

## Percutaneous Revascularization for Coronary Chronic Total Occlusion and Multivessel Stenosis in Takayasu's Arteritis

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### Abstract

Percutaneous treatment with stent implantation is feasible, safe and effective option for stenoses of the coronary and carotid arteries, as well as of peripheral lesions, and has been increasingly considered in the management of Takayasu's arteritis. However chronic total occlusion may present a tough challenge. We report a case of a young female presenting with symptomatic chronic total occlusion of right coronary artery which was treated with percutaneous coronary stenting. She also underwent percutaneous treatment of critical stenosis of left subclavian artery, right renal artery and left common iliac artery which were successfully treated with angioplasty with stenting. This case also reports long term angiographic follow-up of this treatment option.

**Keywords:** Takayasu's arteritis; Claudication; Chronic total occlusion; Angioplasty; Stenting

### Introduction

Takayasu's Arteritis (TA) is a chronic inflammatory disease of unknown etiology that involves the aorta, its major branches, the pulmonary arteries and rarely coronary arteries which leads to stenosis/occlusion or aneurysm formation or both. Angioplasty with or without stenting has emerged as the treatment of choice for such lesions and is safe.

### Case Report

A 28 year old female presented with history of chronic stable angina



**Figure 1:** (A) Right coronary angiography in LAO projection showing proximal chronic total occlusion (arrow). Please note extensive bridging collaterals. (B) Left subclavian artery angiography showing critical ostial stenosis (arrow). (C) Right renal angiography showing critical ostial narrowing (arrow). (D) Left common iliac angiography showing critical proximal stenosis (arrow).

(NYHA class III) and chronic headache of 1 year duration. She was diagnosed to have hypertension a few years ago but it was uncontrolled despite antihypertensive medications. On enquiry she also gave history of left upper and lower limb claudication and also history suggestive of left subclavian steal syndrome.

Physical examination reduced left carotid and high volume radial pulses in the right upper extremity were observed. The left radial, brachial, dorsalis pedis, posterior tibial and femoral pulses were not palpable. There was left subclavian bruit. Continuous bruit were noted over right para-umbilical area and left groin. Blood pressure (BP) was 200/80 mmHg in the right arm, and it could not be measured in the left arm due to the absence of pulse. Cardiac auscultation showed regular rhythm and a LVS4 at apex. The electrocardiogram showed sinus rhythm, heart rate of 98 beats per minute, with features of left ventricular hypertrophy. ESR was 18 mm at 1 hour, and CRP was 1.6 mg/dl.

To confirm the clinical diagnosis of Takayasu's Arteritis she underwent coronary angiography, aortography and peripheral arteriography. The coronary angiography showed chronic total occlusion of proximal RCA with extensive bridging collaterals (Figure 1A). Left anterior descending artery had proximal moderate disease. She also had mild ostial lesion of left common carotid artery and critical narrowing of left subclavian artery (Figure 1B). The right renal artery also had critical ostial stenosis (Figure 1C). Left renal artery was not visualized. The left common iliac artery had proximal critical stenosis (Figure 1D). Remaining aortic branches were normal.

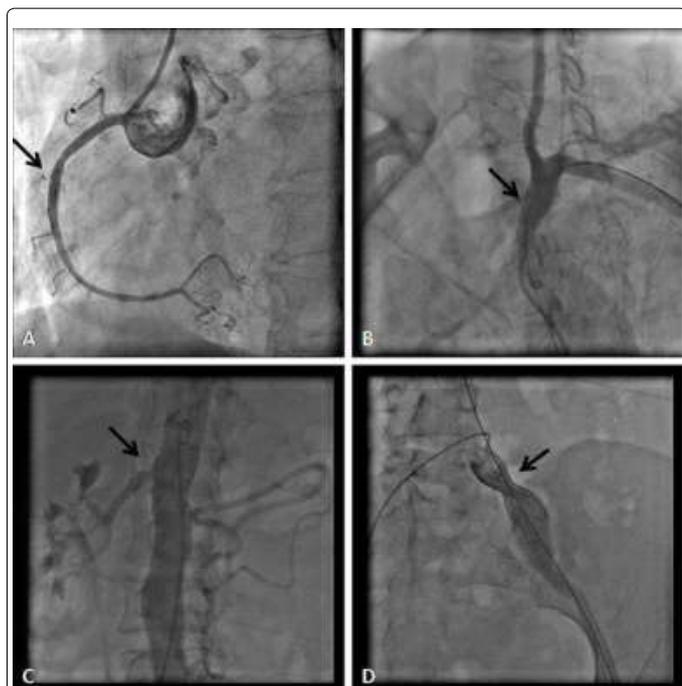
Percutaneous revascularization with stenting of multiple stenoses as a staged procedure was considered as a treatment option. Initially

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**Figure 2:** (A) Post PCI right coronary angiography (arrow) in LAO projection showing TIMI III flow. (B) Post PTA angiography showing restored flow in left subclavian artery (arrow). (C) Post PTA right renal angiography showing restored normal flow (arrow). (D) Left common iliac artery angiography showing good post stenting result (arrow).

percutaneous intervention of RCA was planned. The right femoral artery access was taken and RCA was hooked with JR 3.5 guide catheter. Lesion was crossed with Fielder XT wire and lesion was dilated multiple times with monorail balloon of varying size. After every dilatation recoiling of diseased segment was noted probably due to fibrotic lesion secondary to Takayasu's Arteritis which required multiple dilatations. Later the lesion was stented with 3 × 32 mm sirolimus eluting stent followed by post dilatation with 3 × 9 mm NC balloon with distal TIMI III flow (Figure 2A). Fractional flow reserve of LAD lesion was measured which was insignificant (0.85), hence medical follow was decided. Post PCI there was complete relief from angina.

Two days later she underwent percutaneous transluminal angioplasty with stenting to left subclavian artery and right renal artery. Both left subclavian artery and right renal artery lesions required multiple dilatations with monorail balloon. The left subclavian artery lesion was crossed with Amplatzer extra stiff wire and graded dilatation of lesion was done followed by 9 × 29 mm balloon mounted GENESIS stent was deployed with success (Figure 2B). Right renal artery lesion was successfully stented with 7 × 12 mm GENESIS stent (Figure 2C).

Nine months later she was readmitted for elective angioplasty with stenting of left common iliac artery. The left common iliac artery was stented with 14 × 39 mm Palmaz peripheral vascular stent (Figure 2D). Follow-up angiography showed patent stent in RCA, left subclavian artery and right renal artery stents and there were no development of new lesions. She had complete relief from angina and claudication and hypertension was under control.

## Discussion

Takayasu's Arteritis (TA) is a chronic inflammatory disease of unknown etiology that involves the aorta, its major branches, and

the pulmonary arteries. The disease leads to stenosis/occlusion or aneurysm formation or both [1].

Stenotic lesions in TA are different from atherosclerotic lesions in several aspects. They are more firm, fibrotic, non-ulcerated, and usually involve the ostium of the vessel. There is often involvement of more than one vessel in the same individual and there may be multifocal lesions in the artery. The disease may involve a long segment of one vessel, causing diffuse narrowing. Hence performing percutaneous interventions in TA is a real challenge and long term results are often frustrating [2]. In our patient she had multiple vessel involvement including chronic total occlusion in the RCA. The left renal artery was not visualized and left kidney was atretic. The critical ostial stenosis involving right renal artery with uncontrolled hypertension necessitated the need for renal artery angioplasty.

Percutaneous Transluminal Angioplasty (PTA) has emerged as the treatment of choice for stenotic lesions. The major advantages of this technique over surgical revascularization include its safety, efficacy, ease of performance, the feasibility of tackling multiple lesions at the same sitting, and the ability to repeat the procedure without any significant morbidity in cases of recurrence [3]. PTA is the commonest palliative procedure performed with a success rate varying from 56-80% [4]. Recently the results of angioplasty have been improved by stent placement. Stents not only help to achieve larger luminal diameters but may also abolish or markedly reduce gradients across the stenotic segment. It is postulated that such immediate hemodynamic benefit would translate into improved effort tolerance, better quality of life, and lower restenosis rates [3].

The revascularization procedure was challenging in our patient since multiple vessels were involved including coronaries. The lesion in the LAD was proved physiologically insignificant by Fractional Flow Reserve (FFR) the requiring only medical therapy. The chronic total occlusion in the RCA presented a challenge. The lesion required multiple balloon dilatations with high inflation pressure due to repeated recoiling of the fibrotic lesion. In such situations cutting balloon angioplasty followed by stenting could be a preferred option. Similar recoiling was also observed during PTA in subclavian, renal and common iliac arteries too.

There are only few reported cases of PCI in TA and long term outcome in coronary stenting in such situation is unknown. There has been no report on PCI in chronic total occlusion in TA. Our patient had excellent 6 months angiographic follow-up result with no restenosis.

TA is the most common cause of renovascular hypertension in Asian countries [5]. Renal lesions in TA are often bilateral and involve the ostia as seen in our patient. Our patient resistant hypertension despite multiple antihypertensives. PTA of the renal arteries has been shown to have excellent immediate and long-term results [6]. Our patient responded to PTA and at 6 months follow-up blood pressure was controlled with one antihypertensive medication (Amlodipine).

The challenge with percutaneous angioplasty in TA is the rate of restenosis which has been found to be much higher than that associated with atherosclerotic lesions [7,8]. In our patient we could have 6 months angiographic follow-up of RCA, left subclavian and right renal arteries which showed no restenosis. Our patient is asymptomatic at 9 months follow-up.

## Conclusion

Staged percutaneous treatment of multiple vessels with stenting

is a safe and effective option and should be preferred over surgical revascularization in the management of Takayasu's Arteritis. Even though chronic total occlusion of coronary artery challenging, it's amenable to percutaneous treatment with promising long term result.

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