Intracoronary OCT has been shown to be safe; however, as with any coronary artery instrumentation and manipulation it may lead, albeit rarely, to a variety of complications including coronary spasm and dissection. A multicenter registry evaluated the acute complications associated with the use of OCT in a cohort of 468 patients who underwent imaging for various indications [4]. Coronary spasm was not observed while there was one case of type A coronary dissection induced by the imaging wire. In a subsequent registry, among 40 patients who underwent OCT imaging to evaluate ambiguous/intermediate lesions, one patient with unstable angina and an angiographically hazy lesion developed transient coronary spasm during negotiation with the imaging wire [5]. Furthermore, Dobarro et al. [6] reported the case of a patient who developed severe spasm at the side of a moderate mid right coronary artery lesion during withdrawal of the OCT wire; vessel spasm was captured by the OCT and had an appearance similar to that presented by Tanaka et al. [3].

In the case by Kohno et al. [1], the patient's recurrent chest pain was attributed to spontaneous distal LAD artery spasm during OCT examination; yet, spasm might have been induced by the OCT wire. Nonetheless, scrutiny of the presented OCT images does not support the diagnosis of coronary artery spasm because its features are not present; the intima and media layers do not appear thickened, the intima is not folded and the luminal contour is relatively smooth. The images depict a variable extent of distal LAD artery lumen compromise and detachment of the intima–media complex from the adventitia leaving an intramural signal-free space. Panels C and D show a nearly circumferential disruption of the coronary wall while, as shown in panel B which corresponds to a more distal segment of the LAD artery, disruption preserves approximately one quarter of the vessel wall circumference. Overall these findings favor dissection as the cause of the revealed structural abnormality of the coronary wall with a false lumen that is separated from the true lumen by an intimo-medial flap and bordered by the adventitia. Dissection might have been induced by the OCT wire in case wire navigation through the distal LAD had been difficult. Furthermore, VA has been associated with spontaneous coronary dissection [7,8]; spasm imposes increased shear stresses to the coronary wall that may lead to dissection. Hence, in the present case, dissection of the distal LAD might have been caused by local, spontaneous or imaging wire-induced spasm. The presence of an intimal tear at OCT is not reported; yet it might have sealed under the pressure generated by the intramural hematoma, or following spontaneous thrombosis [9].

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Clinical outcomes of zotarolimus-eluting stents versus the first generation sirolimus-eluting stents and paclitaxel-eluting stents: A meta-analysis of randomized trials

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The first generation drug-eluting stents (DES), including the sirolimus-eluting stent (SES) and the paclitaxel-eluting stent (PES), were demonstrated to reduce angiographic restenosis and revascularization compared with the bare-metal stents (BMS) [1]. However, the long-term safety of the two DESs has been questioned by recent studies and a meta-analysis of randomized trials have reported increased rates of late stent thrombosis and late-occurring death or myocardial infarction (MI) compared with BMS [2]. Thus, a new generation DES, namely zotarolimus-eluting stent (ZES), was introduced. Emerged large randomized trials have investigated the clinical outcomes of ZES, SES and PES and the results were inconsistent. To fill this gap, we performed a meta-analysis with 9 publications resulted from 6 randomized clinical trials (ENDEAVOR III, ENDEAVOR IV, ISAR-TEST-2, ZoMaxx II, SORT OUT III and ZEST) [3–11].

The study population of ENDEAVOR III [3,10], ENDEAVOR IV [4,5,9], ISAR-TEST-2 [7] and ZoMaxx II [11] were consecutive patients aged 18 years or older with symptomatic ischemic heart disease due to de novo stenotic lesions in native coronary arteries. Study population of

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Table 1
Main characteristics of the included randomized trials.

Study name	Publications	Country	Patients	Stents type	Follow up
ENDEAVOR III	Kandzari DE, 2006	USA	436	ZES(Endeavor), SES(Cypher)	8 months
	Kandzari DE, 2011				5 years
ENDEAVOR IV	Leon MB, 2010	USA	1548	ZES(Endeavor), PES(Taxus)	9, 12 months
	Leon MB, 2009				2 years
	Leon MB, 2010				3 years
ISAR TEST 2	Byrne RA, 2010	Germany	674	ZES(Endeavor), SES(Cypher)	1, 2 years
ZoMaxx II	Gray WA, 2011	International	1099	ZES(ZoMaxx), PES(Taxus)	9 months
SORT OUT III	Rasmussen K, 2010	Denmark	2332	ZES(Endeavor), SES(Cypher)	9, 18 months
ZEST	Park DW, 2010	Korea	2645	ZES(Endeavor), SES(Cypher), PES(Taxus)	1 year

ZES(Endeavor), Medtronic Vascular, Inc., Santa Rosa, California; ZES(ZoMaxx), Abbott Laboratories, Abbott Park, Illinois; SES(Cypher), Cordis Corporation, Miami Lakes, Florida; PES(Taxus), Taxus Liberte, Boston Scientific, Natick, Massachusetts.

SORT OUT III [6] and ZEST [8] were aged 18 years or older, had chronic stable coronary artery disease or acute coronary syndromes, and had at least one target lesion, defined as a lesion needing treatment with a drug-eluting stent. The main characteristics were summarized in Table 1. The length of follow-up ranged from 8 months to 5 years and no heterogeneity across the trials was observed (data not shown).

The primary endpoint of this meta-analysis was major adverse cardiac events(MACE) defined as: all-cause death, myocardial infarction (MI) and target lesion revascularization (TLR) in ENDEAVOR III and ENDEAVOR IV; cardiac death, MI and clinically driven target vessel revascularization (TVR) in SORT OUT III and ZoMaxx II; all-cause death, MI and definite stent thrombosis in ISAR-TEST-2; all-cause death, MI, TVR in ZEST. The interested secondary endpoints were all-cause death, cardiac death and MI(including Q-wave MI and non- Q-wave MI).

The endpoints of ENDEAVOR III were reported at 8 months, 3 years and 5 years, ENDEAVOR IV at 9 months, 12 months and 2 years, ISAR-TEST-2 at 1 year and 2 years, ZoMaxx II at 9 months, SORT OUT III at 9 months and 1.5 years, and ZEST at 1 year. Adverse events occurred within 1 year follow-up were defined as late period clinical outcomes and those beyond 1 year as very late period clinical outcomes. The pooled effects were calculated separately.

Compared with SES, pooled analysis demonstrated statistically significant increase of ZES in MACE (late period relative risk [RR], 1.41; 95% confidence interval [CI], 1.17–1.71; very late period RR, 1.33; 95% CI 1.09–1.61) and no significant difference in the risk of all-cause death, cardiac death and MI (shown in Figs. 1–4).

In the comparison between ZES and PES, the risk of MI after ZES implantation was found statistically reduced (late period RR, 0.71; 95% CI, 0.54–0.94; very late period RR, 0.48; 95% CI 0.32–0.73) and no significant differences in the risk of MACE, all-cause death and cardiac death were observed (shown in Figs. 1–4).

The main clinical concern of bare metal stents (BMS) was the development of in-stent restenosis and the first generation drug-eluting stents (SES and PES) were reported to mitigate this problem [12,13]. However, very late stent thrombosis and the subsequent death and myocardial infarction were reported more and more often with first-

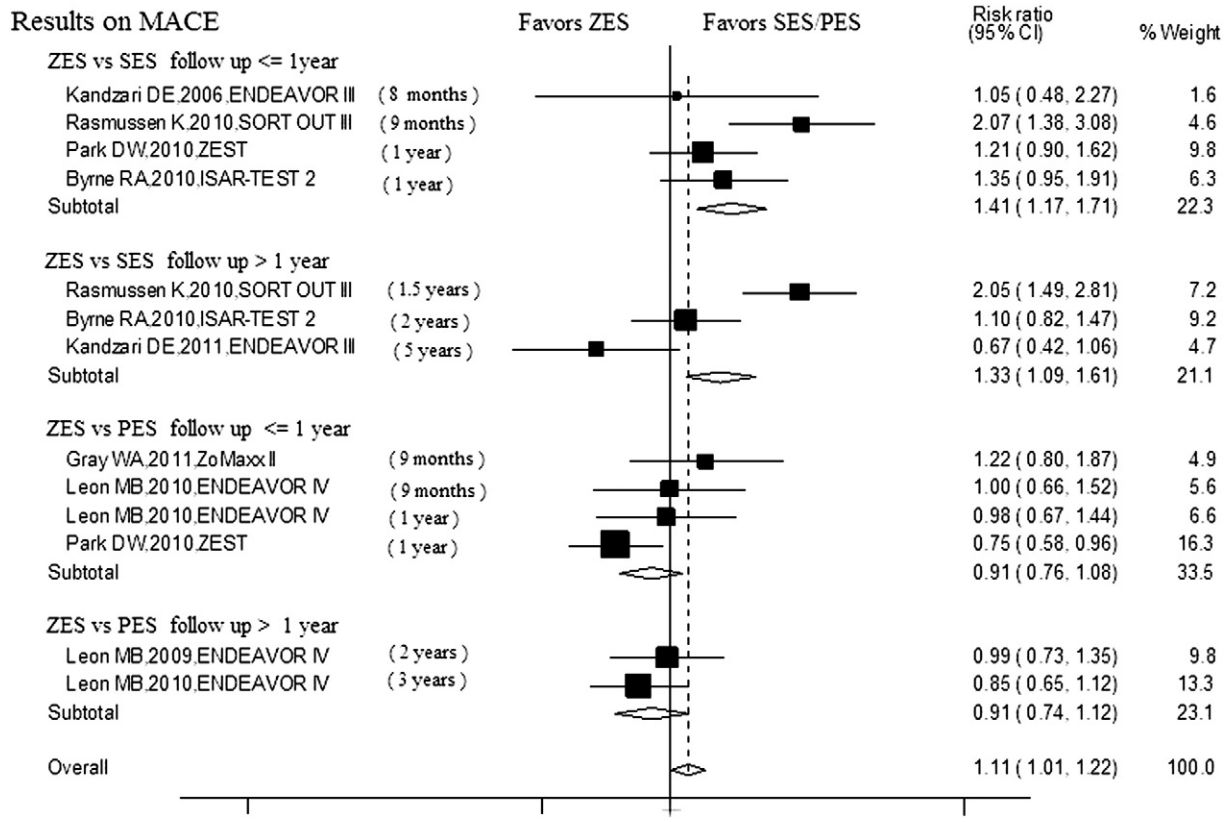

Fig. 1. Forest plot with relative risk for major adverse cardiac events (MACE) associated with zotarolimus-eluting stent versus the first drug-eluting stents for individual trials and the pooled population. The ZES was inferior to SES. Compared with PES, ZES showed a trend to reduce the rate of MACE but without statistical significance.