

Off pump versus on pump coronary artery bypass surgery in Shahid Rajaei Heart Center.

M.Shafiee MD, B.Baharestani MD, B.Nemati MD ,
S.Hosseini MD, R.Baghaie MD ,A.A.Ghavidel MD, A.S.Tabaee MD.

Abstract:

Back ground:

The recent revival of the coronary artery bypass technique without extracorporeal assistance constitutes one of the major revolutions in the cardiovascular community in the last decade. We don't have any report about the results of OPCAP and compare it with on pump operations in our center and we decide to compare these two techniques in our center.

Methods:

In a randomize trial 235 patients selected and divided in two groups. Urgent, emergent and redo operations were not selected. Risk factors were the same in two groups.

Results:

We operated 128 patients with pump and 117 patients without pump randomly. Risk factors were the same in two groups .mean pump time was 99 minutes and mean clamp time was 47 minutes. needs for blood transfusions, Inotrope usage, and balloon pump usage, needs for reoperation, ICU stay and hospital stay, complications and mortality were the same in two groups but post operational hemorrhage was higher in off pump group.

Conclusion:

off pump coronary artery bypass is a good alternative in our center and we can use this technique in patients without any hesitancy.

Key words: OPCAP-on pump.

The recent revival of the coronary artery bypass technique without extracorporeal Assistance constitutes one of the major revolutions in the cardiovascular

Community in the last decade. Criticized by some¹ and praised by others, 2 Off-pump surgeries have left nobody indifferent. By simply typing "off-pump surgery" On a current electronic research database, close to 1,000 manuscripts can be captured indicating the gigantic infatuation with this procedure. From the First aortic-to-coronary bypass performed on a dog by Alexis Carrel in 1910 to the current technique of coronary revascularization, a lot has been accomplished and, in the future, a lot more will be.³

As surgeons, new techniques could be seen as a transgression of our secure and highly predictable daily environment. On the other hand, changes are possible only if we are responsive to our environment. The human being is genetically modified to be resistant to change.

Surgeons have always been on the edge of new techniques and technologies that could facilitate, secure, and improve their "environment". This perpetual search for a "better way" has led them to relentlessly re-question and rechallenge their thinking. OPCAB surgery is another link in the long chain of Progress that has characterized the history of surgery during the last century.⁵ the future will tell us if this was a good "strategy" or not. In the meantime, it is our responsibility to challenge the technique, optimize it, test its limits, and ultimately find its place in the vast puzzle of our surgical evolution⁴. We decide to operate our patients as OPCAP and compare this technique with on pump in our center

Methods:

This study was a randomized controlled



clinical trial, which included 235 patients with well-established coronary artery disease that needs coronary artery bypass graft. Exclusion criteria consisted of emergency and urgency operations, patients that need other concomitant operations and redo operations. We divided these patients in two groups randomly. All patients operated by one team of cardiovascular surgeons. 117 patients operate as OPCAP and 128 as on pump.

Demographic data such as age and gender and history of cigarette smoke, diabetes mellitus, and hyperlipemia was collected.

Left main lesion, number of grafts, postop inotrope needs, and balloon pump usage, postop needs for transfusion, reoperations, amounts of surgical hemorrhage, cardiac enzymes, ejection fraction, electrocardiography, intubation's time, ICU stay, hospital stay and cerebrovascular accidents were compared in two groups. Then complications like mediastinitis, pericardial effusion, plural effusion, mortality and total cost were compared in two groups. In on pump group we use mild hypothermia with aortic clamping, cold blood cardioplegia was used for cardiac arrest and in OPCAP group we use a stabilizer (Forth generation of Medtronic .inc) with or without intracoronary shunt usage.

STATISTICAL ANALYSIS:

All the analyses were performed with SPSS software version 11. Pearson and Chi-square tests were used to determine the difference of gender between the two groups.

Paired t-test for comparison of data's before and after CABG were used

Results:

Mean \pm standard deviation age in pump group were 57.2 ± 9.1

(From 38 to 75 years old) and mean age in OPCAP group were 54.5 ± 9.9 (from 39 to 76 years old) years and above 70 patients were 6.3% in pump group and 4.3% in OPCAP group. Frequency of below 45 years old patients were a little higher in OPCAP group ($\chi^2=0.114$, $p=0.024$). In OPCAP group 55.6% and in on pump group 69.5% were male.

Risk factors in two groups are illustrated in table 1. Diabetes and renal disease and chronic obstructive pulmonary disease were higher in off-pump group, and hyperlipidemia and cerebrovascular accidents were higher in on-pump group, other risk factors were the same.

Risk factors	On pump		Off pump		Data analysis	
	Freq	%	Freq	%	X ²	P Value
Diabetes	30	23.4	51	43.6	11.217	0.001
Hyperlipemia	71	55.5	42	35.9	9.422	0.002
Renal disease	6	4.7	18	15.4	7.916	0.005
Cigarette	48	37.5	49	41.9	0.490	0.484
CAD Hx	30	23.4	34	29.1	1.001	0.317
COPD	4	3.1	9	7.7	2.538	0.111
CVA	10	7.8	4	3.4	2.190	0.139

Table 1: Risk factors in off-pump and on-pump patients operated in shahid Rajaei hospital.

Two groups were the same in left ventricular dysfunction and LV Aneurysm but left main lesion was higher in pump group (12% versus 3.4%). Single vessel disease was 12% in off pump group and none in pump group had single vessel disease but two and three vessels disease were the same in two groups. Function classes of the patients preoperatively were the same in two groups. We use LIMA in all patients, RIMA in 5% and radial artery in 9.4% and saphenous vein were used in 100% in pump group and 85.5% in off pump

group.

Balloon pump usage was the same in two groups (6% in off pump group versus 5.5% in pump group) and inotrope usage was higher in pump group (13.5% versus 10.3%).

ICU events after operation are illustrated in table 2, there were some difference between time of extubation in two groups and above 12 hours intubations were higher in pump group. Other events were the same in two groups.

events	On pump		Off pump		Analysis	
	freq	%	Freq	%	X2	P Value
Bleeding	5	3.9	8	6.8	1.045	.307
ECG	19	14.8	14	12	.434	.510
CVA	90	7	6	5.1	.385	.535
Long intubations	45	35.5	28	23.9	8.039	.005
MI	18	14.1	9	7.7	2.530	.112
Arrest	4	3.1	7	6	1.164	.281
Dead	2	1.6	3	2.5	.882	.429

Table 2: Intraoperative and post operative complications in off-pump and on-pump operations in shahid Rajaei hospital

Post operative complications are illustrated in table 3, frequency of fever and mediastinitis is higher in pump group, other events were the same in two groups.

events	Onpump		Offpump		analysis	
	freq	%	freq	%	X2	P Value
fever	44	34.3	49	24.7	7.381	.007
mediastinitis	20	1.5	1	.85	3.459	.119
Wound infection	11	8.7	8	7.1	.203	.652
Plural tab	14	11.1	15	13.4	.289	.591
chest tube	14	11.1	16	14.3	.542	.461
Mortality*	47	3.1	5	4.2	.199	.655
*plus ICU mortality						

3: Post operative hospital complications in off-pump and on-pump patients operated in shahid Rajaei hospital.

Mean hospital stay in off pump group were 7.8 ± 1.9 days and in pump group were 8.5 ± 2.5 days.

Rises of serum creatinin were the same in two groups and were depend on pre- operative serum creatinin.

There was no difference between two groups in pre-operative ejection fraction and in post operative rises in ejection fraction. In reggretional analysis we found that age of the patient in pump group and long clamp-time were related to post operative lower ejection fraction.

Discussion:

Off-pump surgery with sternotomy has become increasingly popular as an option for CABG surgery patients who have traditionally undergone surgery with a pump oxygenator 8.Andreua Ballotta and coworkers evaluated 60 patients undergoing coronary artery bypass evaluated platelets

function in off-pump and on-pump operations .Among patients undergoing on-pump coronary artery bypass surgery, all studies of platelet function were significantly abnormal after surgical intervention compared with results before surgical intervention. Similarly, among patients undergoing off-pump coronary artery bypass surgery, evidence of platelet dysfunction after surgical intervention was noted, with a lower platelet count and a higher proportion of P-selectin- and Annexin V-positive platelets 9.Erminio Sisillo and coworkers in their experience conclude that patients undergoing on-pump CABG were not exposed to a grater risk of neurological adverse events when compared to OPCAB patients. In shahid Rajae hospital during one year from February 2004 to February 2005 we compare off-pump and on-pump coronary bypass grafting and operated 235 patients, 117 patients operated off-pump and

128 patients operated on-pump. There were no differences between two groups in post operative complications and mortality, we chose the patients randomly but we didn't operate shocked patients, patients that need other cardiac operations like MVR or emergency patients as off-pump. Two groups were the same in pre-operative risk factors. Post operative bleeding were the same in two groups but number of blood transfusions were higher in pump group and needs for FFP transfusions were higher in off-pump group. Rate of post operative fever and mediastinitis were higher in pump group. Prolonged intubations time over 12 hours in ICU were higher in pump group.

Conclusion:

Beating heart coronary artery surgery remains a new player in the large playground of

Coronary revascularization. It still has to acquire its "letters de noblesse" to be fully accepted in the game. Nevertheless, new rules are progressively being written, and strategies redesigned.

Definitely, off-pump surgery is part of the new surgical techniques that cannot be ignored any More by cardiac surgeons. It is likely that better comprehension of the path physiology of the ECC along with the development of new drugs, such as leukocyte depletion, anti-C5a complement, Heparin-bound circuitry etc., will eventually decrease the-ECC generated inflammatory reaction in a significant fashion. This, however, will not be possible without extensive cost and Research. In this study we compare off-pump and on-pump coronary artery bypass in shahid Rajaei hospital and in the meantime, current data have confirmed the efficiency of OPCAB surgery to overcome some of the side-effects of conventional surgery without jeopardizing the success of the procedure.^{6,7}

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