Chronic Total Occlusion of the Innominate Trunk: Successful Recanalization with Retrograde Technique and Dedicated Devices Borrowed from Percutaneous Coronary Interventions

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Abstract: The innominate trunk is a short vessel with crucial clinical relevance as in most patients it provides flow to the right subclavian artery and the right common carotid artery. Innominate trunk occlusions are particularly challenging, as results of endovascular therapy are suboptimal in terms of acute success, whereas open surgery poses a high risk of complications. The systematic application of techniques and devices developed for coronary occlusions holds the promise of substantially improving the management of subjects with peripheral artery disease. We hereby present a case of a patient with innominate trunk occlusion who underwent successful percutaneous revascularization by carefully and expertly exploiting techniques and devices well tested in the coronary realm. This clinical vignette suggests that this treatment approach may be feasible and risk-beneficial for otherwise challenging innominate trunk occlusions.

Keywords: Angioplasty, Percutaneous transluminal angioplasty, Peripheral artery disease, Subclavian artery.

INTRODUCTION

Peripheral artery disease is a major cause of morbidity and mortality, despite its variable clinical impact depending on the severity and location of disease. The innominate trunk is a short vessel with crucial clinical relevance as it provides flow to the right subclavian artery and the right common carotid artery in most patients. Innominate trunk occlusions are particularly challenging, as results of endovascular therapy are suboptimal in terms of acute success, whereas open surgery poses a high risk of complications [1]. Developments in techniques and devices for coronary occlusions have been momentous in the last decade, and application of these novel tools also holds the promise of substantially improving the management of subjects with peripheral artery disease [2].

CASE

We hereby report the case of a patient with innominate trunk occlusion who was successfully managed with percutaneous transluminal angioplasty (PTA) exploiting coronary techniques and devices. He was a 61-year-old man with recent transient ischemic attack, in whom duplex ultrasound disclosed inversion of flow in the right vertebral artery and post-stenotic flow in the distal right subclavian artery. Computed tomography showed that the innominate trunk was totally occluded at its origin, and that the mid tract of the right subclavian artery was significantly stenosed. After multidisciplinary discussion, invasive coronary angiography evidence of lack of significant coronary artery disease, and given that the patient preferred to avoid open surgery, percutaneous recanalization was attempted.

The right radial artery was accessed with a standard 6 French sheath (Avanta, Cordis, Miami, FL, USA), and a JR4 guiding catheter (VistaBrite) was tracked on a 0.035" non-hydrophilic guidewire (Storq, Cordis) up to the distal tract of the subclavian artery (Figure **1**). The subclavian stenosis was crossed with a 0.014" hydrophilic coronary guidewire (Pilot 150, Abbott Vascular, Santa Clara, CA, USA). After deployment of a second buddy 0.014" non-hydrophilic guidewire (BMW, Abbott Vascular) in the proximal tract of the right common carotid artery for protection and support, the occlusion was successfully crossed with the 0.014" hydrophilic guidewire supported by a 2.5x20 mm semi-compliant balloon (Empira, Cordis), which was also used for predilation. After confirmation of true lumen recanalization, a Palmaz Genesis 8.0x40 mm was implanted in the innominate trunk. Following evidence of residual subclavian stenosis at control angiography, another Palmaz Genesis 8.0x40 mm stent was implanted, achieving a satisfactory final angiographic result. The patient was discharged uneventfully the day

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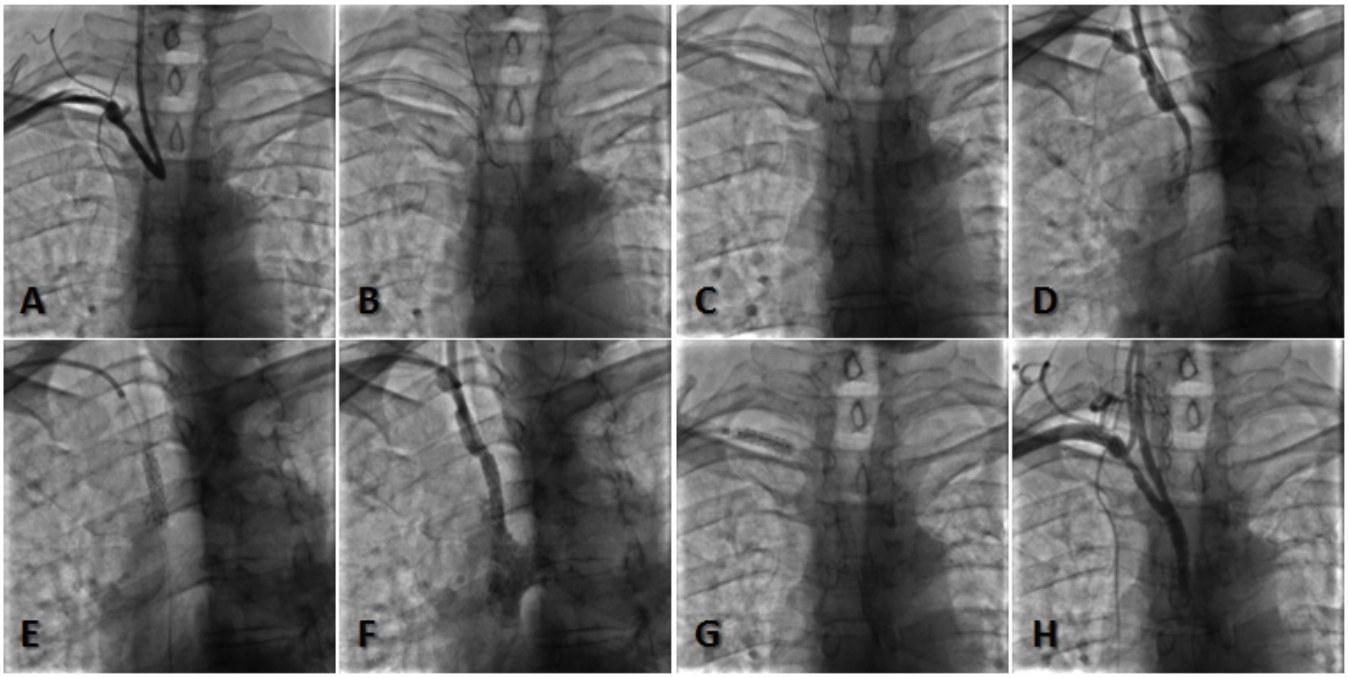

Figure 1: Baseline angiography showing total occlusion of the innominate trunk, with retrograde flow from the right vertebral artery providing antegrade flow to the right common carotid artery (**A**), and disclosing as well a stenosis of the mid tract of the right subclavian artery; retrograde recanalization of the innominate trunk occlusion, using a 0.014" coronary guidewire with a monorail balloon for back-up and a buddy wire in the right common carotid artery for additional support and protection (**B**); balloon predilation of the innominate trunk lesion (**C**); angiography after predilation (**D**); stent implantation in the innominate trunk with a Palmaz Genesis device (**E**); angiography after implantation of the stent, showing a persistent stenosis of the mid tract of the right subclavian artery (**F**); stenting of the right subclavian artery with a Palmaz Genesis device (**G**), achieving a satisfactory final angiographic result.

after the procedure and has been asymptomatic since discharge.

DISCUSSION

The management of peripheral artery disease poses several important challenges for healthcare practitioners, given the need for optimal medical therapy and, when symptoms of ischemia cannot be amended pharmacologically, revascularization [3]. Surgical therapy remains the cornerstone of the management of peripheral artery disease in fit patients, but may still be associated with a high rate of adverse events depending on disease location [4]. Endovascular therapy represents a promising alternative to surgery in selected settings, especially for lesions of limited complexity (e.g. focal and non-occlusive lesions). Even in more complex lesions, however, careful application of aggressive techniques and use of dedicated devices, such as those developed extensively over time for percutaneous coronary revascularization, can prove remarkably safe and beneficial [5]. In particular, the use of retrograde wiring, parallel tracking, subintimal-tracking and arterial re-entry (STAR), may increase recanalization rates in otherwise challenging settings.

Since the historically important registry from Dorros *et al*. on 27 patients [6], several case reports are available on innominate trunk PTA, with three moderate or large sized series recently reported from Woo and colleagues (25 patients) [7], from Patel *et al*. (170 patients) [8], and Paukovits and colleagues (72 patients) [9]. These cases and registries support our own findings, even if no specific emphasis was evident in these works on the use of dedicated coronary devices for this type of procedure.

In conclusion, innominate trunk occlusion may represent a clinical challenge, but the careful and expert application of revascularization techniques and use of devices already well tested in the coronary realm may yield satisfactory clinical outcomes without jeopardizing patient safety.

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CONFLICTS OF INTEREST

None.

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