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CASE REPORT

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Percutaneous transluminal coronary angioplasty in a 52-year-old patient with porcelain aorta and calcified coronaries: A case report

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Key Clinical Message

Porcelain aorta, characterized by extensive calcification of the aortic wall is often associated with coronary calcification. It can pose an increased risk of thromboembolic complications during interventional and surgical procedures. We present a case of a 52-year-old female, a chronic smoker with dyslipidemia with complaints of exertional chest pain for past 6 months. She was diagnosed as a case of non-ST elevation myocardial infarction (NSTEMI) with multivessel CAD, with porcelain aorta and calcified coronaries based on abnormal ECG, elevated troponin and coronary angiography findings. Percutaneous transluminal coronary angioplasty (PTCA) was the treatment modality chosen considering the risk of thromboembolism with aortic manipulation during coronary artery by-pass grafting (CABG). Repeat ECG after the procedure showed resolution of ST segment depression. Her hospital stay was uneventful. She was discharged on dual antiplatelet therapy, statin and metoprolol. One-week follow-up revealed normal ECG and blood reports, with further outpatient department visits scheduled every 3 months. Porcelain aorta and coronary calcification is a challenging case for cardiologists. PTCA if done meticulously could be preferable to coronary-artery by-pass grafting (CABG) in such patients. Despite the risks like aortic rupture and thromboembolic complications, PTCA in a case of multivessel CAD with porcelain aorta and calcified coronaries could be a life-saving procedure.

KEYWORDS

angioplasty, balloon, coronary, case reports, coronary artery disease, vascular calcification

1 | INTRODUCTION

Porcelain aorta refers to circumferential or near-circumferential calcification of the ascending aorta or aortic arch, extending to the descending aorta. It is often an incidental finding in patients with cardiovascular or pulmonary diseases.[1] Two distinct pathophysiological processes contribute to aortic

calcification, atherosclerotic intimal calcification and non-atherosclerotic medial calcification, which are mediated by osteoblasts.[2] Thoracic aorta calcification is mostly age-related, is linked to coronary and valvular calcification, and has an overall increased risk of cardiovascular morbidity and mortality.[3] Manipulation of the porcelain aorta during surgery can lead to an increased risk of atheroembolism, warranting strict vigilance and caution in surgical and interventional cardiac procedures.[4] Recent recommendations from the European Society of Cardiology/European Association for Cardio-Thoracic Surgery (ESC/EACTS) consider porcelain aorta as a condition in which catheter-based procedures should be preferred.[5]

Here, we present a case of successful percutaneous transluminal coronary angioplasty (PTCA) in a patient with non-ST-elevation myocardial infarction (NSTEMI) and multivessel coronary artery disease (CAD) with porcelain aorta and calcified coronaries. This work has been reported in line with CARE guidelines.

2 | CASE PRESENTATION

Our patient was a 52-year-old female who was referred from a provincial hospital in western Nepal to our facility, a tertiary cardiovascular center. She complained of chest pain for the past 6 months that was exertional, radiating to the left arm, neck, and back, and associated with palpitations. She was a chronic smoker with a history of dyslipidemia. There was no any history of chronic kidney disease.

On examination, the patient's vitals were stable and no significant clinical findings were reported. Upon work-up at our center, the patient's electrocardiogram (ECG) showed ST-segment depression in leads V3, V4, and V6 (Figure 1). Echocardiography was normal, with left ventricular ejection fraction (LVEF) of 60%. Coronary angiography revealed significant stenosis of the right coronary artery (RCA), left anterior descending artery (LAD) and left circumflex artery (LCX), along with extensive calcification of the aortic wall (porcelain aorta) and coronary arteries. (Figures 2–4) Renal function test was within normal limits and work up for dyslipidemia revealed raised total cholesterol (280 mg/dL) and low density lipoprotein (LDL-216.87 mg/dL) with high density lipoprotein (HDL) and triglyceride within normal limits. Troponin levels during initial evaluation at our center was raised (20.6 pg/mL) during initial work-up at our center, which later was within normal limits probably owing to troponin's gradual decline over time.

The patient was diagnosed as a case of NSTEMI with multi-vessel CAD, with porcelain aorta and calcified coronaries. Given the extensive calcification of the aorta, the patient was deemed to be a high-risk candidate for surgical revascularization by the cardiac surgery team. The

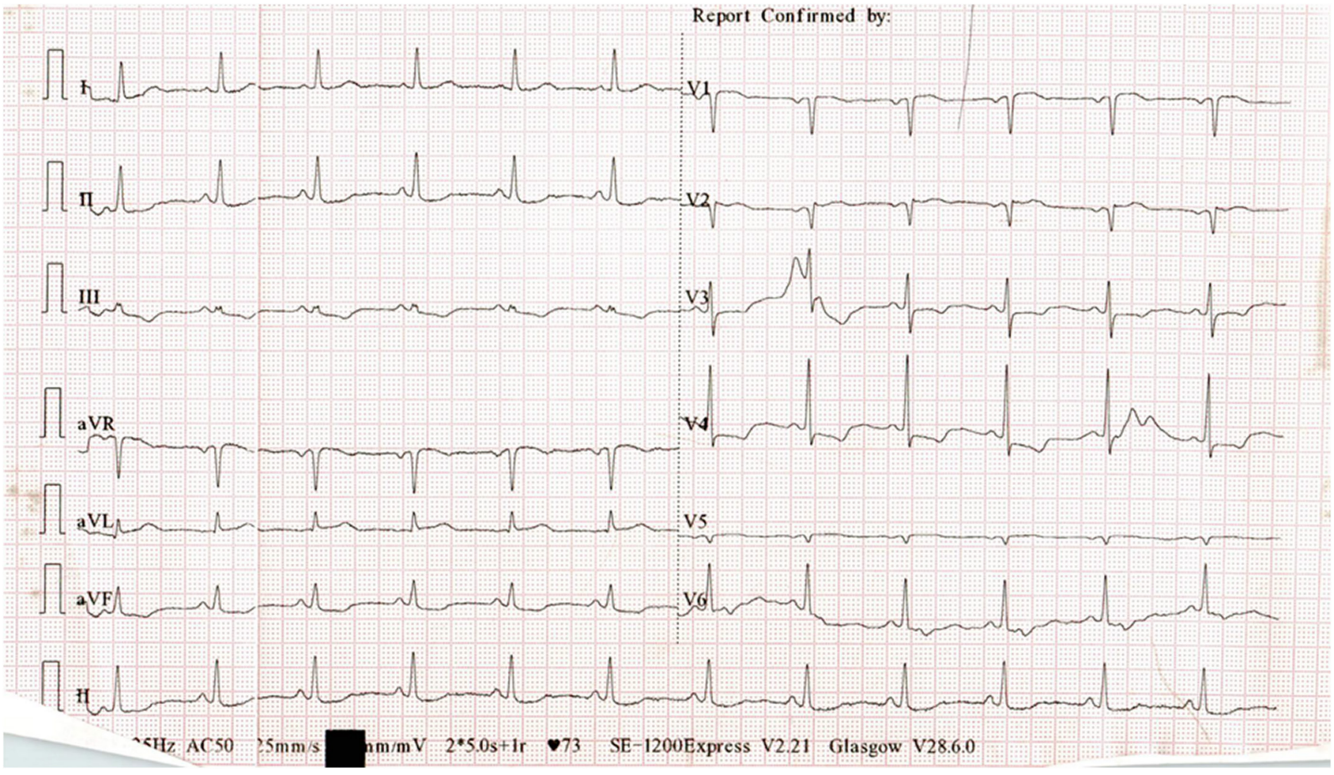

FIGURE 1 Patient's ECG showing ST-segment depression in leads V3, V4 and V6.

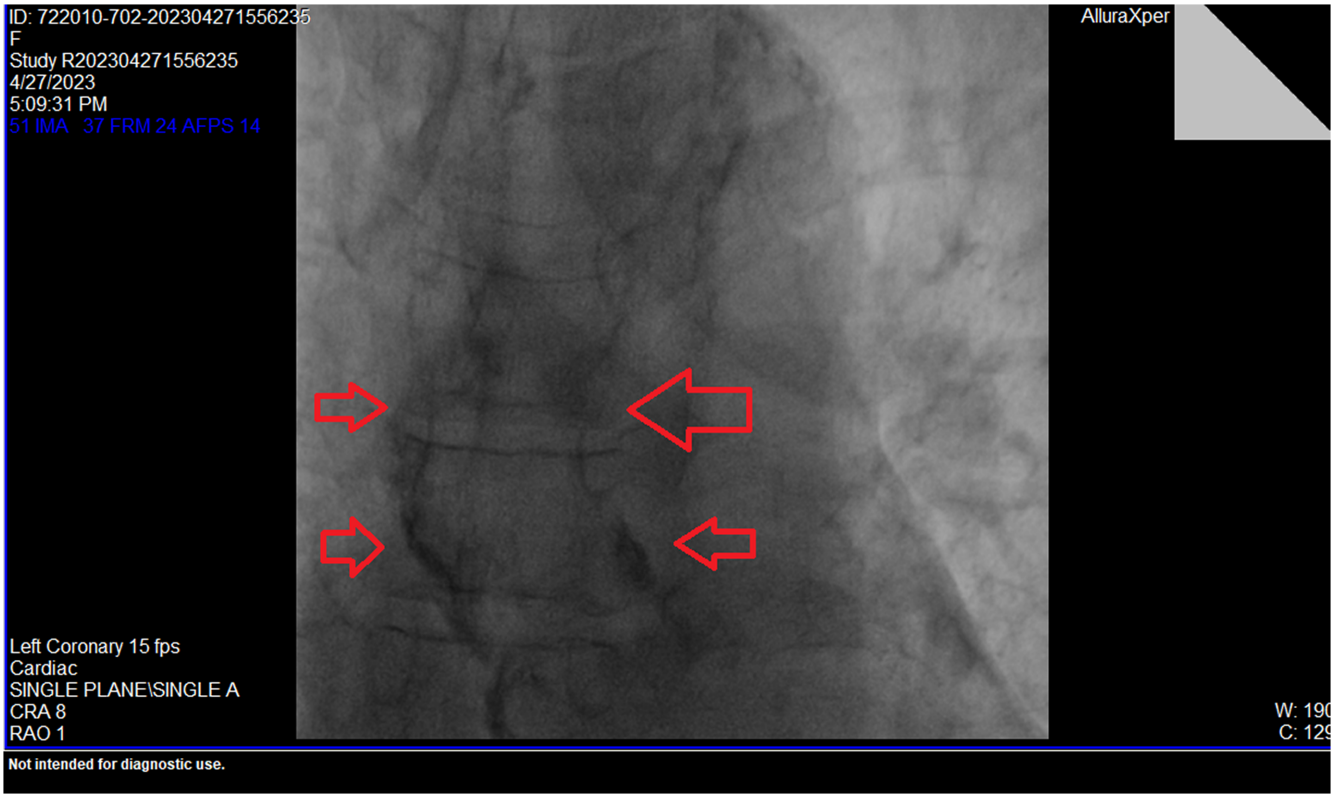

FIGURE 2 Porcelain aorta visualized during coronary angiography (CAG). The extensive calcification makes the walls of aorta visible on CAG as shown by red arrows. The angulation is shown toward the bottom left of the image.

patient was admitted and considered for percutaneous coronary intervention (PCI). The cardiac surgery team advised the patient to undergo PCI and considered CABG only if the former failed. The patient was treated with antiplatelet aspirin and clopidogrel as a premedication. The patient was heparinized adequately. Injection of glyceryl trinitrate was used to prevent coronary spasms, and analgesia was achieved with local lignocaine infiltration and intravenous fentanyl.

Access to the right femoral artery was obtained under fluoroscopic guidance. A six French Judkins Right (JR) catheter was used for this purpose. Initially, the RCA was prepared using a 1.5 mm × 10 mm pre-dilatation balloon, followed by a 2.5 mm × 10 mm pre-dilatation balloon at 12 atm. Stent placement was then performed using a 2.75 mm × 18 mm stent and a 3.0 mm × 38 mm stent to optimize the blood flow. The RCA was further optimized using a 3.0 mm × 10 mm post-dilatation balloon at 16 atm. Moving on to the LAD, a 2.5 mm × 10 mm pre-dilatation balloon was used at 16 atm to prepare the artery, followed by the placement of a 3.0 mm × 30 mm stent to restore blood flow. Finally, a 3.5 mm × 10 mm post-dilatation balloon at 16 atm was used to ensure proper stent expansion and apposition in the LAD. (Figures 5 and 6 show the coronaries after stenting). Meticulous care was taken to avoid trauma to the porcelain aorta. It should be noted that the use of debulking devices wasn't considered due to their unavailability in our center owing to resource constraints.

The patient was hemodynamically stable after the procedure and no complications were observed for 96 h after the procedure. The patient's angina was relieved following the procedure, and immediate ECG showed resolution of the ST-segment depression. She was discharged on dual antiplatelet therapy, statins, and metoprolol. Metoprolol was given to the patient considering the incomplete revascularization as LCX was untouched in this patient. The ECG and blood reports were normal at the 1-week follow-up. The patient was advised to follow up on outpatient basis every 3 months.

3 | DISCUSSION

Porcelain aorta is more common in the elderly population, with a study revealing the median age of 79 years.[6] Our patient was a 52-year-old female, and this early extensive calcification of the porcelain aorta and coronaries could be attributed to smoking and dyslipidemia, which are risk factors known to accelerate atherosclerosis and aortic calcification.[7,8] This case report shows that PCI is a valuable treatment option for multivessel coronary disease when surgical revascularization is not feasible.

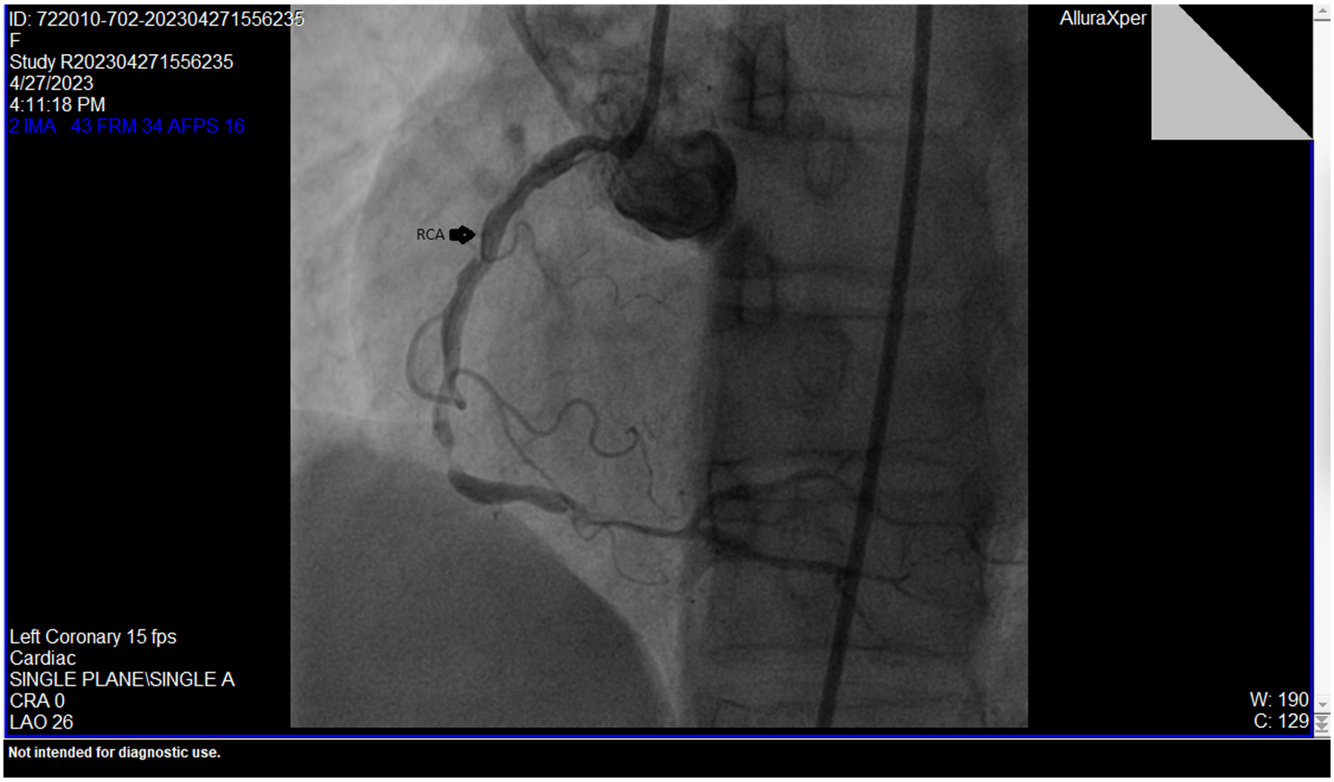

FIGURE 3 Coronary angiography showing right coronary artery (RCA) with stenosed segments and extensive calcification. The angulation is shown toward the bottom left of the image.

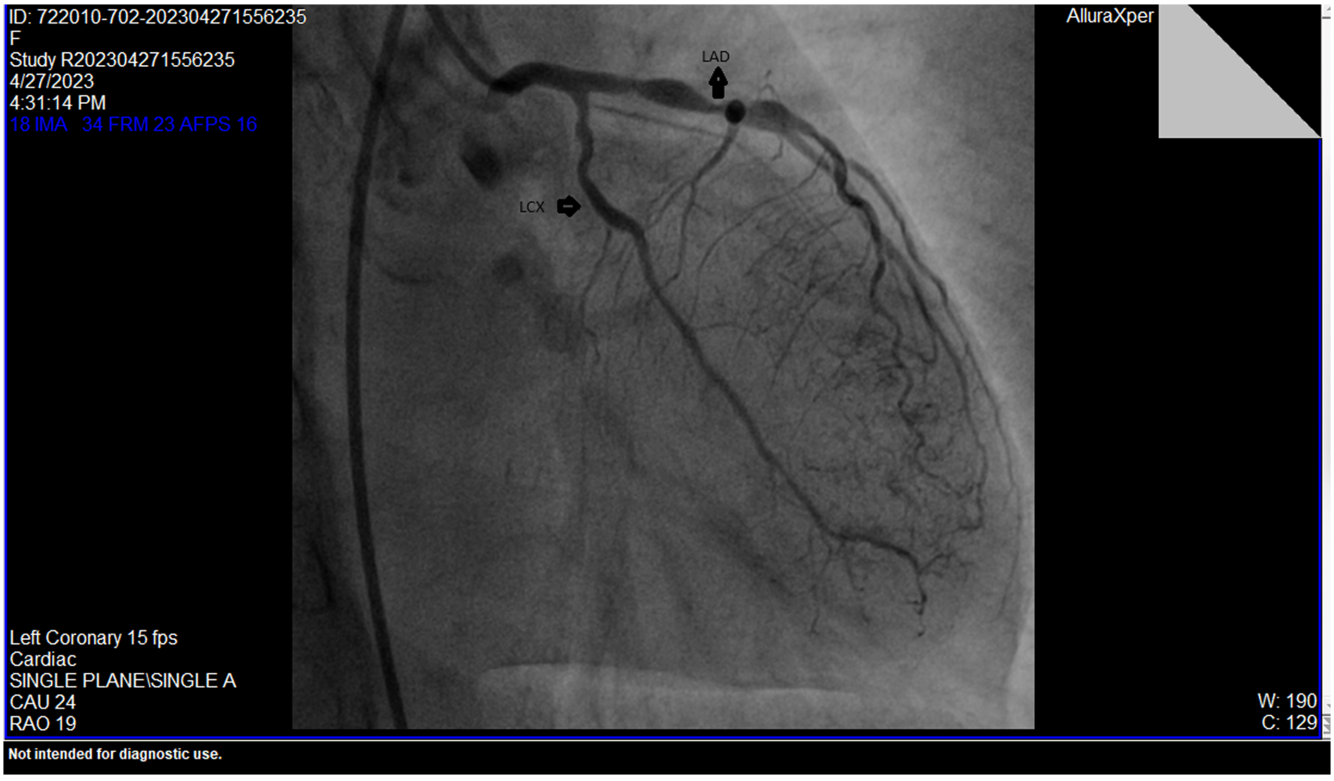

FIGURE 4 Coronary angiography showing left anterior descending artery (LAD) and left circumflex artery (LCX) with stenosed segments and extensive calcification. The angulation is shown toward the bottom left of the image.

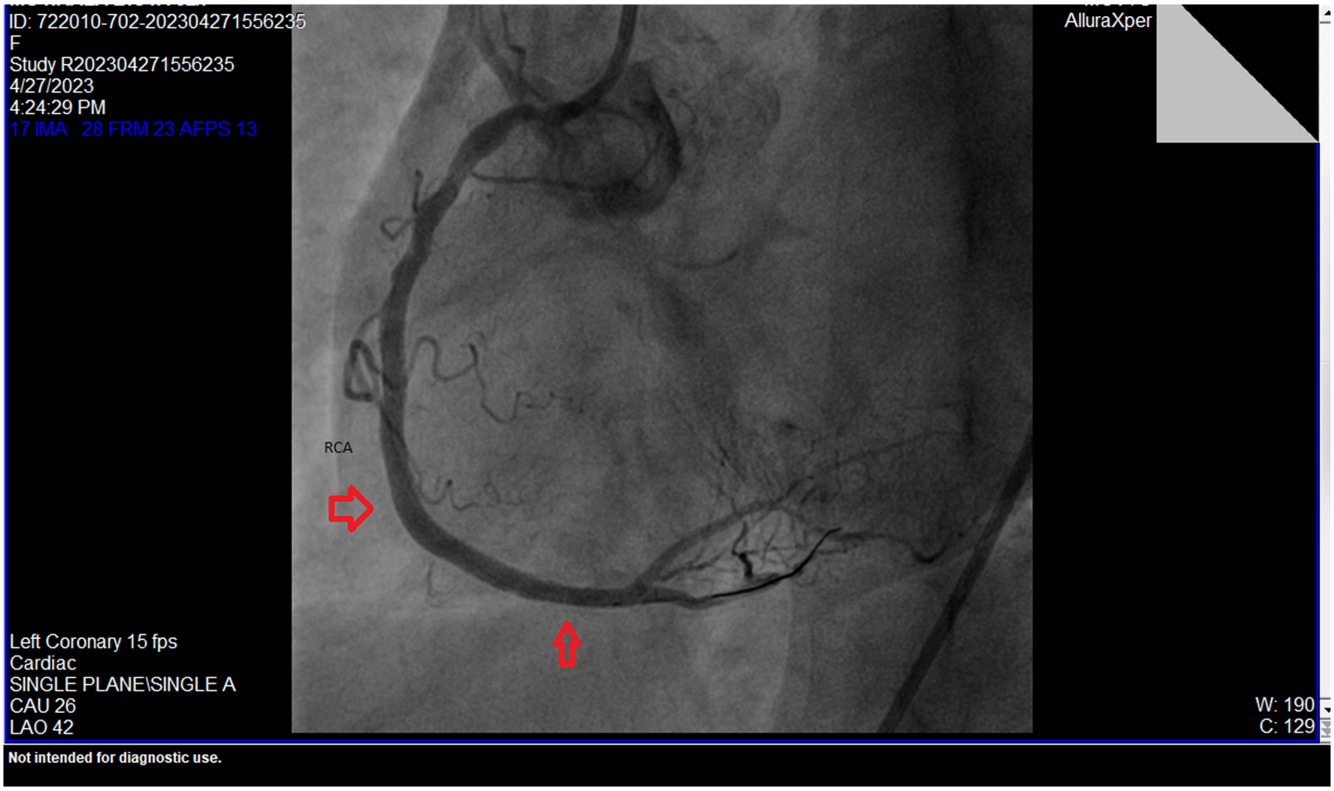

FIGURE 5 Coronary angiography showing right coronary artery (RCA) after stent placement. Red arrows point out the site of stent placement. The angulation is shown toward the bottom left of the image.

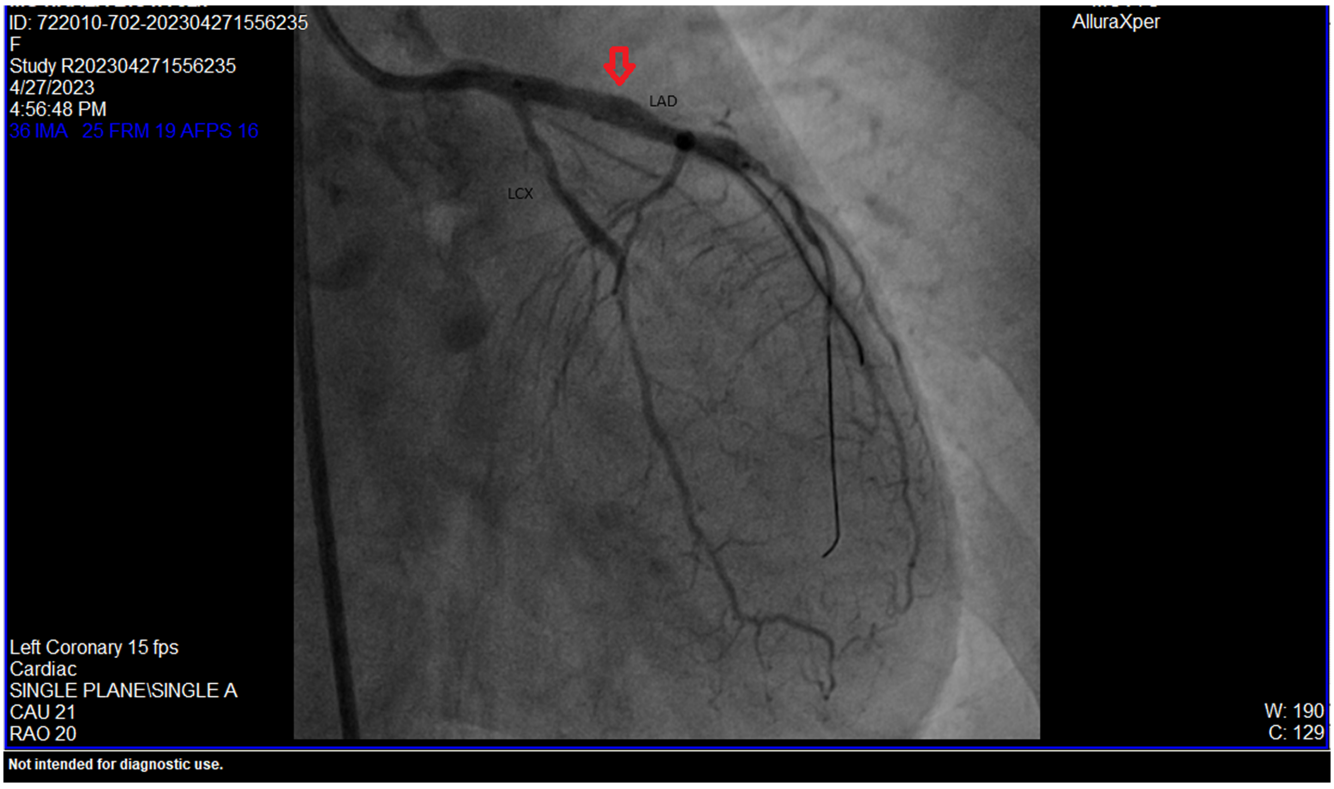

FIGURE 6 Coronary angiography showing left anterior descending artery (LAD) after stent placement. Red arrow depicts the site of stent placement. The angulation is shown toward the bottom left of the image.

CABG or coronary artery bypass grafting involves cannulation and clamping of the diseased aorta, which can lead to embolization from the atheromatous heavily calcified aorta, increasing the risk of stroke and other thromboembolic complications.[9] This forms a basis for the preference for percutaneous intervention (PCI) in the management of coronary artery disease in patients with porcelain aortas. The cardiovascular surgery team took this into consideration and advised the patient to undergo PCI instead of CABG owing to extensive calcification of the aorta and coronaries and the associated risks. Nevertheless, percutaneous transluminal angioplasty (PTCA), which is the preferred option for this patient, is associated with risks. The risk of aortic injury during catheter manipulation mandates a gentle approach during PCI in patients with porcelain aortas.

Recent studies have shown that aortic calcification is associated with coronary calcification.[10] The same finding was evident in our patient, as shown in Figures 2–4. This could pose the risk of artery rupture during stent placement. In this particular case, after a deliberate risk–benefit analysis, PCI was chosen as the treatment modality. With adequate preparation, due deliberation, and meticulous care at the hands of an experienced interventional cardiologist, the procedure was successful in an otherwise risky patient. Hence, this case report serves as an example of how successful PTCA could save the life of a porcelain aorta patient with stenosed and calcified coronary arteries.

4 | CONCLUSIONS

In conclusion, this case report highlights the successful application of PCI in a patient with porcelain aorta and calcified coronary artery. Despite the risk of complications such as aortic rupture, dissection, and coronary artery rupture, the procedure was performed safely and effectively. Careful preprocedural planning, technical expertise, and careful postprocedural precautions remain central to the successful accomplishment of the case. Continued research on such complex cases will help to improve patient outcomes in the future.

AUTHOR CONTRIBUTIONS

Reechashree Dhungana: Conceptualization; data curation; formal analysis; methodology; project administration; visualization; writing – original draft; writing – review and editing. **Padam Sharma:** Conceptualization; data curation; investigation; resources; supervision; validation; writing – review and editing. **Chandra Mani Poudel:** Investigation; resources; supervision; validation; writing – review and editing. **Anup Pandey:** Data curation; formal analysis; visualization; writing – review and editing. **Raja Ram Khanal:** Investigation; supervision; validation; writing – review and editing. **Smriti Shakya:** Investigation; supervision; validation; writing – review and editing. **Ratna Mani Gajurel:** Investigation; supervision; validation; writing – review and editing.

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None.

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

All data underlying the results are available as part of the article and no additional source data are required.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and accompanying images, complying with the requirements as mentioned in Wiley's CCR Consent Form. Consent was taken in Nepali language; however, a copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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