

Systematic Review

THE IMPACT OF SYNTAX SCORES ON THE LONG-TERM OUTCOMES OF CORONARY ARTERY BYPASS GRAFTING AND PERCUTANEOUS CORONARY INTERVENTION FOR LEFT MAIN CORONARY ARTERY DISEASE

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ABSTRACT

The Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery (SYNTAX) score was designed to predict the post-procedural risk associated with percutaneous coronary intervention (PCI) or surgical revascularization. This study aimed to evaluate the long-term outcomes of PCI and coronary artery bypass grafting (CABG) by comparing several existing studies. A systematic search was performed using the PubMed (MEDLINE) and ScienceDirect databases. This systematic review included studies that examined differences in the outcomes of PCI and CABG for left main coronary artery (LMCA) stenosis. This was a systematic review study in which we reviewed original cross-sectional and cohort studies. The search was conducted from February 1st until February 2nd, 2023. The quality assessment of the studies was carried out using the criteria outlined in the Newcastle-Ottawa Scale (NOS). According to the final assessment, all the original research included had a mean NOS score of 8, indicating excellent quality. The literature search yielded 1,675 studies, five of which were selected for the final analysis. A total of 5,494 patients underwent PCI and CABG. This study found that there were variations in outcomes among patients with low, medium, and high SYNTAX scores for long-term major adverse cardiac or cerebrovascular events (MACCE) and long-term mortality. However, similar outcomes were observed in long-term revascularization, long-term stroke, and long-term myocardial infarction (MI). This study concluded that patients with LMCA stenosis and SYNTAX scores ranging from low to high may have different long-term outcomes. CABG is associated with a lower incidence of mortality, repeat revascularization, MI, and MACCE compared to PCI. On the other hand, an association exists between PCI and a lower incidence of stroke.

Keywords: Cardiovascular disease; SYNTAX score; percutaneous coronary intervention; coronary artery bypass grafting; left main coronary artery disease

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Highlights:

1. This study performed a comparison analysis of coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) utilizing the SYNTAX scores, which have been overlooked in prior research.
2. The analysis presents valuable evidence demonstrating the superior effectiveness of CABG in comparison to PCI with regard to long-term outcomes, specifically mortality, revascularization, myocardial infarction, and major adverse cardiac or cerebrovascular events.

INTRODUCTION

In recent years, there have been numerous studies investigating the concurrent use of coronary artery bypass grafting (CABG) and percutaneous coronary

intervention (PCI) with stenting. The studies concerned the efficacy of procedures for treating dysfunction in the left main coronary artery (LMCA) (Lee et al. 2016, Park & Park 2017). PCI has been acknowledged as a suitable intervention for

particular patients with LMCA disease. It has been found that PCI is safe and effective for individuals who have low to intermediate anatomic complexity when compared to CABG (Head et al. 2018, Stone et al. 2019).

The 10-year follow-up of the Premier of Randomized Comparison of Bypass Surgery versus Angioplasty Using Sirolimus-Eluting Stent in Patients with Left Main Coronary Artery Disease (PRECOMBAT trial) revealed that there were no significant differences in the use of drug-eluting stents and CABG. Some of the intervention outcomes were mortality as well as severe composite outcomes of death, major adverse cardiac or cerebrovascular events (MACCE), myocardial infarction (MI), and stroke (Park et al. 2020). Several conditions and comorbidities significantly influence the outcome of revascularization. Risk factors such as smoking, alcohol consumption, sedentary lifestyle, diabetes mellitus, and hypertension may negatively impact the outcome of revascularization procedures (Mehta et al. 2019).

The Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery (SYNTAX) is a tool that researchers developed to help assess the anatomical complexity of coronary artery disease. Additionally, the SYNTAX score can be employed to evaluate the severity of multivessel coronary artery disease (CAD) (Li et al. 2017). The most recent guidelines in the United States and Europe recommend assessing the severity of patients with LMCA disease using the SYNTAX score. After determining the SYNTAX score, clinicians have the option to select the ideal revascularization strategy for the patient. Although the SYNTAX score offers benefits, recent randomized clinical trials have revealed its limitations. The utilization of the tool to compare the outcomes of PCI and CABG is challenging. The patients who enrolled in previous trials had less complex anatomical structures with low to intermediate SYNTAX scores (Mäkikallio et al. 2016, Neumann et al. 2019). Consequently, the findings of these trials could not accurately represent the impact of the SYNTAX scores among the patients. Furthermore, a follow-up duration of less than 5 years was inadequate to ascertain the efficacy of revascularization strategies or assess their long-term effects. Hence, our objective was to review the impact of the SYNTAX score on the long-term outcomes of CABG and PCI for LMCA disease through a comparative analysis of several recent studies.

MATERIALS AND METHODS

In this systematic review, we performed an analysis

of multiple cross-sectional and cohort studies. This study reviewed scientific articles that reported the outcomes of CABG and PCI in relation to the SYNTAX scores. The subjects were patients who had been diagnosed with LMCA disease and were monitored with a follow-up duration of at least five years. The exclusion criteria encompassed papers published in languages other than English, studies unrelated to the topic of this systematic review, articles with insufficient or unavailable data, studies with a follow-up duration of less than five years, and duplicates. The data were compiled and analyzed using the 2020 Preferred Reporting Items for Systematic Review and Meta Analysis (PRISMA 2020) (Page et al. 2021).

The data were extracted from a total of 5,494 research subjects documented in five studies, which were published in English-language international publications. We conducted a literature search between February 1st and February 2nd, 2023, to obtain the five research papers. The search was performed on multiple search engines, including PubMed (MEDLINE) and ScienceDirect, using specific keywords "SYNTAX Score AND Outcome AND (PCI OR Percutaneous Coronary Intervention) AND (CABG OR Coronary Artery Bypass Grafting OR Coronary Artery Bypass Surgery) AND (Left Main Coronary Artery OR Left Main Coronary Artery Disease)". We focused on searching for studies that examined the impact of the SYNTAX score on the long-term outcomes of CABG and PCI for LMCA disease. The Rayyan software (<https://www.rayyan.ai/>) was the tool used for managing the reference sources in this study (Ouzzani et al. 2016).

The studies' quality was assessed according to the criteria set forth by the Newcastle-Ottawa Scale (NOS). A study's quality was deemed "good" if the NOS evaluation resulted in scores of 3 or 4 stars for selection, 1 or 2 stars for comparability, or 2 or 3 stars for outcomes. A study was classified as "fair" if it received a rating of 2 stars for selection, 1 or 2 stars for comparability, or 2 or 3 stars for outcomes. A categorization of "poor" was assigned when the score was 0 or 1 star for selection, 0 star for comparability, or 0 or 1 star for outcomes (Sharmin et al. 2017). The systematic review compared studies that had been evaluated through a rigorous screening process, ensuring that the populations involved appropriately represented patients with coronary artery disease worldwide. In addition, the studies were considered eligible if they exhibited good comparative and exposure characteristics, a sufficient follow-up duration, and a relatively low rate of participant dropout. If the final assessment had a mean NOS score of at least 7, the studies were deemed to be of excellent quality.

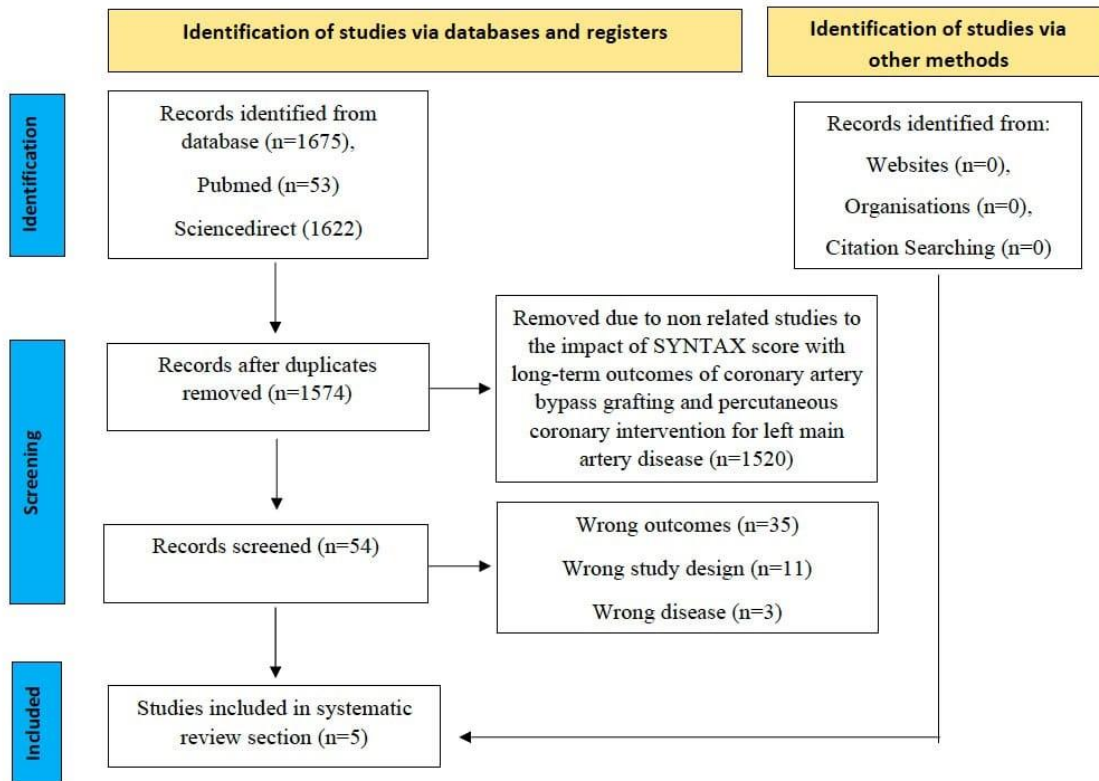


Figure 1. PRISMA flow diagram for the process of article selection.

RESULTS

A total of 1,675 journals were acquired from the electronic databases. After eliminating duplicates and carefully evaluating the titles, keywords, and abstracts, a total of 1,574 papers were identified as not meeting the research's criteria. Furthermore, we excluded 49 journal articles due to inconsistent outcomes, incompatible study designs, and irrelevant diseases. Thus, our analysis only examined five relevant cohort studies (Figure 1).

The five selected studies reported on a total of 5,494 patients, with 2,691 patients receiving PCI and 2,803 patients undergoing CABG. Three of the five papers documented prospective studies, while the remaining two presented a retrospective study and a randomized clinical trial (RCT). The investigations included prospective observational studies, international multicenter randomized trials that utilized the SYNTAX score evaluation, and an open-label RCT known as the PRECOMBAT trial. The SYNTAX score was assessed preoperatively. It was found to be associated with the long-term and late outcomes of interventions for LMCA disease, including mortality, revascularization, MI, stroke, and MACCE. The SYNTAX score was classified into three distinct groups: low, intermediate, and

high. Morice et al. (2014) and Yoon et al. (2020) revealed that the incidence of MACCE and its components were identical in patients who underwent PCI or CABG and had low or intermediate SYNTAX scores. Therefore, they merged these groups into a single category.

Table 1 presents a concise summary of the baseline features of the selected studies. It provides a comprehensive overview of the key attributes of the five studies included in this review. The publication dates of all the papers range from 2013 to 2020. A study took place in seventeen countries; another study was conducted in the USA and Europe; two studies were conducted in Korea; and one study was carried out in Japan. A total of 2,691 patients underwent PCI, while 2,803 patients received CABG. Each of these patients was measured for their preoperative SYNTAX score. The follow-up periods varied, ranging from five to ten years. Three studies had a follow-up duration of five years, while two studies had a follow-up duration of ten years.

One study did not mention any details regarding the participants' risk factors. The four remaining studies predominantly consisted of male participants, with an average age of 60 years. The mean age was 59.8±16 for the youngest participants and 69.4±12.1

for the oldest ones. Diabetes, hypertension, and dyslipidemia were among the comorbidities reported by the participants. In three studies, hypertension appeared as the most common comorbidity, with prevalence rates of 50.44%, 51.7%, and 85%. Lee et al. (2021) documented the highest prevalence of dyslipidemia at 41.5%, while Yoon et al. (2020) and Shiomi et al. (2015) recorded rates of 34.24% and 22.8%, respectively. The study

by Shiomi et al. (2015) showed the highest prevalence of diabetes mellitus at 44.3%, whereas the study by Mohr et al. (2013) captured the lowest prevalence at 26.96%. Another identified risk factor was current smoking, with prevalence rates of 37.61%, 28.9%, and 23.4% reported in three studies.

Table 1. Baseline features of the five included studies.

Authors, publication year	Countries	Populations (n)		Age (years)	Males (%)	HT (%)	Ds (%)	Cs (%)	DM (%)	Follow-up durations
		PCI	CABG							
Morice et al. (2014)	17 countries (MCS)	346	322	NA	NA	NA	NA	NA	NA	5 years
Yoon et al. (2020)	Korea	819	761	60.3±16.3	71.51	50.44	34.24	37.61	32.27	10 years
Lee et al. (2021)	Korea	291	275	59.8±16	76.5	51.7	41.5	28.9	NA	10 years
Shiomi et al. (2015)	Japan	364	640	69.4±12.1	74.5	85	22.8	23.4	44.3	5 years
Mohr et al. (2013)	USA and Europe	871	805	65.1	83.41	NA	NA	NA	26.96	5 years

Notes: MCS=multicenter study; PCI=percutaneous coronary intervention; CABG=coronary artery bypass grafting; HT=hypertension; Ds=dyslipidemia; Cs=current smoking; DM=diabetes mellitus; NA=not available.

Table 2. SYNTAX scores and the long-term outcomes of CABG and PCI for LMCA disease.

Authors, publication year	Study designs	Revascularization methods	SYNTAX scores	Long-term mortality HR (95% CI)	Long-term revascularization HR (95% CI)	Long-term MI HR (95% CI)	Long-term stroke HR (95% CI)	Late MACCE HR (95% CI)
Morice et al. (2014)	International multicenter prospective randomized trial with the SYNTAX trial	PCI (Drug-eluting stents)	Low to intermediate (≤32)	0.71 (0.44–1.14)	1.23 (0.79–1.91)	1.58 (0.63–3.95)	0.35 (0.09–1.35)	0.94 (0.67–1.33)
			High (≥33)	1.23 (0.76–1.98)	3.30 (1.86–5.88)*	1.88 (0.82–4.30)	0.32 (0.07–1.54)	1.78 (1.21–2.63)*
		CABG	Low to intermediate (≤32)	0.71 (0.44–1.14)	1.23 (0.79–1.91)	1.58 (0.63–3.95)	0.35 (0.09–1.35)	0.94 (0.67–1.33)
			High (≥33)	1.23 (0.76–1.98)	3.30 (1.86–5.88)*	1.88 (0.82–4.30)	0.32 (0.07–1.54)	1.78 (1.21–2.63)*
Yoon et al. (2020)	Prospective observational	PCI (Bare-metal and drug-eluting stents)	Low to intermediate (≤32)	1.10 (0.78–1.54)	4.78 (2.59–8.85)*	NA	NA	1.17 (0.84–1.62)
			High (≥33)	1.39 (1.00–1.92)*	8.29 (4.79–14.34)*	NA	NA	1.27 (0.94–1.74)
		CABG	Low to intermediate (≤32)	1.10 (0.78–1.54)	4.78 (2.59–8.85)*	NA	NA	1.17 (0.84–1.62)
			High (≥33)	1.39 (1.00–1.92)*	8.29 (4.79–14.34)*	NA	NA	1.27 (0.94–1.74)
Multicenter	PCI (Drug-	Low (<23)	1.18	n (%) = 21	n (%) =	n (%) =	0.92	

Lee et al. (2021)	prospective open-label RCT with PRECOMB AT trial	eluting stents)		(0.64–2.18)	patients (17.4%)	4 patients (3.3%)	= 2 patients (1.6%)	(0.54–1.55)
			Intermediate (23-32)	0.70 (0.36–1.36)	n (%) = 20 patients (21.4%)	n (%) = 2 patients (2.0%)	n (%) = 2 patients (2.3%)	0.70 (0.41–1.20)
			High (≥33)	1.26 (0.65–2.45)	n (%) = 18 patients (33.4%)*	n (%) = 2 patients (3.6%)	n (%) = 1 patient (2.1%)	0.66 (0.37–1.15)
		CABG	Low (<23)	1.18 (0.64–2.18)	n (%) = 10 patients (10.1%)	n (%) = 3 patients (2.9%)	n (%) = 0 patients (0.0%)	0.92 (0.54–1.55)
			Intermediate (23-32)	0.70 (0.36–1.36)	n (%) = 12 patients (13.2%)	n (%) = 1 patient (1.1%)	n (%) = 3 patients (3.3%)	0.70 (0.41–1.20)
			High (≥33)	1.26 (0.65–2.45)	n (%) = 6 patients (10.1%)*	n (%) = 2 patients (3.2%)	n (%) = 3 patients (5.1%)	0.66 (0.37–1.15)
Shiomi et al. (2015)	Retrospective CREDO-Kyoto PCI/CABG registry cohort-2	PCI (Drug-eluting stents)	Low (<23)	n (%) = 26 patients (22%)	n (%) = 48 patients (42.8%)*	n (%) = 5 patients (4.4%)	n (%) = 12 patients (10.9%)	NA
			Intermediate (23-32)	n (%) = 35 patients (28.8%)*	n (%) = 41 patients (37.1%)*	n (%) = 7 patients (6.4%)	n (%) = 9 patients (8.5%)	NA
			High (≥33)	n (%) = 26 patients (25.7%)	n (%) = 56 patients (60.0%)*	n (%) = 13 patients (13.7%)*	n (%) = 6 patients (6.5%)	NA
		CABG	Low (<23)	n (%) = 25 patients (17%)	n (%) = 20 patients (14.2%)*	n (%) = 1 patient (0.7%)	n (%) = 13 patients (9.2%)	NA
			Intermediate (23-32)	n (%) = 27 patients (16.5%)*	n (%) = 21 patients (12.8%)*	n (%) = 6 patients (4.0%)	n (%) = 10 patients (6.0%)	NA
			High (≥33)	n (%) = 47 patients (20.4%)	n (%) = 36 patients (16.4%)*	n (%) = 10 patients (4.5%)*	n (%) = 19 patients (8.6%)	NA
Mohr et al. (2013)	Prospective randomized clinical trial with nested registries	PCI (Drug-eluting stents)	Low (<23)	0.88 (0.51–1.51)	1.46 (0.99–2.16)	1.79 (0.87–3.70)	0.43 (0.15–1.26)	1.13 (0.83–1.53)
			Intermediate (23-32)	1.10 (0.70–1.72)	2.03 (1.35–3.06)*	3.11 (1.53–6.31)*	0.55 (0.20–1.53)	1.50 (1.11–2.01)*
			High (≥33)	1.84	2.86 (1.93–	2.57	0.89	1.89

			(1.19– 2.83)*	4.25)*	(1.31– 5.06)*	(0.37– 2.16)	(1.43– 2.50)*
CABG	Low (<23)	0.88	(0.51– 1.51)	1.46 (0.99– 2.16)	1.79	0.43	1.13
	Intermediate (23-32)	1.10	(0.70– 1.72)	2.03 (1.35– 3.06)*	3.11	0.55	1.50
	High (≥33)	1.84	(1.19– 2.83)*	2.86 (1.93– 4.25)*	2.57	0.89	1.89
					(1.31– 5.06)*	(0.37– 2.16)	(1.43– 2.50)*

Notes: MI=myocardial infarction; MACCE=major adverse cardiac or cerebrovascular events; CABG=coronary artery bypass grafting; PCI=percutaneous coronary intervention; HR=hazard ratio; CI=confidence interval; n=number of samples; NA=not available.

Table 2 presents a summary of the SYNTAX scores in relation to the long-term outcomes of CABG and PCI in patients with LMCA disease. The table includes data for follow-up durations of 5 years and 10 years. Among the selected studies, one paper documented a retrospective RCT. Three of the five studies used a prospective research design. Overall, the selected studies employed different research designs, including prospective observational, international multicenter randomized trials that incorporated the SYNTAX score evaluation, and multicenter open-label RCTs involving the PRECOMBAT trial. The results of this study revealed an association between the preoperative SYNTAX scores and the long-term and late

outcomes of PCI and CABG. The measured outcomes included long-term mortality, long-term revascularization, long-term MI, long-term stroke, and late MACCE. The SYNTAX scores were categorized into three groups: low, intermediate, and high. Morice et al. (2014) and Yoon et al. (2020) found that the occurrence of MACCE and its components were identical in patients who underwent PCI or CABG with low or intermediate SYNTAX scores. As a result, they merged the two groupings into a single category.

Table 3. Risk of bias assessment using the Newcastle Ottawa Scale.

Study	Selection			Comparability	Outcomes			Total score
	Representativeness of the exposed cohorts	Selection of the non-exposed cohorts	Ascertainment of exposure		Demonstration that outcome of interest was not present at start of study	Assessment of outcome	Follow-up was long enough for outcomes to occur	
Morice et al. (2014)	*	*	0	*	*	*	*	7
Yoon et al. (2020)	*	*	*	*	*	*	*	8
Lee et al. (2021)	*	*	0	*	*	*	*	7
Shiomi et al. (2015)	*	*	*	*	*	*	*	8
Yoon et al. (2020)	*	*	*	*	*	*	*	8

Note: *=the symbol denotes the presence of an assessment component in the study under evaluation.

Table 3 shows the risk of bias assessment for each study. All the studies included in the analysis exhibited a reliable selection process, as the study populations adequately represented the impact of the SYNTAX score on the long-term outcomes of CABG and PCI for LMCA disease. In addition, the

studies demonstrated good comparative and exposure aspects. The final evaluation of the studies resulted in a mean NOS score of 8, signifying that the follow-up durations were sufficient and the dropout rates were reasonably low. No bias or issues were found in the measurement or classification of outcomes in any of the studies. The statistical

analysis provided in each study was determined to have excellent methodological quality.

DISCUSSION

The SYNTAX scores in the studies exhibited the capability of assessing the severity and complexity of CAD. The data were organized using a scoring method (He et al. 2020). The European Society of Cardiology/European Association for Cardio-Thoracic Surgery (ESC/EACTS) guidelines on myocardial reperfusion recommend assigning a class I indication for CABG to patients who have LMCA disease and a SYNTAX score ranging from low to high. In addition, the guidelines recommend assigning class IIA and class III indications for PCI to patients who are diagnosed with LMCA disease and have intermediate and high SYNTAX scores (Neumann et al. 2019). Patients with high SYNTAX scores who underwent CABG were found to attain higher survival rates. The general trend seen in the studies indicated comparable findings, as four out of five studies showed lower long-term mortality rates in patients with a high SYNTAX score who underwent CABG compared to those who underwent PCI with a high SYNTAX score. Patients with moderate to high SYNTAX scores and multivessel CAD, but without a diagnosis of LMCA disease, have also exhibited a reduced risk of mortality following a CABG procedure (Chew et al. 2022). Coronary artery bypass grafting (CABG) is the preferred method of revascularization for patients with complex coronary disease. CABG has emerged as the first-line treatment option since the initial SYNTAX trial. PCI is an alternative for CABG in individuals exhibiting a low to intermediate SYNTAX score. Individuals with higher SYNTAX scores exhibited a more favorable outcome following the CABG procedure (Naganuma et al. 2014, Jahangiri et al. 2020).

According to the findings of this systematic review, PCI resulted in more favorable outcomes, particularly in terms of reduced long-term strokes. Among the five studies that examined the comparison between the outcomes of PCI and CABG, three studies found that the PCI groups had lower incidences of stroke, regardless of the SYNTAX score categories. While the results of different research may vary, it is widely accepted that individuals who have undergone CABG are at a higher risk of stroke compared to those who have undergone PCI. Differences in the occurrence rate may be influenced by a reduced risk of stroke in individuals who undergo PCI within the initial 30 days after the procedure (Head et al. 2018b).

Contrary to the outcomes of PCI in terms of long-term strokes, the frequency of long-term

revascularization was more prominent in patients treated with PCI who had low, intermediate, or high SYNTAX scores. Furthermore, the incidence of long-term MI was reduced in the groups that received CABG across all of the SYNTAX score categories. The studies demonstrated a significantly reduced occurrence of late MACCE in the groups that underwent CABG compared to the groups that received PCI. This finding is consistent with a separate investigation that observed an increase in MACCE among patients who received PCI and had a higher SYNTAX score compared to those who underwent CABG (Shlofmitz et al. 2019).

In this study, when comparing patients with a high SYNTAX score who received CABG to those who underwent PCI, the frequencies of outcomes such as long-term mortality, long-term revascularization, long-term MI, and late MACCE were found to be lower in the CABG groups. The aforementioned statement is in accordance with the guidelines established by the ESC/EACTS. As per the guidelines, PCI is advised for patients who have LMCA disease and a low to intermediate SYNTAX score. Nevertheless, this approach is not advisable for individuals with elevated SYNTAX scores, which makes CABG a viable alternative for PCI. CABG is the preferred treatment for individuals with multivessel disease and a SYNTAX score of ≥ 23 , while PCI is the optimal treatment for patients with a SYNTAX score between 0 and 22 (Neumann et al. 2019).

In contrast to the results of this study, the findings of the decade-long PRECOMBAT trial revealed that there were no statistically significant differences in outcomes between PCI and CABG among diverse subgroups of patients with stable CAD across different SYNTAX score categories. The absence of discrepancy was identified in the comparison of various outcomes, including MACCE, mortality, stroke, or MI. The Evaluation of XIENCE Everolimus Eluting Stent versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization (EXCEL) and the Nordic-Baltic-British Left Main Revascularization Trial (NOBLE) yielded comparable results. The contrasting findings could potentially be attributed to the stringent criteria employed for participant selection in the PRECOMBAT trial. The detailed documentation of the results was not possible due to the lack of information regarding the usage of cardiovascular medications throughout the long-term follow-ups. Additionally, it is worth noting that a higher SYNTAX score could have a significant impact on the outcomes. These data may lack universal applicability, hence potentially affecting the long-term outcomes of the PCI and CABG procedures (Lee et al. 2021).

Shiomi et al. (2015) found that patients with unprotected left main coronary artery disease (ULMCAD) who underwent CABG instead of PCI showed more desirable long-term outcomes, particularly those with more complex anatomical conditions. PCI with drug-eluting stents is an effective option for ULMCAD patients who have a low to intermediate SYNTAX score with minimal anatomical complexity. However, despite the effect of anatomical complexity, the clinical outcomes of CABG tend to remain stable. Therefore, CABG continues to be the preferred treatment option for ULMCAD patients with high anatomical complexity or high SYNTAX scores. When determining the revascularization method, it is undoubtedly crucial to take into account the patient's clinical presentation, including factors such as the type and location of the occlusion and the site of the lesion. Furthermore, it is imperative to engage in extensive discussion with a multidisciplinary team (Takahashi et al. 2020). Overall, PCI is an ideal option for those who have less intricate cardiovascular conditions. Conversely, CABG can be beneficial for patients with more complex medical conditions since it may result in a higher survival rate (Zheng et al. 2016).

Strength and limitations

This study represents the first systematic review that examined the association between the SYNTAX score and the long-term outcomes of CABG and PCI for LMCA disease. An advantage of this study is the valuable insight gained from the comparison of PCI and CABG that incorporated analyses of different SYNTAX scores, a topic that has received limited research attention. A limitation of this systematic review is the variability in the PCI methods employed across the selected studies. The differences were evident in the use of sirolimus-eluting stents in one study, everolimus-eluting stents in one study, and both bare-metal stents and drug-induced stents with different time periods in one study. The other studies did not specify the methods that were used in the procedures. Hence, this might affect the accuracy of the findings pertaining to the overall outcomes of the patients. An additional noteworthy constraint that might influence the results of this investigation is the availability of data on the patients' comorbidities. Some papers did not provide sufficient information regarding patient comorbidities that might impact the outcomes of the procedures.

CONCLUSION

Patients with left main coronary artery (LMCA) disease, regardless of their SYNTAX scores ranging from low to high, may experience various long-term

outcomes after undergoing either a percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG). However, CABG has several advantages in terms of its outcomes, such as reduced long-term mortality, decreased long-term need for revascularization, lowered risk of long-term myocardial infarction (MI), and decreased occurrence of long-term major adverse cardiac or cerebrovascular events (MACCE). On the other hand, PCI provides a favorable outcome concerning stroke. It is imperative to consider the patient's clinical presentation and engage in thorough discussions with a multidisciplinary team to determine the most viable procedure for treating LMCA disease.

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Conflict of interest

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Author contribution

All authors contributed to the conception and design, analysis and interpretation of the data, drafting of the article, critical revision of the article for important intellectual content, and final approval of the article. FM, CFA, ATH, and AFM were also responsible for the collection and assembly of the data.

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