Cardiovascular Revascularization Medicine 16 (2015) 237–242

Contents lists available at ScienceDirect

Cardiovascular Revascularization Medicine

Review

Composite outcomes in 2.25-mm drug eluting stents: a systematic review

Justin Z. Lee [a], Nirmal Singh [b], Gilbert Ortega [c], See Wei Low [b], Uday Kanakadandi [b], F. David Fortuin [d], Tom Lassar [b], Kwan S. Lee [b,*]

[a] Department of Medicine, University of Arizona, 1501 N Campbell Avenue, Tucson, AZ, 85724, USA
[b] Department of Cardiovascular Diseases, University of Arizona, 1501 N Campbell Ave, Tucson, AZ, 85724, USA
[c] College of Medicine, University of Arizona, 1501 N Campbell Ave, Tucson, AZ, 85724, USA
[d] Department of Cardiovascular Diseases, Mayo Clinic Arizona, 5777 East Mayo Boulevard, Phoenix, AZ, 85054, USA

ARTICLE INFO

Article history:
Received 18 December 2014
Received in revised form 9 March 2015
Accepted 17 March 2015

Keywords:
Drug eluting stents
2.25-mm
Small coronary vessels

ABSTRACT

Background: Coronary atherosclerosis often involves small-caliber coronaries, yet the safety and efficacy of 2.25-mm DES have been poorly defined, with a general lack of separation of 2.25 with 2.5-mm performance. No randomized head-to-head 2.25 mm DES studies have been reported. There are several single-arm prospective studies, and we aim to systematically review all published specific 2.25-mm data to estimate composite DES-specific performance and highlight current knowledge gaps.
Methods: We performed a systematic literature search of PubMed, EMBASE, Web of Science and Cochrane database for clinical trials of 2.25-mm DES. Angiographic and composite clinical outcomes were compared with descriptive statistics.
Results: 2.25 mm-Paclitaxel (PES), sirolimus (SES), everolimus (EES) and platinum chromium EES DES-specific outcomes have been reported. Death at 12 months for SES, PES, EES and platinum chromium EES was 1.3%, 3.0%, 1.5%, and 4.4%. Rates of target vessel revascularization at 12 months for SES, PES, EES and platinum chromium EES were 5.7%, 13.3%, 8.8%, and 3.3%. Angiographic outcomes at 9 months to one year were as follows: mean late lumen loss (LLL) for SES, PES, and EES was 0.15 ± 0.11-mm, 0.28 ± 0.11-mm, and 0.16 ± 0.41-mm and mean diameter restenosis for SES, PES, and EES were 29.5 ± 6.2%, 34.7 ± 4.2%, and 20.9 ± 22.5%. Reported stent thrombosis rates for 2.25-mm DES were low ranging from 0% to 2.2% in up to 24-months of follow-up.
Conclusions: This systematic review summarizes and tabulates all available specific data on 2.25-mm DES. Based on our descriptive analysis, 2.25-mm DESs have a favorable safety and efficacy profile for the treatment of very small coronary lesions.

1. Introduction

Atherosclerotic coronary involvement often extends to small-caliber coronaries, with angiographic reference vessel diameter of 2.75-mm or less [1]. Up to 20–30% of patients undergoing percutaneous coronary intervention (PCI) may have significant atherosclerosis in relatively small coronary segments [2]. PCI of small vessels is associated with an increased risk of restenosis and adverse outcomes [3–6]. The use of drug-eluting stents (DESs) in small coronary vessels has been demonstrated to be superior to bare-metal stents (BMS) [7–9]. With the subsequent availability of 2.25-mm DES, the term "very small coronary vessels" has been proposed for coronary segments where 2.25-mm DESs are used [10]. However, the safety and efficacy of the various types of 2.25-mm DES is not well defined. There has yet to be a systematic overview that would provide a more precise estimate of the outcomes of the various types of 2.25-mm DES. In our systematic review, we aim to summarize clinical and angiographic outcome data from clinical trials of 2.25-mm DES.

2. Materials and methods

2.1. Search strategy

A computerized literature search of the PUBMED, EMBASE, OvidSP, Web of science, and Cochrane database of clinical trials was conducted. The cited references were reviewed to identify randomized, non-randomized as well as single arm or double arm trials that compared the clinical, angiographic and/or procedural outcomes from using 2.25-mm DES. Literature searches were completed in February, 2015. We used the following search keywords: "small vessel", "small arteries", "coronary arteries", "everolimus", "zotarolimus", "biolimus", "umirolimus", "paclitaxel", "sirolimus", "serolimus", "2.25-mm", "stent", "drug-eluting stent", or "coronary stent". No time duration, language or study type restriction was used while extracting the data. No

* Corresponding author at: 3950 S Country Club Road, Suite 200, Tucson, AZ, 85714. Tel.: +1 520 626 1859; fax: +1 520 621 2919.
E-mail address: klee@shc.arizona.edu (K.S. Lee).

http://dx.doi.org/10.1016/j.carrev.2015.03.008
1553-8389/

restrictions on the subheadings were applied. The PRISMA guidelines were followed in developing a PRISMA flow sheet [11]. All references of relevant trials were also reviewed.

2.2. Study selection

Our primary objective was the description of 2.25-mm DES composite outcomes in all reported clinical trials. Our pre-specified inclusion criteria were as follows: (1) prospective or retrospective data from clinical trials, (2) reports in the English language, (3) single or two-treatment arm containing any of the available 2.25-mm DES, (4) at least 30 days follow up, (6) studies that have at least mentioned device outcomes (angiographic and/or procedural) and patient outcomes [12]. Data published in the form of abstracts without peer-reviewed publication of the manuscripts were not included. Composite outcomes were defined as combination of angiographic outcome and clinical outcome. Two independent individuals (GO and NS) collected the data separately. All studies included were screened against study eligibility criteria.

2.3. Definitions of outcomes

Successful stent deployment was defined as a minimum stenosis diameter reduction of <20% with final TIMI-3 flow, without side branch occlusion, flow-limiting dissection, distal embolization, or angiographic thrombus. Additional angiographic outcomes included in-stent and in-segment LLL by QCA, binary restenosis and percentage diameter stenosis (DS) [13]. Clinical outcomes including death, target lesion revascularization, target vessel revascularization, stent thrombosis and myocardial infarction (MI) were defined individually as per the recommendations of Academic Research Consortium [14].

2.4. Statistical analysis

A study-level pooled descriptive analysis was performed to summarize the composite clinical and angiographic outcomes of 2.25-mm DES in all eligible patients. The analysis was performed irrespective of the number of study arms and blinding status. Numerical measures used measure of location such as mean and measure of variation such as standard deviation. Follow-up duration of clinical outcomes was categorized into three categories: ≤12 months, 24 months and 60 months respectively.

3. Results

3.1. Citations identified

A total of 428 potentially relevant citations were identified. Fig. 1 shows our search strategy, which yielded nine clinical trials with a total of 1,476 patients.

3.2. Patient characteristics and interventions

Table 1 summarizes the characteristics of the 9 studies, of which 7 were non-randomized [15–21] and the remaining 2 studies [1,22] were randomized studies comparing DES vs. BMS. Out of 9, 4 studies were single arm without any control [15–17,21], 2 studies used BMS as a control arm [1,22], and 3 studies had DES in both arms [18–20]. Four types of DES-everolimus, platinum chromium everolimus, sirolimus and paclitaxel were used in 2.25-mm DES in reference vessel diameter ranging from 1.86-mm to 2.50-mm.

Table 2 describes baseline clinical characteristics, while Table 3 describes baseline target vessel characteristics of the studies included.

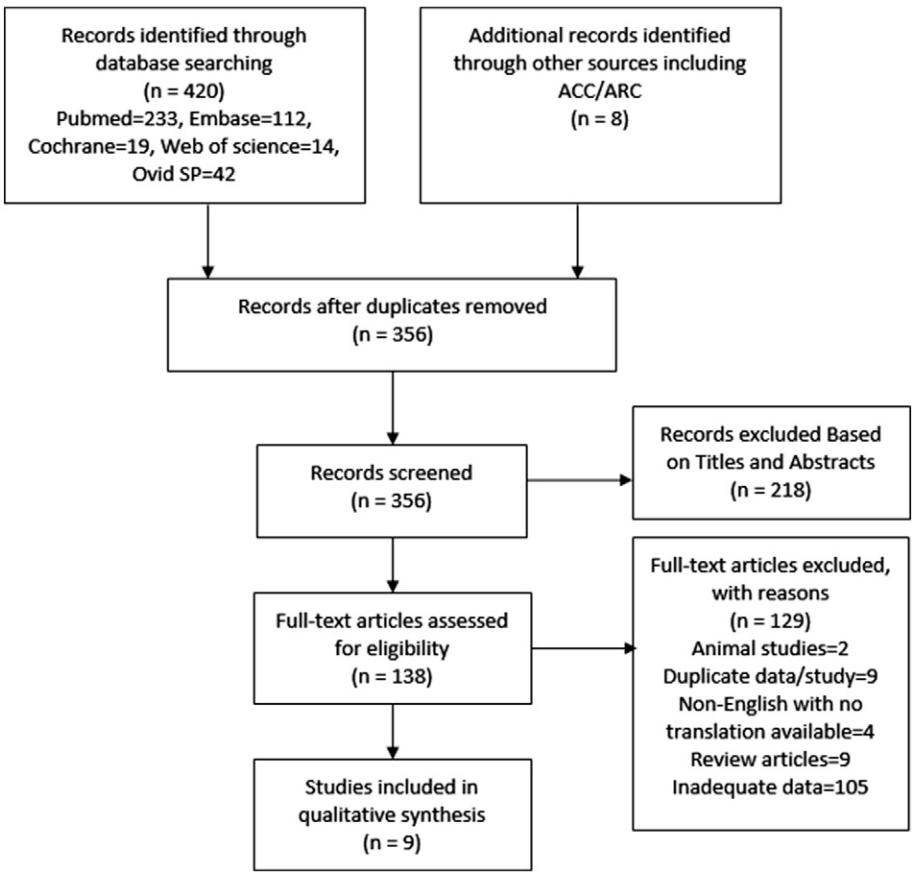

Fig. 1. Study selection diagram.