

Case Report

Cardiogenic Shock After Arterial Y-Graft Coronary Bypass Surgery Secondary to Critical Stenoses of the Left Subclavian and Left Main Coronary Arteries

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ABSTRACT

We present a case of a 62-year-old man who was in cardiogenic shock. He had a history of coronary artery bypass grafting 4 years previously, with left internal mammary radial artery Y-grafting to a left dominant coronary circulation. Critical stenoses of the left main coronary and left subclavian arteries were seen at angiography. An occluded abdominal aorta precluded the use of mechanical circulatory support. The patient underwent high-risk stenting of the left subclavian artery with a successful outcome. The case highlights the unresolved issue of screening for subclavian stenoses in patients being considered for revascularization with arterial Y-grafting.

RÉSUMÉ

Nous présentons le cas d'un homme de 62 ans en choc cardiogénique. Ce patient avait subi un pontage aortocoronarien 4 ans auparavant, par un montage en Y d'une artère thoracique et d'une artère radiale internes gauches pour une circulation coronaire gauche dominante. Une sténose critique de l'artère coronaire gauche principale et de l'artère subclavière gauche a été observée à l'angiographie. L'occlusion de l'aorte abdominale écartait le recours à l'assistance circulatoire mécanique. Le patient s'est soumis à l'installation très risquée d'une endoprothèse dans l'artère subclavière gauche, intervention qui s'est avérée une réussite. Ce cas met en évidence le problème non résolu du dépistage des sténoses subclavières lorsque la revascularisation par un montage en Y des artères est envisagée.

Case

A 62-year-old man with a history of poorly controlled diabetes, claudication, and coronary artery bypass grafting (CABG) in 2014, was admitted with breathlessness and chest pain. Initially hypotensive with a lactate of 9 mmol/L, his electrocardiogram (ECG) showed ST-elevation in aortic valve replacement (AVR), with widespread ST-segment depression (Fig. 1A).

At bypass, the left internal mammary (LIMA) graft had been anastomosed to the left anterior descending (LAD) coronary artery, and a Y-graft (harvested left radial artery) anastomosed sequentially to the first diagonal, first obtuse marginal, and left posterior descending branches.

At emergent angiography, a severe calcified stenosis of the left main coronary artery was seen (Fig. 1B and Video 1 , view video online). It was not possible to intubate the LIMA graft selectively because of a critical stenosis in the left

subclavian artery (Fig. 1C). Myocardial blood flow being dependent on the left internal mammary artery, myocardial ischaemia secondary to left main and subclavian artery stenoses was diagnosed.

Initially stabilized medically, the patient underwent computed tomography (CT), which demonstrated infrarenal aorto-bi-iliac occlusion, precluding mechanical support from a femoral approach. Twelve hours later, the patient was again in pain; an ischemic ECG revealed cardiogenic shock. The patient therefore underwent emergent subclavian intervention, performed by an interventional radiologist with interventional cardiology back-up. Bilateral brachial access was obtained. A 4 Fr Universal Flush catheter was placed in the aortic arch. A retrograde approach was employed; after wiring the stenosis with a 0.018-inch guidewire (Fig. 1D) and predilatation, a balloon-expandable Propos 7 x 26 mm (Stron Medical, Winsen, Germany) stent was deployed (Fig. 1E). The patient remained stable; an excellent angiographic result was obtained (Fig. 1F). The patient made good clinical progress thereafter and was discharged home on day 4.

Discussion

We present a case of successful high-risk subclavian intervention in a patient with cardiogenic shock. Coronary-

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See page 1419.e15 for disclosure information.

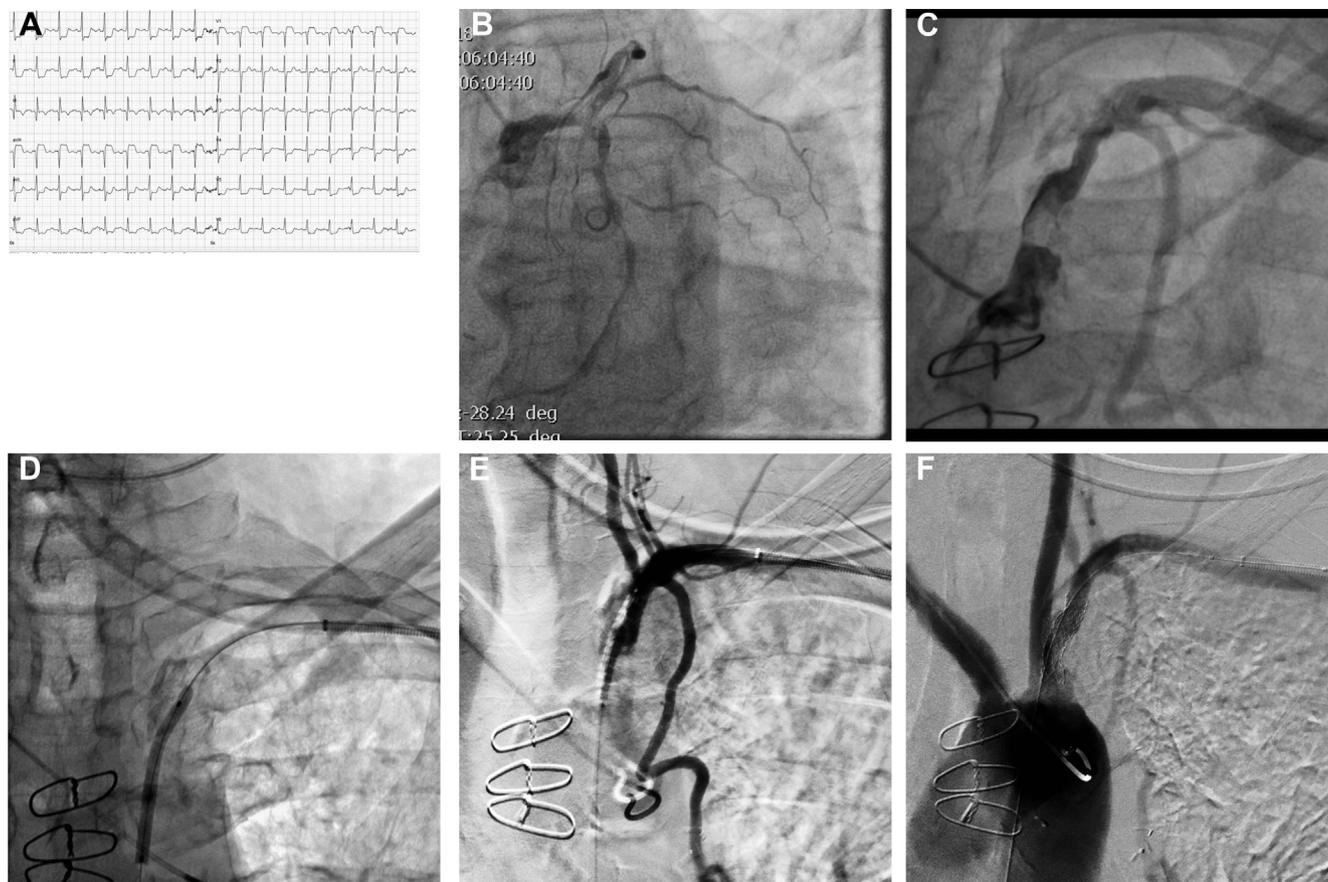


Figure 1. Subclavian intervention in a patient with previous coronary bypass grafting presenting with cardiogenic shock and myocardial ischemia secondary to left main and subclavian stenosis. (A) ECG at presentation; (B) coronary angiography with a critical distal left main stenosis; (C) stenosis of the left subclavian artery; (D) retrograde wiring and predilatation of the stenosis; (E) stent placement respecting origins of the LIMA graft and vertebral artery; (F) final angiographic result. ECG, electrocardiography; LIMA, left internal mammary artery.

subclavian steal describes retrograde flow via a LIMA graft to the left vertebral artery and left arm in cases of subclavian stenoses after coronary bypass surgery.¹ In this case, antegrade blood flow to the myocardium was severely limited by a critical stenosis of the left main coronary artery, with resultant global ischemia. Several treatment options were considered. Restoration of antegrade myocardial blood flow with percutaneous coronary intervention (PCI), including rotablation, of the heavily calcified left main was considered at prohibitive risk. High-risk PCI for coronary-subclavian steal using mechanical circulatory support has been reported;² here, an occluded abdominal aorta precluded this approach. The patient was similarly considered at prohibitive cardiothoracic surgical risk. Published series suggest that approximately 20% of subclavian interventions are indicated because of coronary-subclavian steal,³ and thus PCI to the subclavian artery was recommended. A good outcome was obtained by close co-operation among vascular specialists.

Total arterial revascularization is favoured by some cardiothoracic surgeons. Concerns about sternal wound complications in a patient with poorly controlled diabetes may have mitigated against the use of bilateral internal mammary

grafts in this case. However, the downside of a LIMA-radial Y-graft to a left dominant circulation, as in this case, is that the majority of the coronary circulation is then jeopardized in the event of progressive disease in the subclavian artery proximal to the origin of the LIMA.

Subclavian stenoses are markers for severe atherosclerosis. Although no consensus on screening prior to coronary bypass surgery exists, CT angiography in selected patients may be the favoured approach. The depth of the origin of the left subclavian limits the usefulness of ultrasound, whereas magnetic resonance imaging may be hindered by the heavy calcification typical of subclavian stenosis.⁴ In this case, poor diabetic control contributed to severe systemic atherosclerosis. Data suggest similar outcomes when radial artery grafts are anastomosed proximally to the aorta or to the LIMA graft;⁵ the case does therefore highlight a clinical scenario in which preoperative screening for subclavian disease might have had value in selection of surgical technique.

Conclusion

We present a case of successful high-risk subclavian artery intervention in a patient with cardiogenic shock, left main

coronary disease, and previous Y-graft CABG, after close co-operation among vascular specialists. The case also highlights the unresolved issue of screening for subclavian stenoses in patients being considered for revascularization with arterial Y-grafting.

Disclosures

The authors have no conflicts of interest to disclose.

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Supplementary Material

To access the supplementary material, visit the online version of the *Canadian Journal of Cardiology* at www.onlinecjc.ca and at <https://doi.org/10.1016/j.cjca.2019.06.012>.