Cutting balloon inflation for the bail-out management of coronary artery dissections: A promising option

Short title: Cutting balloon and coronary artery dissection

Kenan Yalta¹, Ugur Ozkan¹, Cihan Ozturk¹, Caglar Kaya¹, Ertan Yetkin²

¹Department of Cardiology, Trakya University, Edirne, Turkey
²Department of Cardiology, Türkiye Hastanesi, Istanbul, Turkey

Correspondence to:
Kenan Yalta, MD,
Department of Cardiology,
Trakya University,
School of Medicine,
Balkan Yerleşkesi, 22030, Edirne, Turkey,
phone: +90 505 657 98 56,
e-mail: kyalta@gmail.com, akenanyalta@trakya.edu.tr

In clinical practice, cutting balloons (CBs) have been occasionally used for the management of spontaneous coronary artery dissections (SCADs) [1–3]. However, percutaneous coronary intervention (PCI) with coronary stenting has been the preferred strategy in patients with SCAD harboring high-risk features including persistent coronary ischemia, malignant arrhythmias, hemodynamic compromise and left main coronary disease [2]. On the other hand, interventional challenges associated with coronary stenting (malapposition, hematoma propagation) may potentially lead to adverse outcomes in patients with SCAD [2, 3]. Therefore, use of alternative tools including CBs has emerged as a promising strategy with excellent outcomes in this context [3].

In their recently published article, Zdzierak et al. [1] have demonstrated a bail-out use of CB inflation in an elderly female patient with severe and extensive dissection of the right coronary artery [1]. As far as we understand from their report, the authors performed a CB inflation in the coronary false lumen eventually resulting in the relief of the severely compromised true lumen [1]. In patients with SCAD with a dissection flap, it is well known that the compromise of coronary flow is not only correlated with the severity of superimposed
thrombotic complications but is also strongly associated with the size of the false lumen impinging on the true lumen [3]. Therefore, luminal pressure in the false lumen may be regarded as an important determinant of adverse outcomes in this context.

In the interventional setting, CB inflation is generally performed in the true lumen of the affected coronary artery (mostly in the setting of type 2 and 3 SCADs characterized by an intramural hematoma) in an effort to drain intramural hematoma via creation of microfenestrations in the intimal layer [2]. Following the initial CB inflation, subsequent stent implantation may be necessary in certain cases for further stabilization of the dissection line [3]. Notably, CB inflation might be labeled as a “bail-out strategy” in the patient reported by Zdzierak et al. [1] largely based on the unfeasibility of conventional PCI (due to the failure of guidewire advancement through the true lumen of the right coronary artery possibly presenting with an occlusive dissection flap rather than an intramural hematoma) in the setting of an acute coronary syndrome presentation with an ST segment elevation. In this patient [1], orientation of the blood flow from the high-pressure false lumen towards the low-pressure true lumen (through microfenestrations created by urgent CB inflation) might have eventually downsized the false lumen along with the expansion of the true lumen (leading to restoration of the coronary flow). However, we hold the opinion that this strategy should not be routinely used in scenarios where the true lumen is not severely compromised. In other words, mild-moderate compromise of the true lumen (generally presenting with TIMI 2 or 3 coronary flow) in patients with SCAD potentially denotes a higher chamber pressure in the true lumen compared with the false lumen. In this context, creation of intimal microfenestrations with CB inflation might paradoxically expand the false lumen (due to enhanced blood flow from the true lumen through microfenestrations) potentially leading to severe compromise of the true lumen. Of note, selection of a lower size CB (compared with the coronary diameter) is a prudent strategy to avoid coronary perforation [3] regardless of the site of CB inflation (false or true lumen). We also wonder about the size of inflated CB along with in-hospital and post-discharge medications in the patient [1, 2].

Finally, the co-existence of SCAD and takotsubo syndrome (TTS) is a well known phenomenon in the context of an acute coronary syndrome presentation [4]. These two conditions might stem from a common background such as extreme stress, or one may provoke the evolution of the other through various mechanisms [4]. The patient was an elderly female, and might have a potential proclivity for a co-existing typical or atypical TTS episode as well [1]. We wonder whether there was any sign of co-existing TTS (ballooning on cardiac imaging, significant natriuretic peptide levels, etc..) in the patient [1].
In conclusion, Zdzierak et al. [1] should be commended for their alternative use of CB inflation as a bail-out therapeutic strategy in a patient with coronary artery dissection. However, therapeutic implications of CBs in various forms of coronary artery dissections still need to be further established.

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