



## Plain Old Balloon Angioplasty (POBA) for Stenotic Lesions in Young Children with Coronary Artery Lesions after Kawasaki Disease

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### ABSTRACT

In coronary artery lesions after Kawasaki disease, calcified lesions tend to occur 6 years after the onset of Kawasaki disease. Plain Old Balloon Angioplasty (POBA) can be performed effectively and safely for Kawasaki disease coronary artery stenosis even in early childhood, although long-term observation is important because restenosis and new aneurysm formation have been noted after POBA, making it an effective treatment to improve myocardial ischemia.

**Keywords:** Kawasaki disease; Percutaneous coronary intervention; Plain old balloon angioplasty; Coronary stenosis

### DESCRIPTION

Coronary Artery Lesion (CAL) in Kawasaki disease leads to long-term vascular remodeling and myocardial ischemia from stenotic lesions caused by intimal thickening. Larger CALs are more liable to develop stenotic lesions, especially at the entrance and exit of the aneurysm [1,2]. Once myocardial ischemia is identified, reperfusion therapy with Coronary Artery Bypass Graft (CABG) or Percutaneous Coronary Intervention (PCI) is indicated, but these procedures are often difficult to perform in children, mainly due to their size.

A report of Plain Old Balloon Angioplasty (POBA) as PCI for CAL in five children with Kawasaki disease showed that POBA was effective in cases of mild calcification in patients fewer than 8 years of age within 6 years of Kawasaki disease onset [3]. Since calcification is generally observed in Kawasaki disease patients more than 6 years after the onset of the disease in other reports, it is thought that the success rate of POBA decreases after 6 years of disease onset due to the increased calcification [4].

On the other hand, restenosis and formation of new aneurysms have been noted with POBA [1,5]. The incidence of restenosis after POBA is high, with about one-fourth of patients experiencing restenosis or occlusion [1]. This is thought to be due to the fact that even if the vessel is sufficiently dilated, excessive vascular remodeling can cause restenosis. In addition, the

development of new aneurysms is an important concern, since optical coherence tomography shows that inflammation of the coronary arteries in the acute phase of Kawasaki disease destroys the internal and external elastic plates and the three-layer structure of the vessels, and high-pressure balloon dilation using POBA can easily result in aneurysm formation [6]. Balloon dilation with POBA can easily transmit the dilatation pressure to the adventitia and induce a new coronary artery aneurysm. Therefore, low-pressure dilation at less than 10 atm is recommended [7].

Stent implantation has been reported to be effective in preventing restenosis and new aneurysms [8,9]. Even at high dilatation pressures, the incidence of new aneurysms is lower with stent implantation than with POBA alone, and even 14-atm dilatation avoids the formation of new aneurysms [1]. However, stent implantation is difficult to perform in young children due to their limited stature. POBA using a Drug-Coated Balloon (DCB) has been reported to be effective in preventing restenosis, and it is expected that DCBs would be applied to patients with Kawasaki disease in the future [7]. However, stenotic lesions caused by Kawasaki disease are due to marked intimal proliferation and are histologically different from stenotic lesions caused by atherosclerotic lesions in adults. Re-expansion of a regressed aneurysm may be possible with a DCB because remodeling of CALs in Kawasaki disease is ongoing and re-expansion of regressed aneurysms has been reported [8]. Reports

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on the long-term results of DCB use in Kawasaki disease are awaited [10,11].

In the present study, we performed POBA in three young children (2 years 0 months, 2 years 2 months, and 6 years 1 month) [12]. All three patients had 99% stenosis in the anterior descending branch, and POBA was performed for the stenosis, with improvement in stenosis and peripheral myocardial ischemia, indicating that POBA was effective. After the dilatation procedure, no restenosis was observed for at least 6 months after the procedure. In the remote period, one patient has remained free of stenosis, while two patients have shown progression of 75% stenosis. However, no significant ischemic findings have been observed in either of the two patients, and careful follow-up is ongoing, but no therapeutic intervention is being performed.

## CONCLUSION

Long-term observation is important for POBA because of the problems of restenosis and new aneurysms. However, POBA is safe, may not require therapeutic intervention for a relatively long time, and is an effective treatment modality for myocardial ischemia in infancy and childhood.

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## CONFLICT OF INTEREST

Authors declare no conflict of interests.

## PATIENT PERMISSION/CONSENT STATEMENT

Permission for publication was obtained from the three patient's guardians.

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