

## ABSTRACT

**Background:** Stent thrombosis (ST) is a feared complication of drug eluting stent (DES) use. One of the strongest predictors of ST is incomplete stent apposition. ST is associated with a high incidence of subsequent myocardial infarction (MI) and death. Appropriately sizing a vessel for stent placement that has been occluded by a thrombus during ST segment elevation myocardial infarction (STEMI) can be challenging. This study investigated the role of intravascular ultrasound to determining DES size and potential impact on clinical outcomes.

**Methods:** A non-randomized, retrospective analysis was performed on 173 patients presenting with STEMI between 8/2004 and 8/2008 at an academic tertiary care hospital. All patients received a DES. 87 patients underwent IVUS prior to DES placement and 86 underwent conventional angiography. The incidence of cardiac death, myocardial infarction (MI), target lesion revascularization (TLR), ST, and a composite of these major adverse cardiac events (MACE) was assessed at 1 year.

**Results:** There were no significant differences in baseline or procedural characteristics between the two groups. Of the 87 patients who underwent IVUS guided DES placement, 77 received a paclitaxel eluting stent (PES), 8 received a zotarolimus eluting stent (ZES), and 1 received an everolimus stent (EES). Of the 86 patients who did not undergo IVUS guided DES placement, 73 received PES, 10 received ZES, and 3 received an EES. All patients completed one year of dual antiplatelet therapy with aspirin and clopidogrel. At one year, there were significant differences between the IVUS guided group and the non-IVUS guided group in MI [11.5% (10/87) vs. 17.5% (15/86);  $p=0.01$ ], death [2.3% (2/87) vs. 7.0% (6/86);  $p=0.03$ ], TLR [5.8% (5/87) vs. 12.8% (11/87),  $p<0.01$ ], ST [1.1% (1/87) vs. 5.8% (5/86),  $p=.04$ ], and MACE [20.7% (18/87) vs. 43.0% (37/86),  $p=0.023$ ]. 4 of the 5 deaths in the group that did not undergo IVUS were due to ST.

**Conclusions:** The use of IVUS reduces MI, ST, and MACE in patients receiving DES for treatment of STEMI. IVUS may provide accurate sizing in a previously occluded artery and may optimize stent size selection and reduce the likelihood of stent thrombosis and subsequent clinical outcomes. Further large scale randomized trials are needed to investigate this finding.

## INTRODUCTION

- Stent thrombosis (ST) is a feared complication of drug eluting stent (DES) use as it is associated with a high incidence of subsequent myocardial infarction (MI) and death.
- One of the strongest predictors of ST is incomplete stent apposition (ISA) to the vessel wall. Appropriately sizing the vessel lumen that has been occluded by a thrombus during ST-segment elevation myocardial infarction (STEMI) for stent placement can be challenging.
- Intravascular ultrasound (IVUS) enables high-resolution tomographic visualization of the coronary arteries, and has an intrinsic advantage over conventional coronary angiography.
- Interventionalists have found it to be also useful in obtaining lumen and vessel dimensions for stent placement, especially in vessels with expansive vessel areas changes, such as those which occur in positive remodeling.
- This study investigated the role of IVUS in determining DES size, as well as the potential impact of its use on clinical outcomes.

# Intravascular Ultrasound Use in STEMI Patients Undergoing Percutaneous Coronary Intervention Reduces Adverse Clinical Outcomes at One Year

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## RESULTS

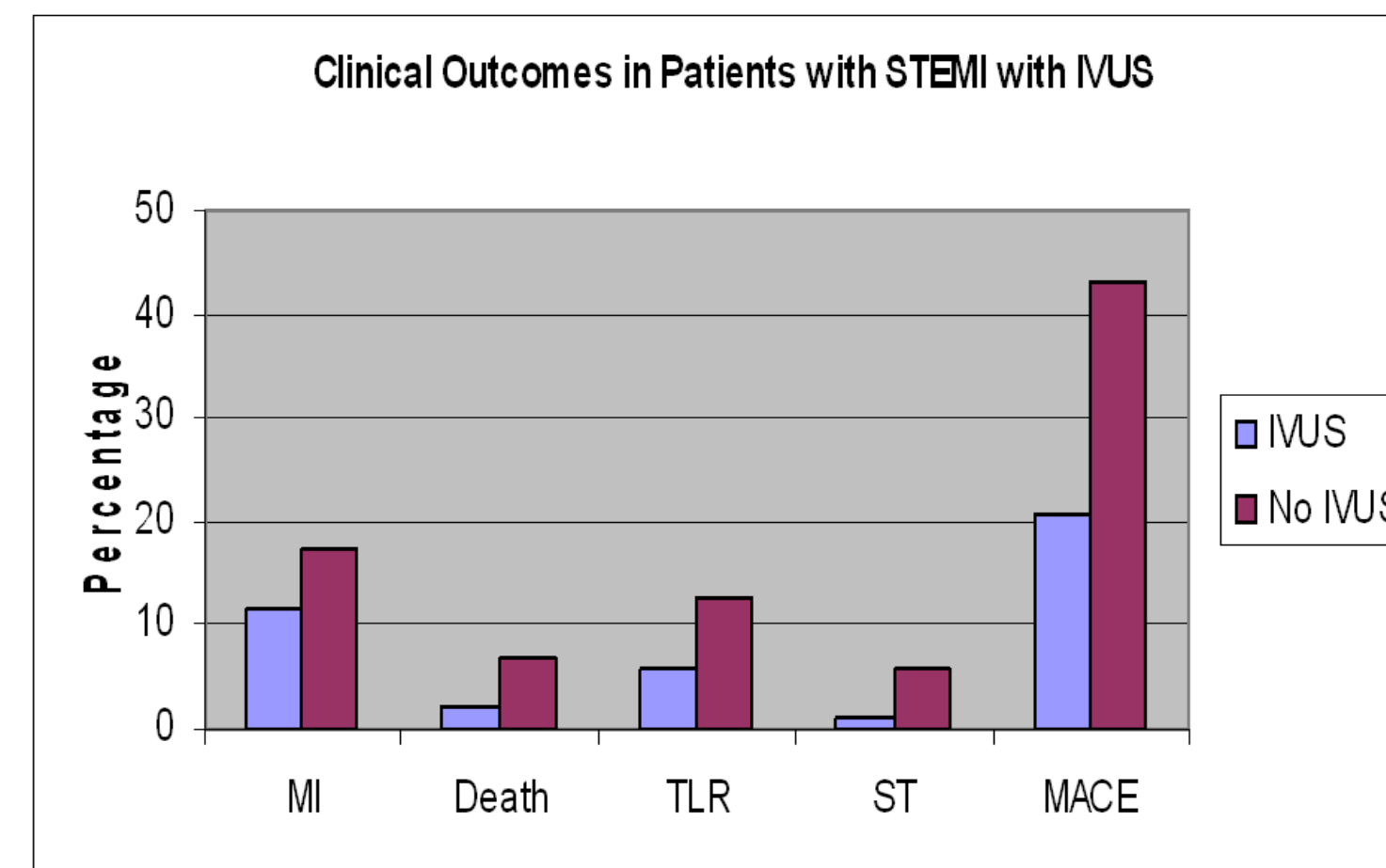


Figure 1. Illustrates the clinical outcomes in patients with STEMI in which IVUS was used.

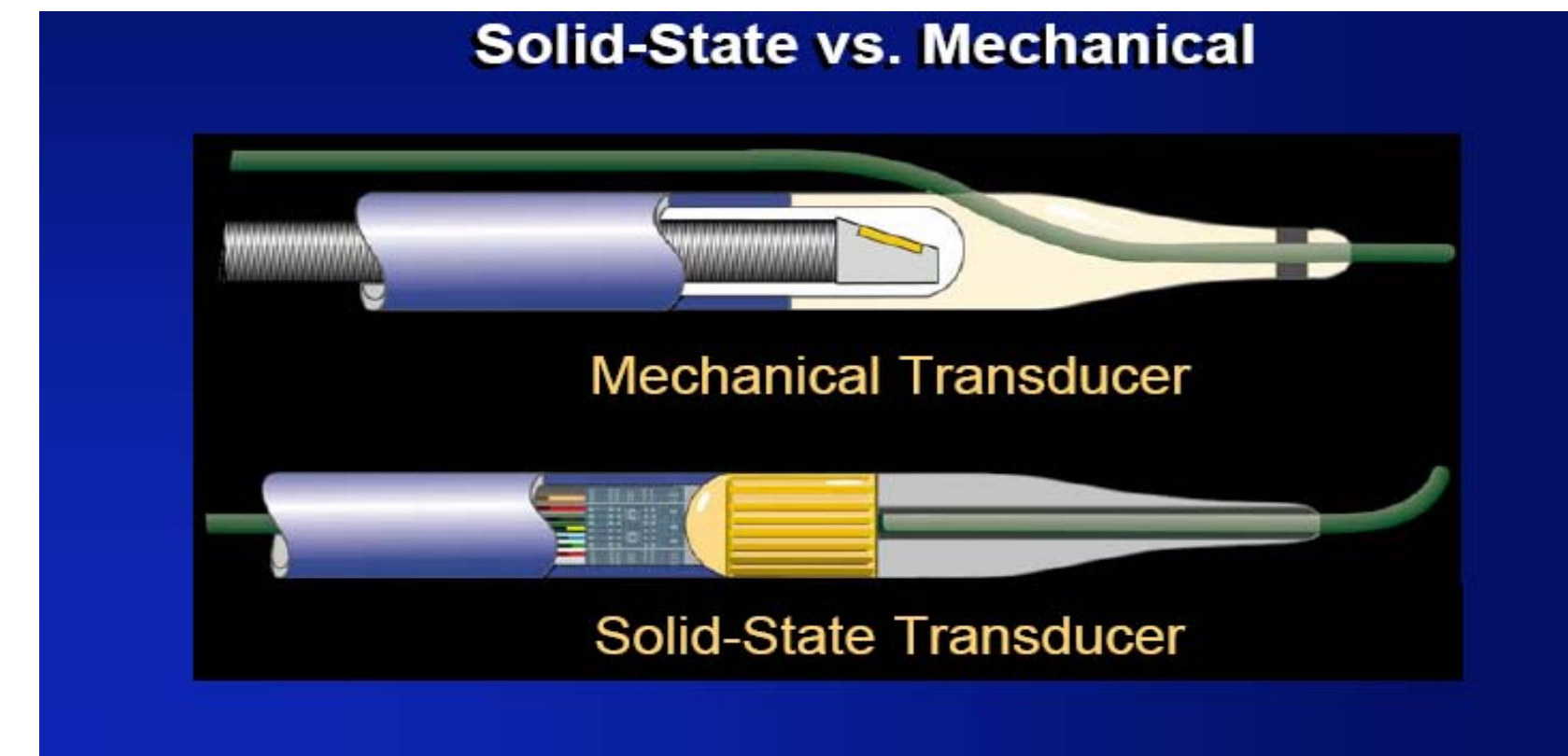


Figure 2. Illustrates the two different types of transducer available for IVUS.

## CONCLUSIONS

- The use of IVUS reduces MI, ST, and MACE in patients receiving DES for treatment of STEMI.
- Several mechanisms have been suggested in the literature for ISA, such as a decrease in plaque and media due to dissolution of the jailed thrombus or plaque debris, or not recognizing ISA at the time of implantation.
- IVUS may provide accurate sizing in a previously occluded artery and may optimize stent size selection, as well as reduce the likelihood of stent thrombosis and subsequent clinical outcomes.
- Further large scale randomized trials are needed to investigate this finding.

## REFERENCES

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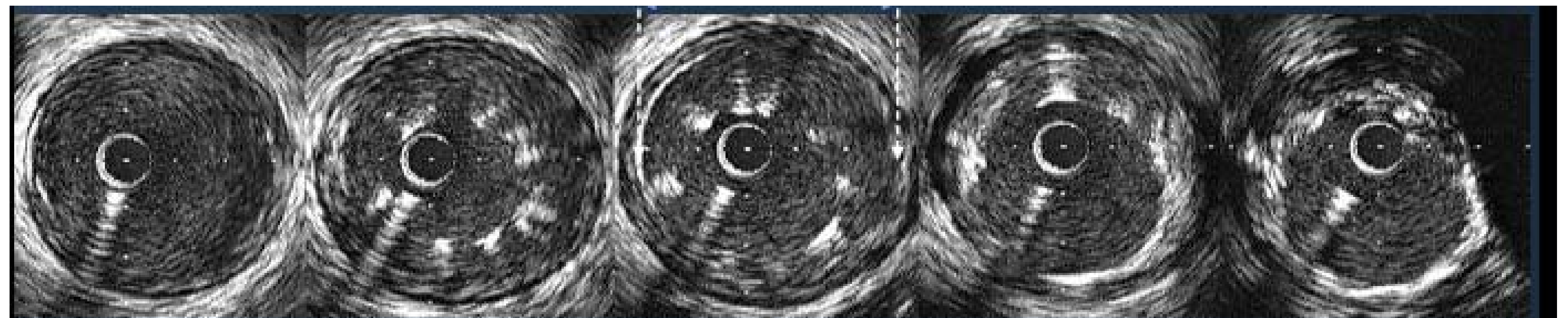


Figure 3. Sequential images obtained via intravascular ultrasound of a coronary artery showing vessel lumen diameter and incomplete