in the trend analysis. The study was exempted by the institutional review board because it used a public de-identified database.

A total of 1,323,110 hospitalizations for AVR and MVR were identified in the Nationwide Inpatient Sample during the study period, of which 56,251 (4.0%) involved women of childbearing age. Among patients who underwent isolated AVR (n = 25,319), the utilization of mechanical valves declined significantly from 70% to 65% and 54% for the periods between 2003 to 2008, 2009 to 2013, and 2014 to 2018, respectively (Ptrend < 0.001; Figure 1). Between 2003 and 2018, the prevalence of infective endocarditis (IE) increased from 20% to 24% in the bioprosthetic AVR group and from 8% to 13% in the mechanical AVR group, Ptrend < 0.001. Among patients who underwent isolated MVR (n = 21,837), there was similarly a substantial decline in mechanical valve use from 79% to 72% and 61% between 2003 to 2008, 2009 to 2013, and 2014 to 2018, respectively (Ptrend < 0.001; Figure 1). The prevalence of IE increased from 2003 to 2018 in patients who underwent bioprosthetic MVR (22% to 35%, Ptrend < 0.001) but remained stable at ~13% among patients who had mechanical MVR.

This focused analysis reveals a continuous shift towards bioprosthetic versus mechanical valves among women of childbearing age in the United States. In 2018, approximately 50% of AVR and 60% of MVR in women age 15 to 49 were bioprosthetic valves. There was also a temporal increase in the prevalence of IE among women of childbearing age who underwent AVR and MVR. These trends are in line with the documented decline in the use of mechanical valves across all ages and the increase in IE prevalence among younger adults undergoing valve replacement surgery.

Disclosures

All the authors have no relevant disclosure.

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1. Otto CM, Nishimura RA, Bonow RO, et al. 2020 ACC/AHA guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol* 2021;77:e25–e197.
2. Osman M, Al-Hijji MA, Kawsara A, Patel B, Alkhouli M. Comparative outcomes of mitral valve in valve implantation versus redo mitral valve replacement for degenerated bioprostheses. *Am J Cardiol* 2020;132:175–176.
3. Hirji SA, Percy ED, Zogg CK. Comparison of in-hospital outcomes and readmissions for valve-in-valve transcatheter aortic valve replacement vs. reoperative surgical aortic valve replacement: a contemporary assessment of real-world outcomes. *Eur Heart J* 2020; 41:2747–2755.
4. Alkhouli M, Alqahtani F, Kawsara A, Pislaru S, Schaff HV, Nishimura RA. National trends in mechanical valve replacement in patients aged 50 to 70 years. *J Am Coll Cardiol* 2020; 76:2687–2688.
5. Alkhouli M, Alqahtani F, Alhajji M, Berzingi CO, Sohail MR. Clinical and economic burden of hospitalizations for infective endocarditis in the United States. *Mayo Clin Proc* 2020; 95:858–866.

Meta-Analysis of Prospective Studies of Risk stratification by Syntax Score for Unprotected Left Main Coronary Artery Revascularization

Current guidelines for the treatment of left main coronary artery disease (ULMCD) with percutaneous or surgical revascularization is debatable. The syntax score, established based on the results of the Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery (SYNTAX) trial, is a well-respected risk stratification method for choosing the optimal revascularization strategy.[1] However, the trial had limitations including inadequate power due to very small number of ULMCD patients incorporated. Although several

studies have demonstrated percutaneous coronary intervention (PCI) to be a reasonable alternative to coronary artery bypass grafting (CABG), controversy remains about whether SYNTAX score can be utilized to guide management in high-risk individuals. This meta-analysis aims to compare the outcomes between PCI and CABG among syntax risk scores subgroups.

We developed a search strategy to cover multiple sources that include Ovid, Medline, PubMed, Embase, Scopus, Google Scholar, and the Cochrane central register of controlled trials. We included all randomized and prospective non-randomized studies that included data on the risk of MACE (major adverse coronary event) based on Syntax score in patients who underwent PCI in comparison with CABG for unprotected left main coronary artery (LMCA). Where necessary we contacted corresponding authors for clarification of missing data. Review manager 5 was used to calculate relative risk, 95% confidence interval and p-value of ≤0.05 was taken significant.

We reviewed a total of 102 studies and identified 94 clinical human studies. After screening titles and abstracts, 60 were excluded. The remaining 34 full text studies were assessed for eligibility. Only 5 studies reported the outcomes by Syntax scores.[1-5] [1-5] There were 3,108 patients (mean age 66 years, 76% males) that underwent PCI and 3,386 individuals (mean age 66.1 years, 77% males) underwent CABG. The mean syntax score was 24.3 and 25.3 for patients who underwent PCI and CABG, respectively.

The mean follow-up was available for up to 5 years. There were 510 (20.4%) MACE in PCI and 436 (16.1%) in CABG group. Compared with CABG, PCI was associated with higher risk of MACE in group with syntax score ≥33 (Risk ratio; RR for MACE; 1.67; 95% CI 1.27 − 2.19, p = 0.0002) in random effect model. PCI was non inferior to CABG among groups with syntax score 23 − 32 (RR 1.22; 95% CI 0.97 − 1.55, p = 0.09) and syntax score 1 − 22 (RR 1.21; 95% CI 0.95, 1.55, p = 0.13). Figure 1 shows the comparison of MACE outcomes between PCI and CABG among syntax risk subgroups. The net reclassification index for syntax ≥33 was 0.29 and 38.8% of the patients were reclassified.
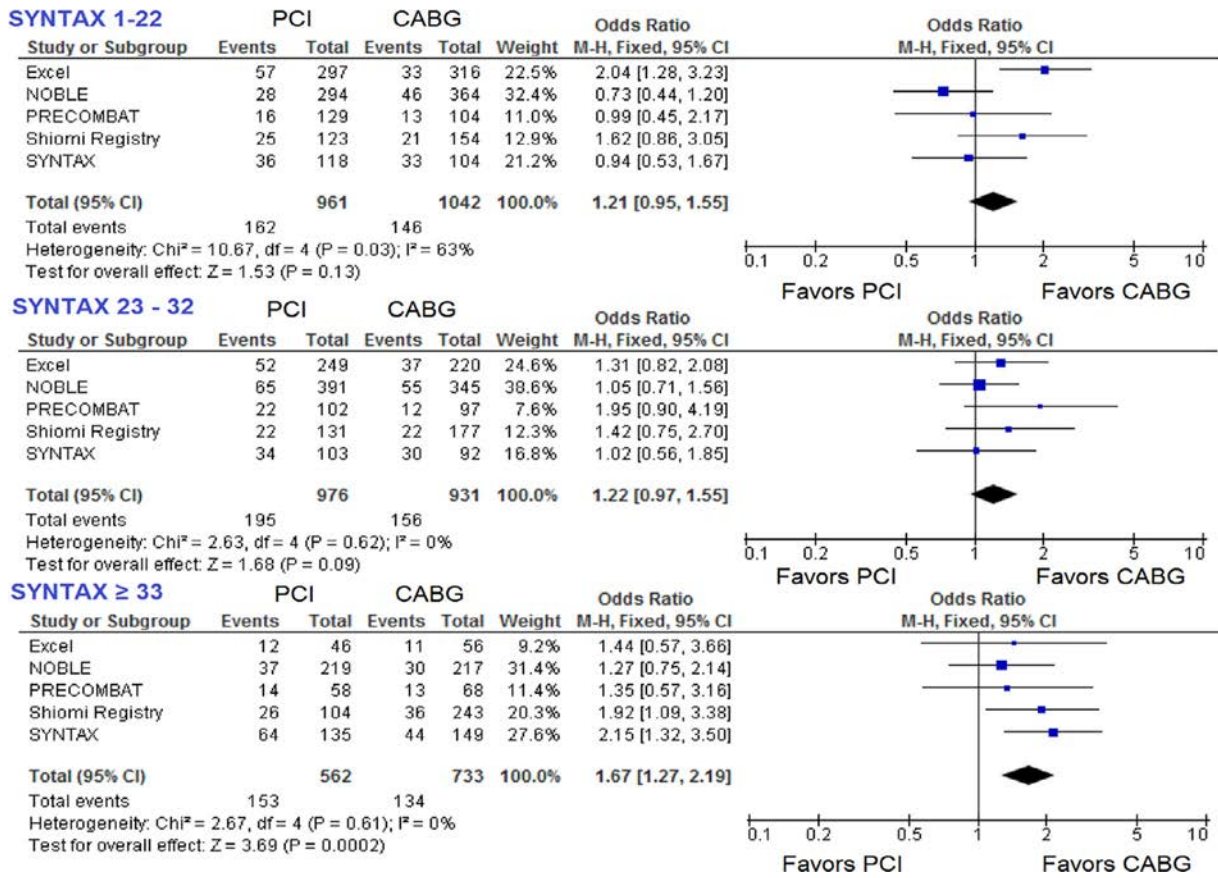
Figure 1. Association of percutaneous coronary intervention (PCI) with major adverse cardiovascular events compared with coronary artery bypass graft (CABG).

Funnel plot of studies included in the analysis of primary outcome was relatively symmetrical.

This meta-analysis examined the outcomes of revascularization of ULMCD between PCI versus CABG among syntax score subgroups. This study showed that CABG had better outcomes among patients with ULMCD in high-risk syntax subgroup (i.e., ≥33) but otherwise had no significant difference in outcomes among low and intermediate risk syntax score. Syntax score could potentially help in reclassifying up to 38.8% of the patients with ULMCD.

The limitations of this study include unavailability of individual patient level data and inability to determine the lesion characteristics of ULMCD. Also, the study population was not diverse owing to <30% of them were females, which influenced the generalizability of the results. Despite these limitations, the current meta-analysis provided helpful insights and support the implementation of syntax score to risk-stratify patients with ULMCD for revascularization with PCI versus CABG.

Declaration of Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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1. Ong AT, Serruys PW, Mohr FW, Morice M-C, Kappetein AP, Holmes Jr DR, Mack MJ, van den Brand M, Morel M-A, van Es G-A. The SYNergy between percutaneous coronary intervention with TAXus and cardiac surgery (SYNTAX) study: design, rationale, and run-in phase. *Am Heart J* 2006;151:1194–1204.

2. Mäkikallio T, Holm NR, Lindsay M, Spence MS, Erglis A, Menown IB, Trovik T, Eskola M, Romppanen H, Kellerth T. Percutaneous coronary angioplasty versus coronary artery bypass grafting in treatment of unprotected left main stenosis (NOBLE): a prospective, randomised, open-label, non-inferiority trial. *Lancet* 2016;388:2743–2752.

3. Stone GW, Sabik JF, Serruys PW, Simonton CA, Généreux P, Puskas J, Kandzari DE, Morice M-C, Lembo N and Brown III WM. Everolimus-eluting stents or bypass surgery for left main coronary artery disease. *N Engl J Med* 2016;375:2223-2235.

4. Shiomi H, Morimoto T, Hayano M, Furukawa Y, Nakagawa Y, Tazaki J, Imai M, Yamaji K, Tada T, Natsuaki M. Comparison of long-term outcome after percutaneous coronary intervention versus coronary artery bypass grafting in patients with unprotected left main coronary artery disease (from the CREDO-Kyoto PCI/CABG Registry Cohort-2). *Am J Cardiol* 2012;110:924–932.

5. Park S-J, Kim Y-H, Park D-W, Yun S-C, Ahn J-M, Song HG, Lee J-Y, Kim W-J, Kang S-J, Lee S-W. Randomized trial of stents versus bypass surgery for left main coronary artery disease. *N Engl J Med* 2011;364:1718–1727.