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Editorial Board Member of *World Journal of Cardiology*, Akshyaya Pradhan, MD, DM, FACC, FSCAI, FESC, FAPSIC, Professor (Jr), Department of Cardiology, King George's Medical University, Lucknow, Uttar Pradesh 226003, India. akshyaya33@gmail.com

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LETTER TO THE EDITOR

# Bioresorbable stent unloading during percutaneous coronary intervention: Early detection and management

Nabil Eid, Mohamed Abdel Wahab, Amardev Singh Thanu

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**Nabil Eid,** Department of Anatomy, Division of Human Biology, School of Medicine, IMU University, Kuala Lumpur 57000, Kuala Lumpur, Malaysia

**Mohamed Abdel Wahab,** Department of Pediatrics, School of Medicine, IMU University, Clinical Campus, Batu Paha 83000, Johor, Malaysia

**Amardev Singh Thanu,** M. Kandiah Faculty of Medicine and Health Sciences, University Tunku Abdul Rahman, Kajang 43000, Selangor, Malaysia

**Corresponding author:** Nabil Eid, MD, PhD, Assistant Lecturer, Assistant Professor, Associate Professor, Senior Lecturer, Doctor, Research Scientist, Department of Anatomy, Division of Human Biology, School of Medicine, IMU University, Bukit Jalil, Kuala Lumpur 57000, Kuala Lumpur, Malaysia. nabilsaleheid@imu.edu.my

## Abstract

In this letter, we comment on a recent case report by Sun *et al* in the *World Journal of Cardiology*. The report describes the successful management of a rare complication: The unloading or detachment of a bioresorbable stent (BRS) during percutaneous coronary intervention (PCI) in a male patient. The unloading of BRS was detected *via* angiography and intravascular ultrasound (IVUS) imaging of the left coronary artery and left anterior descending artery. Although this case is interesting, the authors' report lacked crucial details. Specifically, insufficient information about the type of BRS used, potential causes of BRS unloading, or whether optical coherence tomography (OCT) imaging for coronary arteries was performed before, during, or after PCI. The OCT imaging of coronary arteries before PCI can potentially prevent BRS unloading due to its higher resolution compared to IVUS. In addition, despite detecting myocardial bridging during the PCI, the authors did not provide any details regarding this variation. Here we discuss the various types of BRS, the importance of OCT in PCI, and the clinical relevance of myocardial bridging.

**Key Words:** Coronary artery diseases; Percutaneous coronary intervention; Optical coherence tomography; Bioresorbable/Biodegradable stents; Stent unloading/detachment; Myocardial bridge; Intravascular ultrasound; Coronary angiography

**Core Tip:** In a recently published case report in the *World Journal of Cardiology*, Sun *et al* reported successful management of an early and rare complication of percutaneous coronary intervention (PCI) in a male patient. This complication was the unloading or detachment of bioresorbable stent (BRS) during PCI, which was detected during PCI based on angiography and intravascular ultrasound imaging of the left coronary artery and left anterior descending artery. However, despite the rarity of this case, information regarding the type of BRS, possible causes of BRS unloading, use of optical coherence tomography (OCT) imaging for coronary arteries, and the importance of myocardial bridge during PCI were not discussed in the article. Here we shed light on the several types of BRS, the importance of OCT, and the clinical relevance of myocardial bridging.

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## TO THE EDITOR

Percutaneous coronary intervention (PCI) with stent implantation is a widely accepted treatment for patients with coronary artery disease. However, the use of permanent metallic stents has been associated with various complications, including in-stent restenosis, late thrombosis, artery injury, and local chronic inflammation. To address these concerns, biodegradable or bioresorbable stents (BRSs) have emerged as a promising alternative, offering the potential for improved patient outcomes[1,2]. Compared to drug-eluting stent (DES), BRS provides temporary mechanical support until vascular remodeling and functional recovery, followed by gradual degradation, contributing to the restoration of vascular systolic function and reduces the risk of late stent thrombosis[3,4].

A recent study by Sun *et al*[5] reported successful detection and early treatment of a rare complication of PCI in a male patient. This complication was related to the unloading or detachment of BRS during PCI, which was detected during PCI based on angiography and intravascular ultrasound (IVUS) imaging of the left coronary artery and left anterior descending artery (LAD). However, despite the rarity of this case, the information provided regarding the type of BRS used during the PCI was insufficient. Several types of BRS have recently been reported, including polymer- and magnesium-based stents[1], which are important for successful loading during PCI.

Sun *et al*[5] linked the unloading of DES during PCI to calcification, angulation, and distortion of the coronary artery, in addition to device-related factors and technical operation factors, such as inadequate pretreatment. However, the authors failed to elaborate on the specific factors leading to the unloading of BRS, leaving out critical data about vessel wall pathology, anatomical vitiations such as angulation, and the technique used for intervention. Importantly, these potential factors contributing to DES or BRS detachment during PCI should be assessed using optical coherence tomography (OCT) imaging for coronary arteries[6,7]. This is based on the advantage of OCT over IVUS examination for superior delineation of calcified plaques, enabling the quantification of calcium arc and thickness[8]. In addition, OCT enables precise measurements of vessel size and lesion length, facilitating the selection of appropriate coronary stents[9].

It is crucial that authors must provide the exact size of the lesion site to be stented, as measured by IVUS/OCT prior to stent preparation so that a precisely sized BRS can be implanted. The preparation must be adequate along the entire length of the disease area; accordingly, stent expansion would be appropriate to prevent stent embolization and detachment. Even after adequate lesion preparation and stent deployment with optimum pressure, the proper deployment of the scaffold and its position to the vessel wall must be confirmed through imaging. Additionally, during removal of the deflated balloon after the scaffold is deployed, the contrast in the balloon should be properly evaluated to avoid unnecessary pulling or pushing of the stent.

Sun *et al*[5] in their discussion section suggest that the thicker lateral beam of BRS compared to DES necessitates adequate pretreatment before BRS implantation, and that PSP guarantees successful implantation and reduces poor BRS expansion. The authors fail to provide the full form of the terms DES and PSP, which should be done at first mention. The authors also found myocardial bridging during PCI, but did not touch on the finding and its impact on PCI. Myocardial bridging is a variation of the left coronary artery where a segment of the epicardial coronary artery or LAD is intramyocardial, instead of running on surface[10]. This may impact BRS loading during PCI, resulting in complications. Interestingly, new types of BRS have been recently developed, such as bioresorbable electronic stents integrated with biosensors[1].

## CONCLUSIONS

PCI with stent implantation is a widely accepted treatment for patients with coronary artery disease. Compared to DES and metallic stents, BRS provide temporary mechanical support until vascular remodeling and functional recovery, followed by gradual degradation, contributing to the restoration of vascular systolic function and reduction of the risk of late stent thrombosis. Detachment or unloading of bioresorbable scaffolds during PCI is a rare complication that can be detected by angiography and IVUS imaging of the coronary artery. The successful loading of BRS and management of arising complications is a challenge in coronary intervention. The type of BRS, vessel factors, and techniques used to load

the BRS can impact the success of treatment and predict the potential for complications. OCT imaging of the coronary arteries may help successful BRS loading by identifying vessel variations, calcification, and myocardial bridging.

## FOOTNOTES

**Author contributions:** Eid N wrote and approved the final draft of the manuscript, Abdel Wahab M revised and edited the manuscript, Thanu AS revised and edited the manuscript. All authors have read and approved the final manuscript.

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**Country of origin:** Malaysia

**ORCID number:** Nabil Eid 0000-0002-2938-2618.

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