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Case Report

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The New Weapon "Shockwave IVL" to Treat ISR Calcification Lesion

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Abstract

A 63-year-old woman was admitted to our hospital due to angina pectoris. Coronary angiography showed severe restenosis in the proximal segment of the anterior descending artery. Optical Coherence Tomography (OCT) examination showed that the restenosis in the stent proximal to the anterior descending branch was accompanied by obvious fiber proliferation and calcification. Neither Intracoronary high-frequency atherectomy nor high pressure balloon can handle in stent restenosis with calcification, Therefore, we used shockwave IVL to treat the patient. The shockwave IVL shock loosens the calcified deposits within the vessel wall into soft, safe fragmented calcified plaques by acoustic pressure waves, significantly improving vascular compliance. Finally, the stenosis in the stent disappeared. After treatment, the patient did not have chest pain again and the treatment effect was satisfactory.

Introduction

The treatment of coronary artery calcification is difficult and the prognosis is poor, and the incidence of restenosis is higher after stents areimplanted in the calcified sites. Therapies targeting coronary calcificationare currently available with high-pressure balloon dilation, laser plaque corroding, and intracoronary high-frequency atherectomy. The high-pressure balloon has an uncertain efficacy, more complications, and a higher incidence of restenosis. Intracoronary high-frequency atherectomy for in Stent Restenosis (ISR),the stent structure is easily damaged when rotary grinding, which is proneto complications such as dissection, perforation, no reflow, distal embolization. The shockwave IVL shock loosens the calcified deposits within the vessel wall into soft, safe fragmented calcified plaques by acoustic pressure waves, significantly improving vascular compliance. Recently

we used shockwave balloon to treat one patient with in stent restenosis complicated by calcification with satisfactory results.

Case Presentation

A 63-year-old woman underwent intermittent chest pain for 10 years. He was treated by Percutaneous Coronary Intervention (PCI) in anterior descending branch due to acute myocardial infarction 10 years ago. She was hospitalized again 3 years ago because of chest pain and coronary angiography showed: severe restenosis in the proximal and mid segments of the anterior descending artery with chronic occlusion of the right coronary artery, therefore, the intervention with the anterior descending and right coronary arteries was given. Later, Chest pain recurred in this patient 1 month ago, and then coronary angiographyshowed severe restenosis in the proximal segment of the anterior descending artery **(Figure 1).**

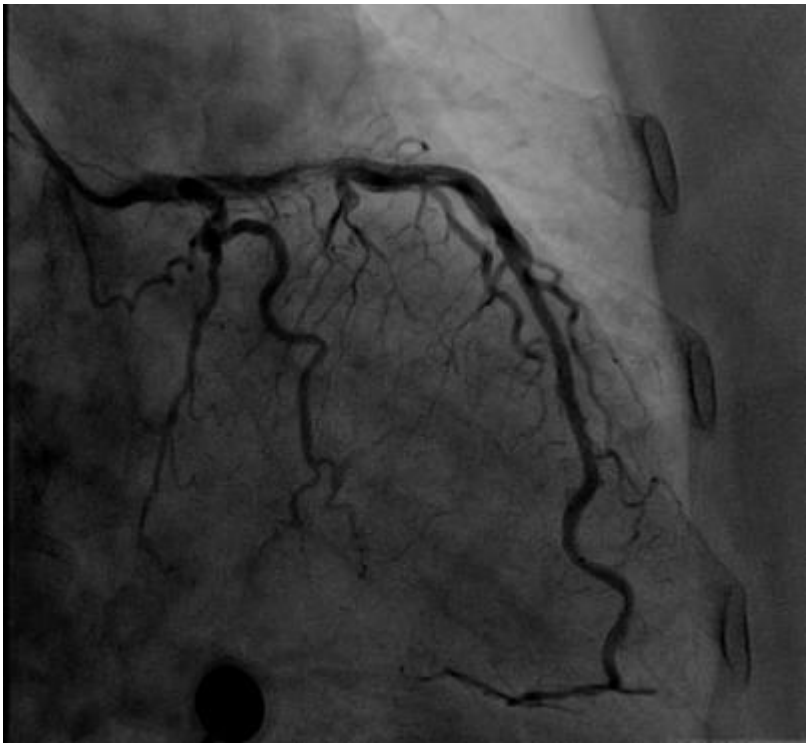

Figure 1: Severe in stent restenosis in the proximal part of the anterior descending artery.

Optical Coherence Tomography (OCT) examination showed that the restenosis in the stent proximal to the anterior descending branch was accompanied by obvious fiber proliferation and calcification **(Figure 2).** According to the patient's medical history and condition, shockwave balloon was selected. OCT examination showed that the minimum lumen area of the stenosis was 2.48 mm^2, the stenosis was a double-layer stent metal shadow which showed poor stent expansion, and the hyperplastic plaque was an obvious circular calcified plaque.

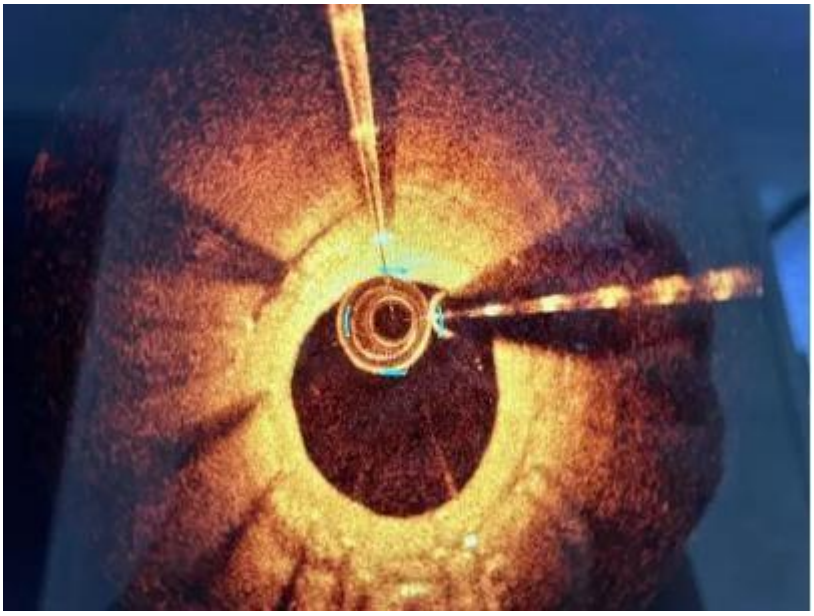

Figure 2: OCT shows fibrous hyperplasia and calcification deposition at the narrowestpart of the proximal anterior descending branch.

We selected shockwave 3.0*12 mm balloon for calcified plaque fragmentation. Initially, the balloon was fully attached by filling with 4atm, and the shock wave was given for 6 cycles. The calcified part of the balloon depression disappeared and the stenosis was alleviated **(Figure 3).** After continuous treatment for 8 cycles (80 pulses), OCT reexamination showed that there were obvious cracks between the inner membrane of the calcified part and the stent beam, with a shock wave depth of 0.49 mm, and the calcified ring was opened **(Figure 4).**

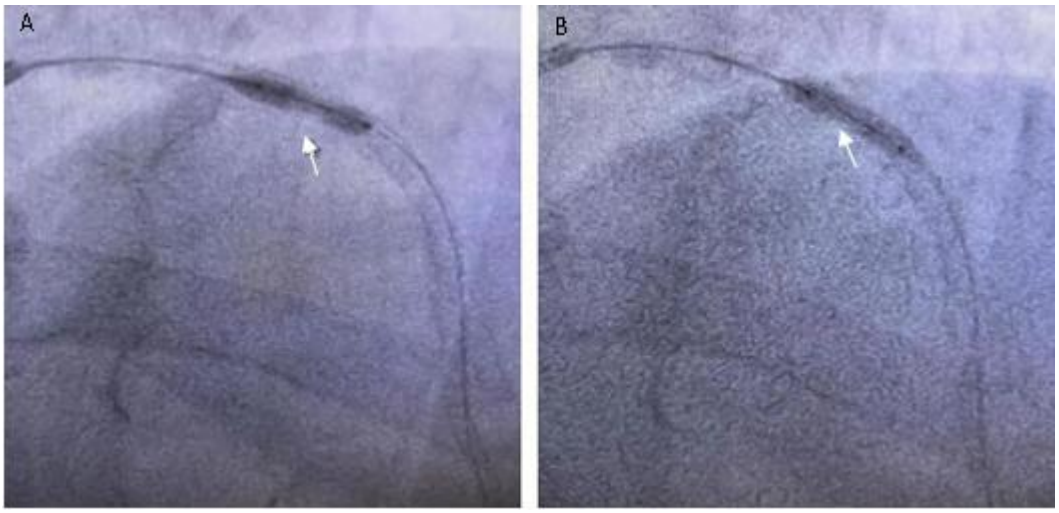

Figure 3: A) Before use of shockwave balloon. B) After use of shockwave balloon.

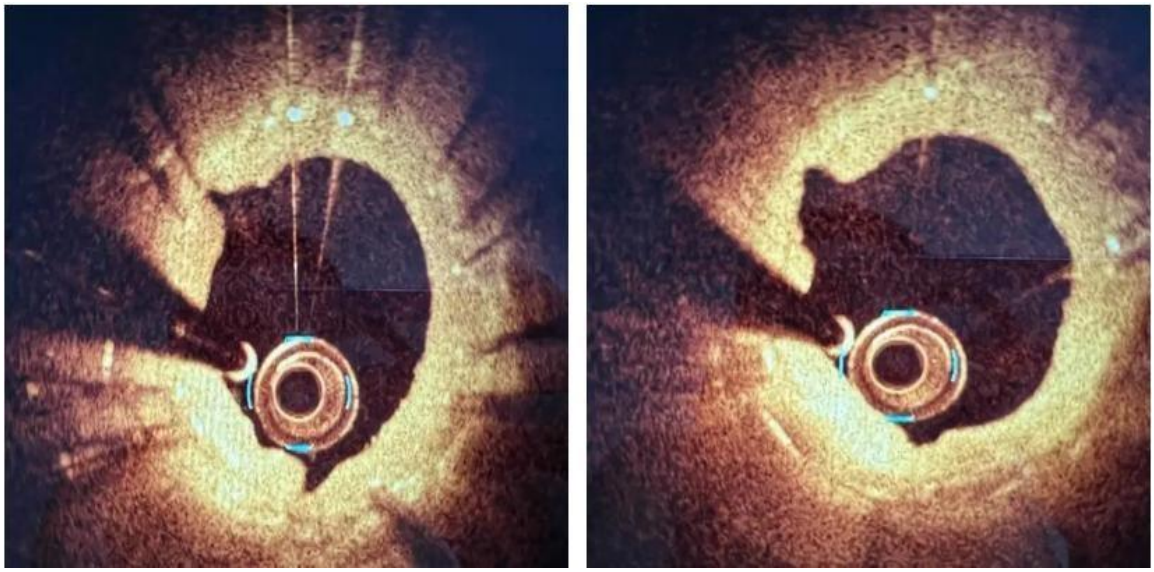

Figure 4: The calcified ring at the stenosis was opened.

At last, we selected 3.0*12 mm high pressure balloon (18-20 atm) fully expanded. After the intervention, OCT was used again to measure the area of the stricture. It is Up to 4.86 mm^2. The expansion of the lesion was satisfactory. The stenosis in the stent basically disappeared **(Figure 5).** The TIMI blood flow was grade 3, and the patient had no complaints of discomfort.

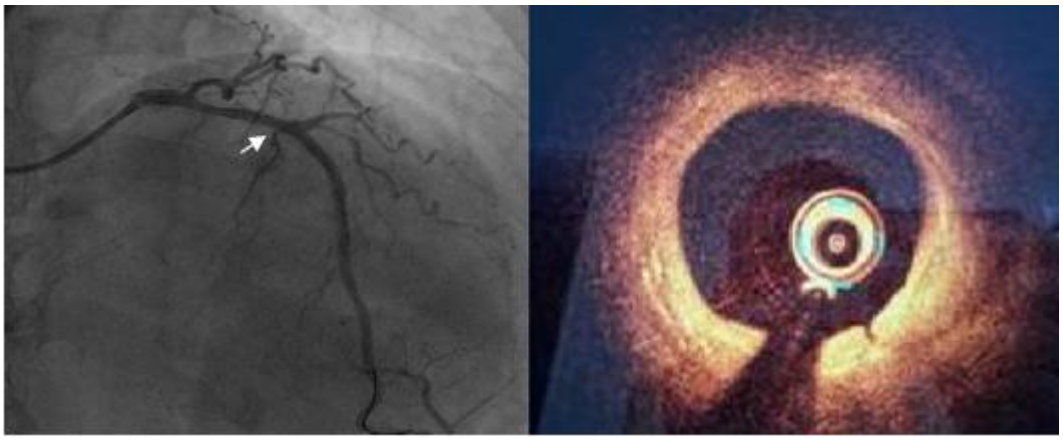

Figure 5: The stenosis disappears. The lumen area of the stenosis in the stent wassignificantly enlarged.

Discussion

The characteristic of this case is that ISR is accompanied by calcification, especially there are two-layer stents at the in-stent restenosis.If intracoronary plaque spinning is selected, spinning is performed in two-layer stents for in stent restenosis, it is possible that the spinning head is embedded in the stent and there is a risk of slow flow/no reflow. In addition, there is no good method for the treatment of poor stent expansion caused by calcification outside the stent. In this case, shockwave balloon is a good choice. Therefore, we chose shockwave balloon combined with OCT to implement a more accurate, efficient and safe treatment strategy. During the operation, there were no complications of dissection and microcirculation obstruction such as slow flow/no reflow. There was no adverse effect of shock wave on stent beam. If this patient can be combined with

drug balloon therapy, it may achieve better efficacy, but the patient refused for personal reasons. This new weapon brings a new breakthrough in the precise treatment of ISR combined with calcified lesions. This technology does not affect the structure of the stentbeam, and can make the calcification outside the stent soft, so as toexpand the plasticity again, increase the inner diameter of the bloodvessel lumen, improve the blood supply to the heart. The safety andeffectiveness of shockwave have been confirmed [1]. The disrupt coronary artery disease studies I and II demonstrated the safety and feasibility ofIVL in calcified coronary lesions. The Disrupt CAD III is an ongoingprospective, multicenter, single-arm study evaluating the safety andeffectiveness of IVL in de novo calcified coronary arteries [2]. We expectcomplete clinical data to further confirm the clinical value of IVL.

References

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