP (mmHG)	84.63	±14.594
SPO2	95.47	±5.670
Number of Grafts	1.73	±.890
Hospital Stay	3.79	±1.189
ICU stay	32.00	±12.683
Characteristics	**Frequency (n)**	**Percentage (%)**
Gender		
Male	63	84%
Female	12	16%
Clinical Presentations		
Angina	15	20%
Shortness of breath	16	21.3%
Palpitation	17	22.7%
CCS class		
CCS I	2	2.7%
CCS II	35	46.7%
CCS III	37	49.3%
CCS IV	1	1.3%
Vessels Involvement		
LAD, Diagonal	33	44%
RCA, LCX and LAD	7	9.33%
LAD and RCA	35	46.7%
CABG status		
Elective	75	100%
Emergency	0	0%
NYHA class		
NYHA I	2	2.7%
NYHA II	49	65.3%
NYHA III	23	30.7%
NYHA IV	1	1.3%
Post-op Complications		
None	66	88%
Arrhythmia	2	2.6%
Wound Infections	3	4%
Re-exploration for bleeding	3	4%
Pneumonia	1	1.3%
Medical History		
Hypertension	8	10.7%
Diabetic Mellitus	14	18.7%
Previous stroke	3	4%
Smoking	4	5.3%
Previous myocardial infarction	7	9.3%
Chronic lung disease	6	8%

Table-I. Demographic profile, clinical presentations and post-op outcomes of the patients: (n=75)

Table-I illustrates the demographic profile of the patients, which shows that the mean age of the patients was (57.67±10.058), mean weight (74.24±12.514), mean ICU stay (32±12.683), mean hospital stay (3.79±1.189) and mean number of grafts (1.73±.890) was assessed in our study.

It also shows that 84% male and 16% female. On the basis of clinical presentations 20% chest pain, 21.3% shortness of breath, 22.7% palpitation. If we discuss about the CCS classification which shows that 46.7% with class II and 49.3% with CCS class III.

If we discuss about the vessels involvement which shows that 44% LAD, and Diagonal, 9.33% LAD, LCX and RCA, and 46.7% LAD and RCA were involved. All patients were selected electively for off-pump CABG surgery. According to our result, post-operative complications were assessed 88% patients with no complications, Arrhythmia 2.6%, wound infection 4%, Re-exploration for bleeding 4%, and Pneumonia 1%.

DISCUSSION

These innovative groups' technical advancements over the next ten years made off-pump surgery a safe and successful procedure. With the use of soft silicone snares to interrupt coronary flow, medications to lower heart rate and oxygen demand, and surgical techniques to stabilize the heart's movements, these forward-thinking surgeons were able to investigate OPCAB as a safe and repeatable alternative to revascularization.[10] These groups demonstrated the advantages of non-CPB revascularization through their published reports. Numerous studies demonstrated how OPCAB can lower mortality, morbidity, and expenses, particularly for high-risk patients.[11]

Despite the positive outcomes of off-pump heart surgery, OPCAB was nevertheless marginalized in the field of cardiac surgery. Because performing CABGs in the traditional fashion was the standard practice among cardiac surgeons, there was a built-in opposition to changing a routine operation that had proven to be generally safe despite any acknowledged risks.[12] Furthermore, legitimate questions about the technical simplicity of executing OPCAB and the caliber of the anastomoses carried out during off-pump operations persisted. When minimally invasive surgery for myocardial revascularization became more common in the 1990s, attitudes against the off-pump approach started to shift.[12,13]

Off pump coronary artery bypass grafting (CABG) has established in newly developed tertiary care hospital at Peshawar KPK. In KPK no other hospital is facilitating with this service. It is less cost effective as compared to on pump CABG.[14,15] In our study mean age of the patients was (57.67±10.058), mean weight (74.24±12.514), mean ICU stay (32±12.683), mean hospital stay (3.79±1.189) and mean number of grafts (1.73±.890).

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One of the important findings in our study is a smaller number of distal anastomoses 1.73% compared to other studies.[16] This can be due to selection of patients for OPCAB having 1 or 2 vessel diseases. All patients selected were elective there is potential space to evaluate the role of OPCAB in emergency or urgent situation. There is no difference in term of re-exploration for bleeding, Arrythmia's, wound infection and pneumonia in our newly established OPCAB center and well-established OPCAB center.[17,18] Therefore, it is concluded that it is safe to established OPCAB services in a newly build tertiary care cardiac hospital but further studies are required to compare OPCAB results with on-pump CABG in newly established cardiac center.

LIMITATION

It is single centered study and only included those patients who underwent for off-Pump coronary artery bypass surgery. We did not include on-pump CABG and other congenital defects. This

study provides the benefits and outcomes of off-pump CABG which only done in our tertiary care hospital in KPK.

CONCLUSION

Our early result shows safety and feasibility of off pump coronary artery bypass surgery at tertiary care center, Peshawar Institute of Cardiology (PIC) with comparable early outcomes in terms of morbidity.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Abdul Nasir	Substantial contribution to the conception or deisgn of the work, or the acquisition, analysis or interpretation of data for the work.	
2	Aamir Iqbal	Drafting the work or revising it critically for important intellectual content.	
3	Abdul Haseeb	Drafting the work or revising it criticaly for important intellectual content.	
4	Attiya Hameed Khan	Drafting the work or revising it critically for important intellectual content.