

## Emergency Conversion from Off Pump to Cardiopulmonary Bypass in Patients with Coronary Artery Bypass Graft Surgery

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ABSTRACT

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**Introduction:** As off pump Coronary artery bypass grafting surgery (CABG) is a developing method in coronary cardiac surgery, most surgeons are anxious about the danger of emergency crash conversion. In this observational study we tried to show the rate and outcome of conversion .

**Materials and methods:** In this descriptive study about 477 coronary off-pump CABG patients were operated in Ghaem hospital in Mashhad, Iran, from Jan 2012 to Jan 2013. In this group 20 patients needed to convert to Cardiopulmonary Bypass (CPB) immediately .We analyzed these 20 patients and produced the results.

**Results:** There was no cerebrovascular accident (CVA) and no neurologic problems. There was one death among these 20 patients. There was one case of renal failure who was the same patient that expired. 75% of these 20 patients had hypertension and 45% had diabetes .

**Conclusion:** 20 patients (4.19%) had an emergency switch to On-pump CABG and only one death occurred among 20 patients.

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**Introduction:**

Coronary artery bypass grafting surgery (CABG) has been conducted by median sternotomy approach and cardiopulmonary bypass (CPB) through cardiac arrest. This approach promised to be the most ideal operation method by providing a motionless and bloodless field by easy

access to coronary arteries. However, it is not without risk of mortality and serious morbidity (1) and could be commitment with complications including: cerebral injury and stroke, renal failure, myocardial injury, pulmonary complications, and systemic inflammatory response syndrome

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(1-6). Recently a new alternative method for CABG, the off-pump coronary artery bypass graft surgery (OPCAB) method has been emerged by a lower CPB related side effects and incidence of postoperative atrial fibrillation (6,7). Some studies show comparable mortality between CPB and off-pump method (8-16), while the other experiences (17, 18) and large Society of Cardiothoracic Surgeons of Great Britain and Ireland (SCTS) Database (4) and United Kingdom report (5) had indicated risk adjusted mortality benefit with OPCAB. Corresponding any formally reported data from our state due to high prevalence of OPCAB and CABG in our studied area, the aim of our study was to report the clinical characteristics and operative mortality of patients undergoing OPCAB and crash to CPB in Mashhad University of Medical Sciences, Mashhad, Iran.

### Materials and Methods

During Jan 2012 to Jan 2013, 477 patients whom were operated Off-pump CABG in Ghaem Hospital, Mashhad, Iran, were entered into this study. Among these 477 patients 20 individuals needed to convert to cardiopulmonary bypass immediately. We analyzed these 20 patients and produced the results. This study also used operative mortality as the outcome measure, and the study population was all isolated CABG surgeries performed during the study period. OPCAB procedures that were converted to CPB during the surgery were considered as emergency conversion from OPCAB to On-pump CABG for the purpose of the study. We used SPSS software version 11.5 (SPSS Inc., Chicago, IL, USA) for all statistical procedures. Summary statistics were expressed by mean, frequency or numbers and percentages of the patients.

### Results:

Of the 477 isolated OPCAB surgery

candidates in our hospital whose surgery was started Off-pump, during a year, 20 patients (4.19%) had an emergency switch to On-pump CABG. The OPCAB surgeries include 20 cases with conversion from OPCAB to CPB intra-operatively. Clinical and demographic characteristics of the studied patients are shown in Table 1. They did not have any sign of thyroid and chronic obstructive pulmonary disease. As information about EF of the patients is showed in table 1, this variable among them ranged 15 to 75 percent.

**Table 1:** Clinical and demographic characteristics of the CPB patients

Variable	Mean $\pm$ SD OR Number (%)
Age (yrs.)	59.37 $\pm$ 13.08
Weight (Kg)	65.31 $\pm$ 12.05
EF	43.26 $\pm$ 15.70
Admission ICU (days)	1.69 $\pm$ 0.6
HTN	Yes 15 (75)
	No 5(25)
Diabetes	Yes 9 (45)
	No 11(55)
HLP	Yes 9 (45)
	No 11 (55)
Expire	Yes 1 (6.2)
	No 19 (93.8)

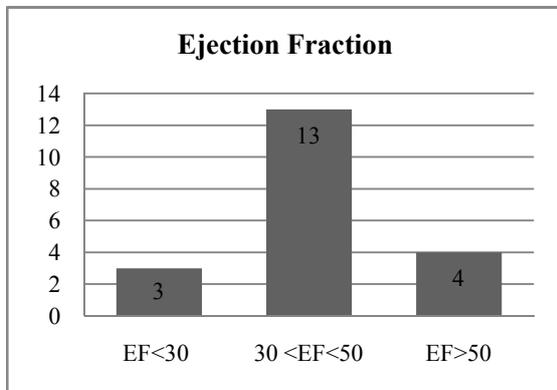
EF; Ejection Fraction

HTN; Hypertension

HLP: Hyperlipidemia

Figure. 1 is presented number of studied cases in three different categories (EF<30, 30 <EF<50, EF>50). Our data showed that there was not any case with pneumonia, pneumothorax, hypoxia, hemotorax, cerebral vascular and neurologic problems. In this study only one patient who was under 65 years old

had renal failure that was expired. However, about the cerebral vascular and neurological problems, there was 7 patients below 65 year old and 8 ones older than 65 years old.



**Figure. 1:** Number of studied cases is mentioned in this table in different ejection fraction category

### Discussion

As off pump CABG is a developing method in coronary cardiac surgery, most surgeons are anxious about the danger of emergency crash conversion. Although high morbidity and mortality results due to the urgent pump conversion during off-pump coronary artery bypass. Yokoyama et al (19) studied a ninety nine percent of the CABG patients that were scheduled to undergo OPCAB. They found that two patients (0.5%) had pump conversion due to ventricular arrhythmia and sustained hypotension, respectively. These pump conversion did not result in hospital mortality. While we studied 477 consecutive patients that 20 patients did not tolerate OPCAB, so they underwent to on pump CPB. Beside this pump conversion resulted 1 mortality.

Urso et al (20) studied the impact of off-pump to on-pump conversion rate on post-operative results in patients undergoing off-pump coronary artery bypass by evaluating the randomized controlled trials (RCTs). They found that the off-pump to on-pump conversion rate incidence ranged from 0 to 13.3%. The

most frequent causes of conversion were haemodynamic instability and intra myocardial-coronary target. They conclude that randomized controlled trials with a high off-pump to on-pump conversion rate were often associated with a lower experience in OPCAB of the surgeons participating in the trials. These studies were also mostly unable to show any benefit in terms of mortality or morbidity of OPCAB over the on-pump strategy. On the contrary, a low conversion rate is mostly reported by randomized controlled trials with a high structured experience in OPCAB. These trials were mostly able to show a benefit, in terms of morbidity and survival, of the OPCAB over the on-pump strategy. Like our study, Li et al (21) evaluated the impact of OPCAB on operative mortality compared to CABG with CPB. They were reported their results of the 57,284 isolated CABGs that were 13,515 (22.9%) were OPCAB. They found that those who converted to CPB intraoperatively had higher propensity-adjusted operative mortalities (converters 3.47% vs non-converters 2.53%). Their sample size was so bigger than our study patient's number, they found that age, female sex, diabetes, congestive heart failure and left main disease were associated significantly with a higher risk of intraoperative conversion from OPCAB to CPB. They concluded that OPCAB and CPB patients had significantly different preoperative risk profiles, and OPCAB was associated with lower operative mortality compared to CPB.

### Conclusion

In this study we concluded that the rate of crash conversion was 4.19% only one death was occurred among 20 patients. Future analytic studies with control groups are needed to identify the risk factors of conversion.

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**Conflict of Interests:**

The authors have no conflict of interests.

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