

Outcomes of Left Main Coronary Artery Revascularization after Percutaneous Coronary Intervention or Coronary Artery Bypass Grafting Surgery

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ABSTRACT

Background: Our study's major goal is to examine how several existing ULMCAD Currently, percutaneous coronary intervention (PCI) and coronary artery bypass grafting are the most common non-invasive methods of treating (unprotected left predominant) CAD in the United States (CABG).

Place of study and duration: Conducted at the department of Cardiology, Hayatabad Medical Complex, Peshawar for the Duration from July 1 -2016 to Jun 30 -2017.

Methods and Results: The effects of PCI and CABG have been analyzed in 558 patients with ULMCAD in a row (suggest age 71.9 years, eighty-one percent male). The most important end results were a total prevalence of mortality, nonfatal MI, and stroke. Diabetes prevalence increased to 29 percent, whereas acute coronary syndrome increased to 56 percent and 11 became the standard Euro SCORE. An extremely complicated form of coronary disease affected 50% of the patients (SYNTAX score >32). Up to four years after PCI and CABG, the primary composite outcomes were equivalent (15, 53, 1 percent vs. 17, 126.6 percent; $p=0.585$). Additionally, the impacts on the top findings were equivalent for the 2 cohorts with similar propensity ratings. Revascularization was required in 5.5 percent of PCI patients and 1.5 percent of CABG patients, respectively, due to ischemia ($p=0.010$).

Conclusions: According to our local network of ULMCAD patients, the long-term scientific outcomes of the present PCI or CABG revascularization procedures were equivalent. No matter the intricacy of the coronary artery.

INTRODUCTION

Unprotected left predominant coronary artery disease (ULMCAD), which puts a lot of myocardium at jeopardy, is linked to a higher risk of serious adverse events. Coronary artery skip grafting is the preferred revascularization method for ULMCAD (CABG). [1-3]. Due to advancements in drug-eluting stent (DES) technology, antithrombotic drugs, procedural techniques, and interventional cardiologists' experience, PCI has been increasingly more widely employed over the last 10 years for the treatment of ULMCAD. Given that PCI in ULMCAD has shown encouraging results in both large registries and randomized clinical trials (RCTs) guidelines now recommend treatment as a viable option to CABG in certain patients (70 percent in Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization (EXCEL) trial, produced results that were inconsistent over an extended period of time, raising concerns about the best revascularization method for ULMC [4-6]. The medical outcomes of PCI and CABG revascularization for ULMCAD are similar, even if their effectiveness in "real world" conditions is still debatable. We need to compare the medical outcomes of ULMCAD patients treated with PCI with those treated with CABG using the local population treated at a high-volume referral Centre. Both methods are carried out in accordance with modern technology and international medical standards [7].

MATERIAL AND METHODS

Study Population: The inclusion criteria for this research were ULMCAD patients who had revascularization at our high-volume (PCI procedures >1500) facility between July 1, 2016, and June 30, 2017. In Peshawar, Hayatabad Medical Complex is a referral facility for CABG operations (more than 500 are carried out yearly). The original definition of ULMCAD used a 50 percent or more de novo stenosis of the left main coronary artery. Acute coronary syndromes and patients with solid coronary artery disease have both been included. The SYNTAX algorithm, version 16, was used to assign a grade to every angiogram. Each angiography was given a grade using the SYNTAX algorithm, version 16. The chosen revascularization strategies were intended to provide the optimal revascularization for each patient. A logistic Euro SCORE was used to evaluate each patient's risk of surgical complications, with a score of indicating a high likelihood of problems [8-10]. The most current iteration of DES was used in each PCI scenario.

Patients with common or seemingly modest side branches benefitted better with a single-stent method for distal left primary illness, but those with disease inside the ostia and proximal quantities of the left anterior descending and circumflex arteries required a double-stent approach. The use of noncompliant balloons for kissing balloon inflation and proximal optimization has been standard practise throughout the history of stenting. It was recommended that a vascular system be guided using intravascular ultrasonography. Initial angiography showed at least 70% obstruction in a couple major coronary arteries, so we knew we were dealing with serious disease. If a TIMI go with the drift grade three was performed with residual stenosis of 30% on visual evaluation inside the three main coronary arteries and their branches >2 mm in diameter, then the entire coronary revascularization was performed during the index hospitalisation or anytime within 30 days of ULMCAD PCI, as described anatomically.

Aspirin (75 mg once day forever), ticagrelor (90 mg BID), and clopidogrel were examples of long-term antithrombotic medications (seventy-five mg day by day). The DAPT therapy protocol has been discussed for possible expansion (greater than 12 months). Antiplatelet agent was administered to those who suffered from Acute Coronary Syndrome and/or serious coronary disease.

Modern scientific training also recommended taking statins, beta-blockers, and angiotensin-converting enzyme medications where indicated. Because angiography was deemed essential for scientific grounds, it was approved as an emergency treatment. In order to execute complete anatomical revascularization, CABG techniques were carried out in accordance with accepted procedures, as was indicated for the PCI group. Bilateral inner mammary artery (BIMA) grafts and the off-pump approach are advised to be used whenever feasible. The ascending aorta, ventricles, and heart valves may all be assessed during surgery using transesophageal echocardiography. Every patient received aspirin in the weeks before to surgery. Modern standards propose giving antithrombotic medication to patients undergoing CABG. The examination has received approval from the institution's ethics committee and closely conforms to the moral standards outlined in the Declaration of Helsinki. Every participant in the test provided their permission, or that of their legal guardian.

Study Outcomes: Each PCI case used DES in its most recent iteration. Single-stent surgeries were more beneficial for patients

with disease in the distal left main artery than for those with disease in the ostia and proximal parts of the left anterior descending and circumflex arteries. Over the course of the study's four-year follow-up, the researchers looked at outcomes including all-cause mortality, non-fatal myocardial infarction, and stroke incidence. Primary outcomes were defined as death due to ischemia and revascularization procedures, whereas secondary outcomes included everything else. Stroke is defined by medical experts as neurological dysfunction lasting more than 24 hours. After index surgery, symptoms and/or ischemia dictate the need for revascularization treatment.

Follow-Up: Every patient was checked on after one month, after six months, after a year, and then once a year after that. The prospective database is made up of information from several different sources, including hospital readmission records, referral forms, family members, and publicly available vital statistics.

Statistical Analysis: Categorical information is represented through frequencies, while non-stop information is defined through the mean, popular deviation, median, and interquartile range. To evaluate discrete and non-stop variables, we hired both the unpaired two-tailed Student's t-check or the Mann-Whitney rank-sum check. Using the Kaplan-Meier method, we have been capable of generate a cumulative occurrence curve, and the log-rank check became used to become aware of statistically huge variations among the businesses. The impartial contributions of clinical, angiographic, and procedural elements to the number one final result have been assessed by using multivariate regression evaluation the usage of the Cox proportional risks version. Factors including diabetes, a SYNTAX rating of 32 or higher, and a Euro SCORE of thirteen are accounted for withinside the version, at the side of revascularization operations. (Percutaneous coronary intervention or coronary artery pass grafting). We have been capable of save you overfitting through proscribing the quantity of impartial variables in every pattern to a hundred or much less. For every predictor category, we plotted log (log) survival curves in opposition to log survival instances and searched for parallelism among the curves to visually compare and affirm that the proportional threat assumption became true. Since the authentic pattern did now no longer encompass any STEMI sufferers, we carried out a sensitivity examine to peer how the version could carry out below different conditions. An prolonged evaluation of the connections became performed the usage of a Cox proportional risks version. In order to decrease the capacity of bias and overfitting provided through the examine's nonrandomized design, every patient's propensity rating became calculated relying on whether or not they have been much more likely to acquire PCI or CABG. Age, male gender, diabetes mellitus, acute coronary syndrome, left ventricular ejection fraction (LVEF) 40%, three-vessel disease, continual entire occlusion of the proper coronary artery, SYNTAX rating >32, and Euro SCORE have been all covered withinside the version. The C statistic became used to examine version discrimination, and the Hosmer-Lemeshow check became used to examine version goodness of fit. Next, a Cox multivariate evaluation became performed, with the propensity rating covered as a non-stop covariate. A matched evaluation became additionally carried out to manipulate for capacity confounding variables among the percutaneous coronary intervention and coronary artery pass graft revascularization cohorts. To accurate for propensity rating modifications because of the unbalanced features (SYNTAX rating >32, LVEF 40%, diabetes, and Euro SCORE >thirteen), information have been preferably matched (1:1) in a randomised series the usage of the greedy-matching approach. Researchers in comparison the standardized distinction among the 2 businesses earlier than and after matching to envision whether or not there has been a discount in bias (a fee of 10 percentage or much less shows a negligible imbalance). After matching became entire, the usual deviation dropped through nine percent factors from its preliminary ascent of sixty-seven percentage. A Kaplan-Meier evaluation became carried out after sufferers have been matched to evaluate

effects at 4 years for the principal endpoint. We calculated the HR and 95% self-assurance c programming language for that risk (CI). Two-tailed exams have been run in every instance. The cutoff factor for statistical importance became set at 0.05. The research has been performed the usage of SPSS, model 21, a statistical programme.

RESULTS

Patient Population and Procedural Outcome: This research looked at 558 people who had revascularization for ULMCAD in a row (52 percent vs. 48 percent in PCI and CABG groups, respectively). Table 1 contains a list of the baseline's most significant components for your convenience. Left ventricular dysfunction and ST-elevation myocardial infarction were more prevalent in PCI patients than in CABG patients (10 percent vs. 2 percent; 0.001). (28 percent as opposed to 14 percent; p 0.001). 19% of the total number of patients, or 107, were female. 47 (17%) patients received coronary artery bypass grafting, while 60 (20%) patients underwent percutaneous coronary intervention. Clopidogrel was administered to only 12% of PCI patients, whereas ticagrelor or prasugrel was given to 84% of patients; 13 of these patients had to switch to a stronger P2Y12 inhibitor after developing HTPR.

Table 1: Baseline characteristics.

	All (n = 558)	PCI (n = 288)	CABG (n = 270)	p value
old age	71 ± 9	72 ± 10	71 ± 8	0.487
>75 years	242 (43%)	72 ± 10	114 (42%)	0.597
gender male	451 (81%)	228 (80%)	223 (83%)	0.387
Diabetes	162 (29%)	69 (24%)	93 (34%)	0.011
Hypertension	424 (75%)	210 (73%)	214 (79%)	0.079
Dyslipidemia	349 (62%)	172 (60%)	177 (66%)	0.154
ACS	313 (56%)	157 (54%)	156 (58%)	0.438
STEMI	32 (6%)	28 (10%)	4 (2%)	<0.001
NSTEMI	228 (41%)	117 (41%)	111 (41%)	0.907
a prior MI	156 (28%)	77 (26%)	79 (29%)	0.507
Earlier CABG	4 (1%)	2 (1%)	2 (1%)	0.948
kidney failure	93 (17%)	42 (15%)	51 (19%)	0.173
Smoker	94 (17%)	49 (17%)	45 (17%)	0.869
LVEF ≤0.40	119 (21%)	82 (28%)	37 (14%)	<0.001
Euro SCORE	11 ± 8	10 ± 8	12 ± 7	0.028
LVEF	50 ± 12	47 ± 13	52 ± 10	<0.001
Euro SCORE >13	11 ± 8	71 (24%)	88 (33%)	0.038

Table 2: The angiographical and surgical features.

	PCI (n = 288)	CABG (n = 270)	p value
LM distal	272 (95%)	228 (84%)	<0.001
a three-vessel condition	90 (31%)	155 (57%)	<0.001
CTO	75 (26%)	74 (27%)	0.790
RBC CTO	48 (17%)	59 (21%)	0.147
Score SYNTAX > 32	123 (43%)	158 (59%)	<0.001
Rotational thrombectomy	21 (7.3%)	—	
IVUS	217 (76%)	—	
Patient-specific stent insertion rate during the baseline procedure	2.7 ± 0.9	—	
IABP	30 (10%)	—	
maximum air pressure (atm)	21 ± 3	—	
most inflation pressure (atm)	66 (23%)	—	
Multivessel PCI	263 (91%)	—	
Effective CTO PCI	60/70 (86%)	—	
CABG's heartbeat	—	218 (81%)	
BIMA	—	157 (58%)	
Mean venous graft	—	0.8 ± 0.7	—
Revascularization in its entirety	233 (81%)	233 (86%)	0.086
Average hospitalisation (days)	4.7 ± 3	10.3 ± 5	<0.001

58% of CABG patients selected for a BIMA graft, while 81% of CABG patients preferred an off-pump approach. Left main

stenting with a second-generation DES was performed in all PCI patients, and intravascular ultrasonography was employed in 74% of stent implantations (IVUS). Among all patients, 83% achieved successful revascularization; however, among those who got CABG, 86% did, and only 83% did among those who underwent PCI ($p=0.086$). In contrast, PCI patients spent much less time in the hospital overall (4.3 vs. 10.5 days; $p=0.001$). 58% of CABG patients selected for a BIMA graft, while 81% of CABG patients preferred an off-pump approach. Left main stenting with a second-generation DES was performed in all PCI patients, and intravascular ultrasonography was employed in 74% of stent implantations (IVUS). Among all patients, 83% achieved successful revascularization; however, among those who got CABG, 86% did, and only 83% did among those who underwent PCI ($p=0.086$). In contrast, PCI patients spent much less time in the hospital overall (4.3 vs. 10.5 days; $p=0.001$).

Patients' Effects: Patients were often followed up with for a full three years after their treatment had concluded. There was no statistically significant difference between the PCI and CABG groups in the cumulative incidence of the primary composite outcome over the first four years following therapy (15.53.1 percent vs. 17.12.6 percent, respectively; $p=0.585$). Patients with severe coronary complexity (left main and three-vessel disease; 15% vs. 17%, $p=0.7$) had comparable outcomes in the PCI and CABG groups. Overall, there was no significant difference in mortality across the three groups (11.1%, 15.2%, and 2.5%; $p=0.44$). Table 3 displays some more findings from our early research. Only 8% of patients required revascularization due to ischemia; however, this rate was significantly higher in the PCI cohort than in the CABG group (6 vs. 2%; $p=0.010$).

Table 3: Clinical outcomes.

	PCI (n = 288)	CABG (n = 270)	p value
two-year results			
first endpoint	28 (10%)	27 (9.6%)	0.1
absolute demise	24 (7.9%)	24 (8.5%)	0.812
heart failure	16 (5.2%)	16 (5.5%)	0.86
Unexpected MI	5 (1.4%)	3 (0.7%)	0.4
Stroke	3 (0.6%)	5* (1.4%)	0.6
revascularization brought on by ischemia	18 (5.9%)	6(1.8%)	0.01

Table 4:

	PCI (n = 202)	CABG (n = 202)	p value
old years	72 ± 10	71 ± 9	0.463
>75 years of age	94 (46%)	80 (40%)	0.191
Men's gender	158(79%)	167 (83%)	0.362
sweet diabetes	54 (26%)	53 (26%)	0.863
Hypertension	136 (67%)	148 (73%)	0.193
Dyslipidemia	124 (61%)	134 (65%)	0.353
Previous MI	56 (27%)	58 (28%)	0.824
Renal failure	33 (16%)	59 (28%)	0.677
ACS	103 (50%)	103 (50%)	0.921
NSTEMI	84 (41%)	74 (36%)	0.306
LVEF	51 ± 11	53 ± 11	0.111
LVEF ≤0.40	37 (18%)	37 (18%)	0.999
Euro SCORE	9.7 ± 1.2	10.7 ± 1.2	0.414
Revascularization in its entirety	162 (80%)	178 (88%)	0.029
Average hospital stay, in days	5 ± 3	10 ± 5	<0.001

Both the composite primary endpoint and its component parts were associated with Euro SCORE (HR 2.00; 95% CI 1.27 to 3.18; $p=0.003$), as were the individual components of Euro SCORE (HR 3.71; 95% CI 2.35 to 5.85; $p<0.001$) and C statistic = 0.63, $p<0.001$; $p=0.003$). No other demographic factors, including age, gender, race/ethnicity, smoking status, or diabetes mellitus, were shown to be significantly correlated with Euro SCORE. Once ST-elevation myocardial infarction patients were excluded from the analysis, it was shown that the revascularization technique (PCI

vs. CABG) was not independently related with the composite primary outcome (HR 0.882; 95 percent CI: 0.55 to 1.41; ($p=0.599$)). Using propensity score matching, we identified a sample of 404 individuals with similar sociodemographic and clinical features at baseline (1:1). Patients with severe coronary complexity (left main and three-vessel disease; 17.2 percent vs. 16.1 percent, $p=0.634$) had similar outcomes in the PCI and CABG groups. The characteristics of the initial and matched populations are listed in Table 4.

DISCUSSION

Patients with ULMCAD who participated in studies and meta-analyses over the last decade showed comparable long-term results regardless of revascularization approach, while those who had PCI were more likely to have their target vessels revascularized [9-12]. Our study's findings provide credence to the idea that PCI and CABG provide equivalent benefits for patients with ULMCAD in a community setting, independent of whether or not they have three-vessel disease and/or extremely convoluted coronary anatomy. Our findings generalise the findings of previous randomised controlled trials to an unselected real-world population. Disease severity, coronary complexity, and severity of clinical presentation are all generally higher in this population. Comparatively, the patients in the EXCEL and NOBLE studies were younger (median age = 66) and healthier (mean Euro SCORE = 2%) than the patients in our research. While only 8% of patients in the NOBLE trial and 25% of patients in the EXCEL trial had severe coronary complexity (SYNTAX score >32), we found that 25% of patients in the EXCEL trial had a SYNTAX score >32 thanks to a post hoc core lab examination [13-17]. Revascularizing using cutting-edge methods Off-pump PCI and CABG, full revascularization, second-generation DES, a high incidence of intracoronary imaging in the PCI group, arterial grafts, and BIMA all contributed to the good clinical outcomes seen in our research. The results of the aforementioned randomised controlled trials may have been different if a different methodology had been utilised. Ten percent of participants in the NOBLE study were administered first-generation DES, and aspirin and clopidogrel were used for all patients instead of the most recent P2Y12 inhibitors. Patients undergoing PCI for ACS were given aspirin and clopidogrel in the vast majority in the EXCEL study. Therefore, the new class of antiplatelet medicines known as P2Y12 inhibitors showed little success. Further, the HTPR has never been the subject of a randomised controlled trial. Of the 592 patients treated with PCI in the NOBLE trial, 543 (92% of them) achieved complete revascularization; in contrast, just 24.80% of the CABG group in the EXCEL study did so. Additionally, the EXCEL research found that the PCI group had a higher all-cause mortality rate than the CABG group, even though 58 of the 119 deaths in the PCI group were determined to have been caused by factors other than cardiovascular disease (13 percent vs. 9.9 percent). Longitudinal comparisons of clinical outcomes after PCI and CABG have been made in other large registries [18-20].

However, Zheng et al. a single-center analysis comprising 4,046 patients between 2004 and 2010, revealed that CABG was connected with improved results at 3 years, particularly in patients with more complicated illness. Although innovative procedures were not employed in PCI revascularization the MAIN-COMPARE registry found that clinical outcomes were improved 10 years after CABG. Data from these registries was extrapolated from younger people with a lower risk Euro SCORE and simpler coronary morphology than the participants in our research. Complete coronary revascularization was either not reported at all or had a very low rate. Therefore, from the perspective of a regional community, the information included in our referral register represents a new resource [21]. These patients tended to be more severely sick than the general population, with a greater frequency of advanced disease, a more complicated coronary architecture, and a more severe clinical presentation. Patients in the EXCEL and NOBLE trials had a lower mean Euro SCORE (2%) and were

younger (median age = 66) than those in our study. Our research had a substantially greater number of patients with severe coronary complexity (SYNTAX score >32) compared to the NOBLE trial (8% of patients) and the EXCEL trial (25% of patients) [22]. While conducting research, it is essential to apply some limits to our results. First, since it was conducted as an observational study, this research cannot establish any causal relationships. Even though we used multivariate analysis, it is still possible that other variables had an impact on our findings. If we test too many variables, overfitting might occur. Some confounders persisted because of the structure of the study, despite the fact that the propensity score-adjusted analysis was intended to reduce their impact. We were limited in our ability to analyse considerably larger patient associates, which would have allowed for substantially longer continuation, due to our decision to only include patients who had had PCI or CABG during the previous few years [23]. All registries have their drawbacks, but we think our study's findings provide fresh and therapeutically relevant understandings into the consequences of surgical or interventional revascularization for LMCAD in the real world [24-25].

CONCLUSION

In conclusion, whether high-risk patients have PCI or CABG for myocardial revascularization, the effects of ULMCAD and complicated coronary architecture are comparable. Throughout the decision-making process, it is important to consider all relevant clinical factors, including the SYNTAX score, anatomic and procedural complexity, functional and performance status and anatomic and procedural complexity.

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