Is Redo Coronary Artery Bypass Graft In Patients Over 70 Years Old Safe?

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ABSTRACT

Objective: The aim of this study is to examine the outcomes post redo CABG in patients above 70 years old.

Method: This retrospective study was carried out at Liverpool Heart and Chest Hospital, for 148 patients above the age of 70 (Mean age 74.29±3.4 years) who underwent reoperation for Coronary Artery Bypass Graft (CABG) over 10 years period between 2001-2011. Post operative mortality and morbidity was analyzed. We used Major Adverse Vascular Events (MAVE) as in-hospital safety of treatment assessment tools.

Results: The mean EURO score was 7.41± 2.67. Thirty-day mortality was 6% (9 out of 148), and the one-year survival was 84.4% (n=125). MAVE show 4.7% post-operative Q-wave MI and 4% stroke. Renal impairment was noted in 14.2%. Rate of re-exploration was 12.8% mainly for bleeding and tamponade 8.1% and 2.7% respectively. Mean length of stay was 16.3 days.

Conclusion: This study shows acceptable survival and post operative mortality and morbidity in this high risk group. Therefore, Redo CABG in patients over 70 alone should not deter a cardiac surgeon from offering such a potentially beneficial intervention.

Keywords: reoperation, morbidity, coronary artery bypass grafting.

JRMS SEP 2016; 23(3):49-54/ DOI: 10.12816/0029073

Introduction

Survival following coronary artery bypass grafting (CABG) has been increasing over the last twenty years, despite increasingly high risk patients. The survival of older patients also continues to improve, with mortality in septuagenarians falling from 5.0%to3.4% in 2008.[(1)] Advances in surgical technique and medical management have improved graft patency, leading to an increase in the time between first and second time CABG. As a result, more patients presenting for redo CABG are increasingly elderly. [(1,2)]

The reoperation rate of CABG is still approximately 3% at five years, over 11% at 10 years, and 17% at 12 years after the initial operation.[(1,2)] Younger age group at the time of 1st CABG is a good predictor for redo surgery.[(2)] The type of conduits used in the first operation i.e**.** LIMA versus vein grafts only, is another predictor

The presence of patent LIMA to LAD graft has reduced the incidence of redo CABG by at least 50% in a 10 year period.[(2)] Furthermore, the advances in the use of percutaneous catheter interventions have also decreased the need for isolated redo coronary artery bypass grafting.[(2)] The recent tendency towards total arterial grafts use decreased the need for Redo CABG, however this means that patients who are in need for redo CABG will be at older age with consequent increase in mortality and morbidity [(2)]

The mortality rate of redo CABG is reported to be more than three times higher than that of primary CABG (3, 4, 5).Redo coronary artery

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Manuscript received Feb29,2016. Accepted June 23, 2016

bypass grafting carries higher risk due to the possibility of injury to patent coronary grafts, aorta and ventricle, in addition to the progression of native coronary artery disease with difficult targets and impaired left ventricular function with time, especially if this is accompanied by older age as in most of the cases. In recent studies mortality in redo CABG is reported to vary between 4.2%and 11.4 %.[3]

In this study, we retrospectively analysed our results of redo CABG in patients above 70 years old. The endpoints evaluated for the study were in hospital mortality and morbidity and one year mortality.

Methods

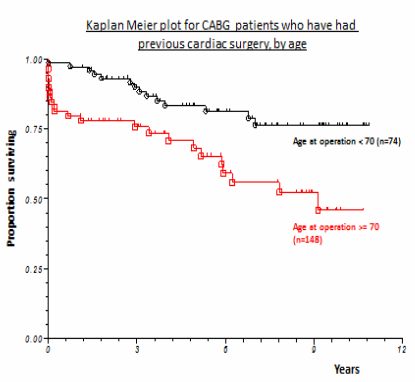
We retrospectively analysed data from a collected database at our single centre tertiary level cardiac surgical centre. Over a 10 years period from 2001 to 2011, 148 patients over the age of 70 presented for re-operation for coronary artery bypass grafting. All patients included in this study were above 70 years. Redo CABG with valvular surgery was excluded. The follow up period was one year. Demographic data is presented in Table (I).Medical records were retrieved and reviewed and pre-operative, intra- operative and post-operative variables were entered into a specifically developed dataset. Variables considered were co morbidities, euro score, logistic euro score, while preoperative ones include angina status, Dyspnoea, NYHA, congestive state, Q wave MI history, history of peripheral vascular disease, history of stroke or TIA and Preoperative IABP insertion. Intraoperative variables include number of grafts, on pump VS off pump, arrhythmias in form of AF, VT, VF, on the other hand post-operative complications include use of IABP, patients who were reintubated and readmitted, perioparative MI, pericardial effusion, arrhythmias, strokes or TIA .

Table I: Demographic data

	N=148
Age /yrs – mean ± SD	74.29 ± 3.457
70-80 years 137	
>80 years 11	
Male – n (%)	123 (83.1)
Diabetes – n (%)	37 (25)
Diet	8 (5.4)
Oral	21 (14.2)
Insulin	8 (5.4)
Hypertension – n (%)	97 (65.5)
Smoking – n (%)	125 (84.5)
Hypercholesterolemia – n (%)	117 (79)
Q-wave MI – n (%)	81 (54.7)
PVD – n (%)	52 (35.1)
Angina status – n (%)	
Asymptomatic	4 (2.7)
Stable	108 (73)
Unstable	36 (24.3)
Dyspnoea NYHA – n (%)	
I	26 (17.5)
II	59 (39.9)
III	61 (41.3)
IV	2 (1.4)
Congestive Cardiac Failure – n (%)	
Now	3 (2)
Past	14 (9.5)
Recurrent	7 (4.7)
Previous Q-wave MI – n (%)	
Total numbers	81 (54.7)
one	57 (38.5)
Two	16 (10.8)

three	6 (4.1)
Four	1 (0.7)
five	1 (0.7)
Peripheral Vascular Disease – n (%)	52 (35.1)
TIA – n (%)	28 (18.9)
CVA – n (%)	17 (11.6)
Inotropic Support – n (%)	
0 - 12h	16 (10.8)
12 - 24h	14 (9.4)
24 - 48h	8 (5.4)
>48h	20 (13.5)
None	90 (60.8)
eGFR / ml/min/kg – mean ± SD	63.635 ± 18.29
No. grafts – n (%)	3.04
I	10 (6.8)
II	28 (18.9)
III	63 (42.6)
IV	41 (27.7)
V	5 (3.4)
VI	1 (0.7)
EuroSCORE – median (IQR)	7.41 ± 2.672
Logistic EuroSCORE – median (IQR)	11.2118 ± 9.579
Operative status – n (%)	
Elective	122 (83.7)
Urgent	24 (16.2)
Preop IABP – n (%)	4 (2.7)
Pre op AF – n (%)	14 (9.5)
Pre op VF or VT – n (%)	4 (2.7)

SD: standard deviation, NYHA: New York Heart Association, MI: Myocardial infarction, IABP: intra-aortic balloon pump, CVA: cerebro vascular accident, AF: atrial fibrillation, PVD: peripheral vascular disease, IQR: inter quartile range, VF: ventricular fibrillation, VT: ventricular tachycardia).



Results

During the study period. Out of these, 80(54.1%) patients were done under cardiopulmonary bypass while 68(45.9%) patients were done off pump **.**

Most of the patients were symptomatic (81.2% of patients in NYHA class II or III**).**

Coronary artery disease risk factors including Diabetes (25% of patients) and hypertension (65.5% of patients **,**Smoking (84.5%), hypercholestolemia (79%) previous Qwave myocardial infarction was experienced by 81 (54.7% of patients), euro score mean for the patients was 7.41± 2.672.It is worth mentioning that 90 patients (60.8%) did not need any kind of inotropic support postoperatively, however IABP was inserted postoperatively in 3 patients (one for weaning from bypass, while 2 patients for hemodynamic instability**.**11 patients had reintubation post op (7 patients for one time, while 4 needed intubation twice). Perioperative myocardial infarction was noticed in 7 patients (4.7%), and postoperative AF was seen in 41 (27.7%) patients while VF/VT developed in 6 patients (4.1%)

Pericardial effusion developed in 2 (1.4%) patients, while stroke occurred in 6 (4.1%) patient (1transient, 5 Permanent). Renal impairment developed in 21 patients, with 13 patients went into failure while 8 required hemofiltration. 19 patients required reoperations that, with 12(8.1%) for bleeding and 4 (27%) for tamponade, 3 (%20) for cardiac arrest. Mean length of hospital stay was 16.3 ± 16 days.

30 day mortality was 6% (9 patients died out of 148), while one year survival was 84.4% (125 out of 148) postoperative complications are shown in Table II**.** Risk factors for mortality were studied found to be the followings: intraaortic ballon pump use, urgentcases, age more than 80 years, use of more or equal to 4 grafts, see Table (III).

Table II: Percentages of post operative complications

Complication	
Post op IABP – n (%)	3 (2.1)
CPBW – n (%)	1 (0.7)
HI – n (%)	2 (1.4)
Number of reintubation – n (%)	
One	7 (4.77)
Two	4 (2.7)
Reintubation – n (%)	11 (7.4)
Readmission – n (%)	12 (8.1)
Perioperative MI – n (%)	7 (4.7)
Pericardial effusion – n (%)	2 (1.4)
Permanent Pacemaker – n (%)	1 (0.7)
Post op VT/VF – n (%)	6 (4.1)
Post op AF – n (%)	41 (27.7)
Stroke – n (%)	6 (4.1)
Transient	1 (0.7)
Permanent	5 (3.4)
Reoperations – n (%)	19 (12.8)
Bleeding	12 (8.1)
Tamponade	4 (2.7)
Arrest	3 (2)
Renal impairment – n (%)	21 (14.2)
Failure – n (%)	133 (8.8)
Haemo – n (%)	8 (5.4)
Length of stay /days – median (IQR)	16.35 ± 15.972
Intervals / years - median (IQR)	14.26 ± 4.623

IABP: intraaortic balloon pump, CPBW: cardiopulmonary bypass weaning, AF: atrial fibrillation, HI: hemo dynamic instability

Table III: Risk factors for mortality:

Intraaorticballon pump use	P<0.05%
Urgent cases	P<0.05%
Age more than 80 years	P<0.05%
Number of grafts use more or equal to 4	P<0.05%

Discussion

Redo CABG has many technical difficulties that make it more challenging than primary CABG. These include the challenges of repeat sternotomies **,**injury to previous grafts or the heart during dissection, quality and availability of conduits, calcified ascending aorta, and more advanced coronary disease involving the native vessels.**(4)**

According to previous studies **,**symptoms, hypertension, left main coronary artery disease tend to be more severe in elderly patients.**(4)** In our study 43% of patients were NYHA class III or IV, 65.5%were hypertensive, and 54.7% had history of MI pre operatively.

Sabic *et al* **(6)** hypothesized that the higher risk profile of the reoperative patients was the main factor affecting higher hospital mortality rather than the operation itself, per se. Some of this risk may be obviated by the tendency for re-do surgery to be performed by more experienced surgeons. **(7)**

Taking into consideration the above factors, others can affect early mortality, most importantly age of patient and NYHA class IV. **(8,9)** In our study, we selected the patients over 70 years of age and expected high mortality, however our mortality was 6%

which is comparable to other studies for example, yamamuro and his colleagues[10] had a hospital mortality of about 7.6% on 739 patients>70 years operated upon between 1983 – 1993 **,**moreover blanche et al had a hospital mortality of 8% on 49 patients above the age of 80 who are operated upon between 1983 –1996.[11] Once patient survived the first 6 months postoperatively, only advanced age>65 years affected long term survival while impaired left ventricular function was the only independent factor for late cardiac mortality (8,9).Risk factors for early mortality were studied and found to be the followings: intraaorticballon pump use, urgentcases, age more than 80 years,use of more or equal to 4 grafts, see Table (III) .these above mentioned risk factors reflect the poor status of patients. Kaplan-Meyer curve showed decreased survival of patients with time when compared to ages less than 70 years.

A study conducted by Van Eck and colleagues on patients who had redo CABG between 1987 to 1998, showed that the mortality increased from 5.5%for patients<60 to 6.9% for patients between 60– 70and 7.8% for patients above 70years. [12] In septagenarians,Blanche et al found the mortality rate was 8.9% inpatients aged 70 years or older, [11] Czernyt al found ,in a study on patient older than 75 years who underwent redo CABG, amorality rate of 9.7%(14).In our study ,mortality rised from(6/137) 4.37% for patients above 70 years to(3/11) 27% which clearly demonstrates the age above 80years as strong predictor of early mortality.

It is clearly noticed that reoperative coronary artery bypass grafting in elderly is associated with relatively increased morbidity compared to primary CABG .Manumi and his colleagues operated on 739 patients above the age of 70 years, had 3.5% incidence of preoperative myocardial infarction, while in our study it was 4.7% .However, Hiroyak and his colleagues had 19% preoperative myocardial infarction. [4] Good myocardial protection plays a major role in decreasing the incidence ofperioperative myocardial infarction, especially with increasing use of retrograde delivery of cardioplegia which allows adequate delivery of cardioplegic solution and prevent embolization of atherosclerotic debris from vien graft into coronary arteries.[15,16] This might explain the relatively low peroperative myocardial infarction rate that we had.

We noticed in our study that the need forintraop or post op IABP ,is relatively low in comparison to other studies(6.7%).For example, Konstantinos and his colleagues found that 11.3% of patients needed IABP at some point. This is largely related to better and more careful cardiac protection during reoperation, which is achieved by various techniques most importantly the use of retrograde cardioplegia. In addition to the no touch technique to decrease the likelihood of embolization to distal coronary arteries from atherosclerotic saphenous venous grafts. [7]

It is noticed that the need for urgent or emergency operations was relatively low in comparison to other studies. In our study ,it is 16.3%(24 cases)while in other studies it is more, forexample, Konstantinos and his colleagues found that urgent operations were needed in 42-49%of cases. This may be explained largely due to therecent increased use of PCI in the cases of acute coronary syndromes.[7] As well, the decreased frequency of acute coronary syndrome which is related to the better follow up and care in the recent years to the patients.[7] Reduced need for emergency operations contribute to our lower mortality we had, as emergency operation is being considered strong factor for in-hospital mortality.[7,8]

In our study, 19 patients (12.8%) had reopening for various reasons; 12 patients for bleeding (8.1%) while 4 patients for tamponade(2.7%) and 3 (2.0%) for arrest. However Hiroyuki [4]and his colleagues had reopening rate of 11% while Jodati[8] and his colleagues had reopening rate of 8.3% which is close to our results despite the fact that not all patients included in the above two studies were more 70 years of age. On the other hand, a study conducted byCzerny and his colleagues ,on patients above75 years of age ,had reopening rate of 17.2%.The higher reopening rate in comparison to primary CABG is related to the fact that in redo surgery more adhesions requiring more dissections.

Regarding cerebrovascular events, 5patients in our study (3.4%) had permanent stroke while Jodati and his colleagues (8) had 4.2%,

though all our patients were above 70 years. Moreover, Hiroyuk had incidence of (11%).This is a bit higher than the primary CABG ,mostly because all patients are above the age of 70 with highr possibility of encountering atherosclerosis in the aorta and carotids. AF developed in 41 patients (27.7%) which is close to others like Czerny who reported incidence of 34.6%.

Conclusion

Perioperative morbidity and mortality rise with increasing age in patients undergoing redo CABG, however our results show good survival rate, acceptable morbidity and 30 days mortality in this high-risk group. Redo CABG in patients over 70 should not be a reason to exclude them from thispotntially beneficial intervention.

Limitation of study

It is retrospective study on prospectively collected data, though our follow up was complete for all patients. It remains that our results could not be free from random bias which is found in similarly performed analysis on other studies.

Reference

1. **Di Mauro M, LacoAl, Contini M, Teodori G, Vitolla G, PanoM, *et al.*** Reoperative coronary artery bypass grafting:analysis of early and late outcomes. *AnnThoracSurg* 2005;79:81-7.
2. **V.R machiraju, HartzellV. Schaff, LarsG. Svensson.** *Redo cardiac surgery in adults*ISBN:978-1-4614-1325-7(PRINT)978-1-4614-1326-4(ONLINE).
3. **Ibrah Kara, anturkCakalagaoglu, asinAy, aleh Al Salehi, ehmetYanartas, useyin, engizKoksal.** eoperative coronary artery bypass surgery: he role of on-pump and off-pump techniques on factors affecting hospital mortality and morbidity. *AnnThoraccardiovascsurg* 2013;19:435-440.
4. **Hiroyuki Nishi, MasatakaMitsuno, Mitsuhiro Yamamura, *et al.***Safe Approach for Redo Coronary Artery BypassGrafting - Preventing Injury to the Patent Graft to the Left AnteriorDescending Artery. *AnnThoracCardiovasc Surg* 2010 Aug; 16(4):253-8.
5. **Engin Usta, RaoofElkrinawi, AdrianUrsulescu, *et al.*** clinical outcome and quality of life after reoperativeCABG;Off-pump versus on –pump-observational pilot study.Journal of cardiothoracic surgery 2013;8:66.
6. **Sabic JF, BlackstoneEH, HoughtalingPL, WaltsPA, Lytle BW.** Is reoperation still a risk factor in coronary artery bypass surgery? *Ann Thorac Surg* 2005;80:1719-27.
7. **KonstantantinosSpiliotopoulos,Manjula, StephanieBrister,**andVivekRaoChanging pattern of reoperative coronary artery bypass grafting :A 20-year study. *AnnThoracSurg* 2011;92:40-7.
8. **AR Jodati. MA Yousefinia.** Reoperative coronary artery bypass grafting:analysis of early and late outcomes.*RMJ*2008;33(1):37-40.
9. **Luc Noyez, FransM. vanEck.** Long –term cardiac survival after reoperative coronary artery bypass grafting. *European journal of cardio-thoracic surgery*25 (2004)59-64.
10. **Yamamuro M, Lytle BW ,Sapp SK, Cosgrove DM 3rd,Loop FD, McCarthyPM.** Risk factors and outcomes after coronary reoperation in 739 elderly patients. *AnnThorac Surg* 2000 Feb:69(2)464-74.
11. **Blanche C, Kahn SS, Chaux A, Denton TA, Sandn M,** Cardiac reoperations in octogenarians: analysis of outcomes. *AnnThoracSurg* 1999;67:93-8.
12. **Frans M.VAN Eck LucNoyez, FreekW.A.Verheugt.and Rene M H J.Brouwer.** Analysis of mortality within the first six months after coronary reoperations. *AnnThoracSurg* 2002;74:2106-12.
13. **He GW, AcuffTE, Ryan WH, Bowman RT, Douthit MB, Mack MJ.** Determinants of operative mortality in elderly patients undergoing coronary artery bypass grafting:emphasis on the influence of internal mammary artery grafting on mortality and morbidity. *LThoraccardiovascsurg* 1994:108;73-81.
14. **Czerny M, ZimpferD, KiloJ, GottardiR, WolnerE, GrimmM.** Redo coronary artery bypass grafting with and without cardiopulmonary bypass in the elderly. *Heartsurg forum* 2003;6(4):210-5.
15. **Lytle BW. Coronaryreoperations.** *Coronary artery disease* 1993;4:703-6.
16. **Syed shahabuddin, JunaidAlamAnsari, FahadJawaidSiddiqui, *et al.*** Redo coronary artery surgery;early and intermediate outcomes from a tertiary care hospital in a developing country. *JPMA* 61:31;2011.