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Anomalous right coronary artery from the left aortic sinus: technical issues during revascularisation

Nieprawidłowa prawa tętnica wieńcowa odchodząca od lewej zatoki aortalnej — problemy techniczne w trakcie rewaskularyzacji

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Abstract

Anomalies of the coronary arteries are reported in 1–2% of patients subject to a diagnostic angiogram. Ectopic origin of right coronary artery from the opposite sinus is one of the most common, and while mainly benign, at times may be malignant. We report the case of a 72 year-old male who underwent percutaneous coronary intervention for chronic stable angina who had a critically diseased obtuse marginal branch, and an anomalous right coronary artery (RCA) arising from the left aortic sinus on coronary angiogram, and various technical challenges during the procedure. RCA was cannulated using a Judkins left guiding catheter and revascularised by deployment of a 2.75 × 18 mm Promus Premier Stent (everolimus-eluting stent, Boston Scientific, USA) at 12 atm.

Key words: anomalous right coronary artery, chronic stable angina, Judkins left guiding catheter

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Introduction

Coronary arteries of anomalous origin are uncommon and encountered in 0.2–1.2% of patients undergoing percutaneous coronary intervention. They represent a marked deviation of the normal anatomic pattern [1, 2]. An anomalous origin of the right coronary artery (RCA) from the left aortic sinus has been reported in 6–27% of patients with coronary anomalies. It varies in angiographic series of consecutive patients from various centres. The unusual location and course of this anomaly poses a considerable technical challenge during revascularisation. Therefore, the selection of an appropriate guiding catheter is crucial to ensure selective angiography, proper assessment of lesion characteristics, and facilitate successful delivery of hardware in order to avoid complications.

Case report

A 72 year-old male smoker presented with exertional angina — Canadian Cardiovascular Society (CCS) class III for the past three years with recent worsening despite guideline-directed medical treatment. He was receiving acetylsalicylic acid — 75 mg, metoprolol — 200 mg, atorvastatin — 20 mg, and ramipril — 5 mg daily. His physical examination and biochemistry were all unremarkable. Electrocardiogram revealed mild ST-T changes in precordial leads. Echocardiography revealed mild concentric hypertrophy of left ventricle, grade-II diastolic dysfunction with normal ejection fraction (EF = 55%). His treadmill test was strongly positive for reversible ischaemia. His coronary angiography, which was performed at a different hospital, showed a discrete eccentric lesion with 90% stenosis in large obtuse marginal

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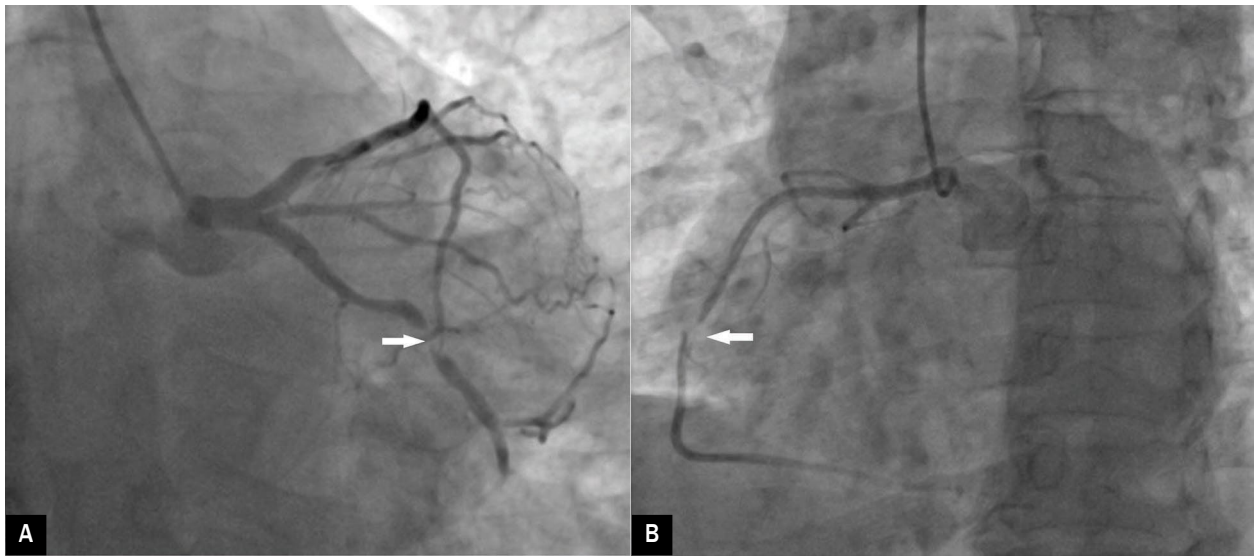

Figure 1A, B. Coronary angiogram showing discrete eccentric lesion with 90% stenosis (white arrow) in large obtuse marginal branch (OM) of left circumflex artery (**A**), and mid part of anomalous right coronary artery (RCA) from left aortic sinus respectively (**B**)

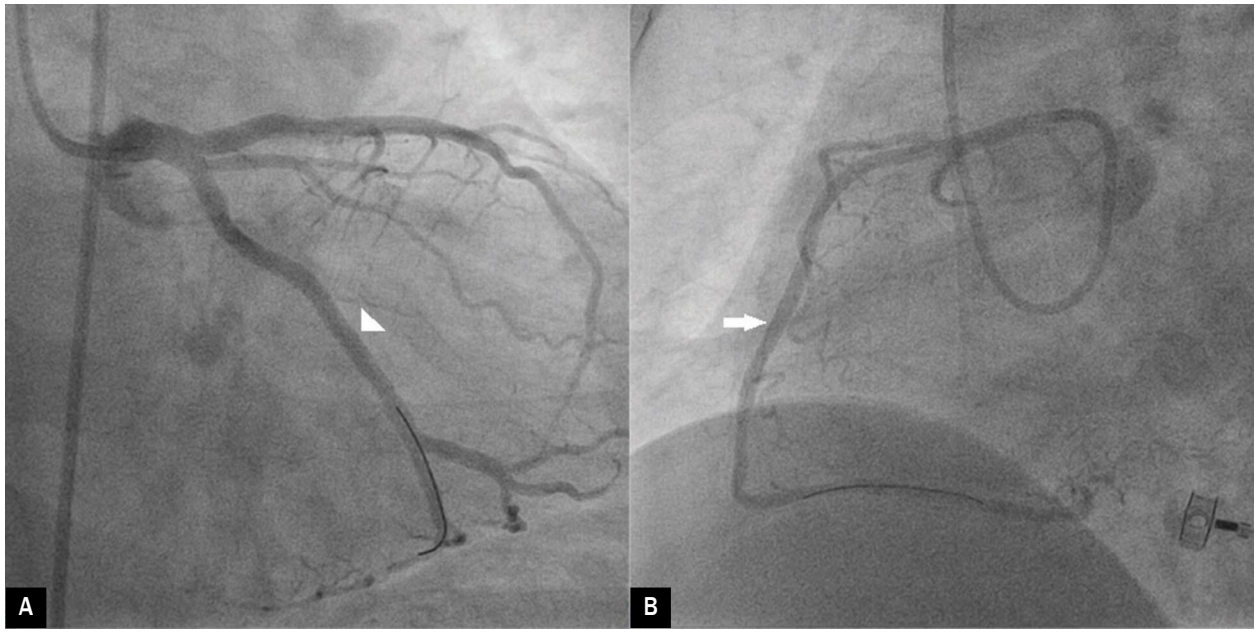

Figure 2A, B. Obtuse marginal branch after being stented with 3 × 28 mm Xience Prime stent (everolimus-eluting stent, Abbott, USA); anomalous right coronary artery (RCA) after being stented with 2.75 × 18 mm Promus Premier stent (everolimus-eluting stent, Boston Scientific, USA)

branch (OM) of left circumflex artery, and mid part of ectopically arising RCA from left aortic sinus respectively (Figure 1A, B). He attended our outpatient department for revascularisation. Percutaneous coronary revascularisation was performed through the transfemoral route after proper consent. The OM was stented by deploying a 3 × 28 mm Xience Prime stent at 13 atm pressure (everolimus-eluting stent, Abbott, USA) achieving TIMI III flow using a 6 F extra backup guiding catheter (EBU, Medtronic, USA) (Figure 2A). As RCA had an anomalous origin, cannulating it using different guiding catheters such as Amplatz left (AL) — 1, 2, Voda left, Amplatz right (AR) — 1, 2, and Multipurpose (MP) failed. We then chose a Judkins left (JL) — 3.5 and pushed to left sinus (Figure 3A). As RCA was arising anteriorly, we manoeuvred it clockwise which brought it close to its ostia (Figure 3B). When it was slightly pulled up and manoeuvred in the same fashion, it cannulated the ostia of RCA (Figure 4A). It was wired with a runthrough wire

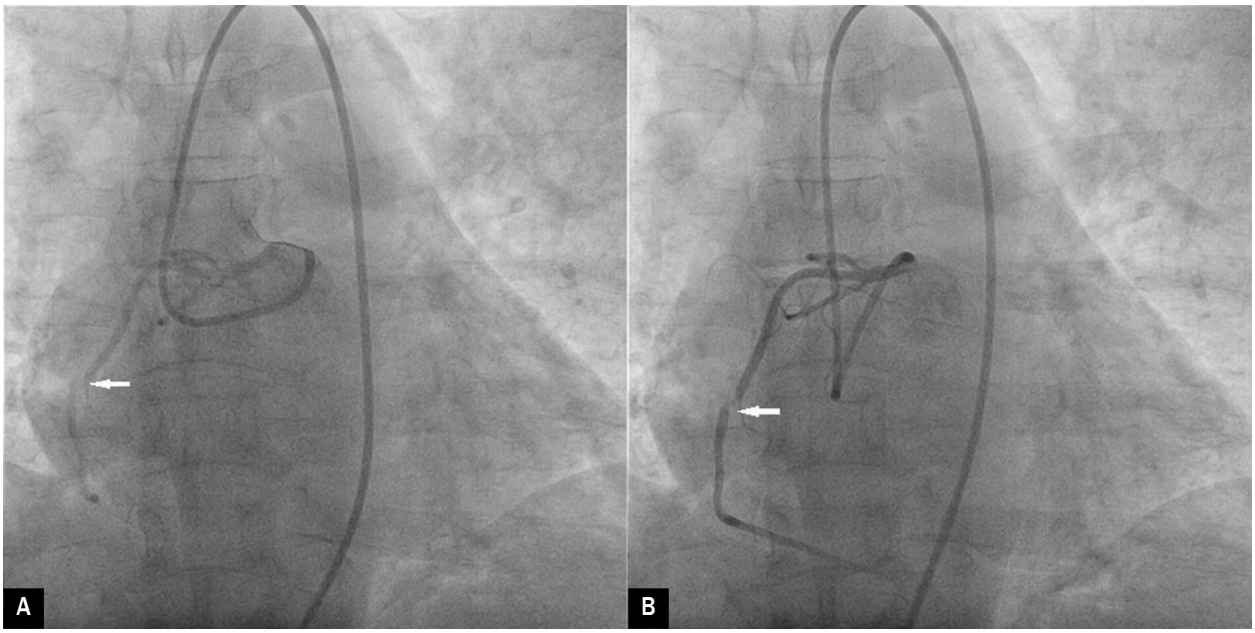

Figure 3A, B. Judkins left (JL) — 3.5 guiding catheter being gradually pushed and manoeuvred clockwise to bring it close to the ostium of anteriorly arising right coronary artery (RCA) from left aortic sinus in antero-posterior view. RCA is also showing discrete eccentric, critical lesion in mid part (white arrow; **A**)

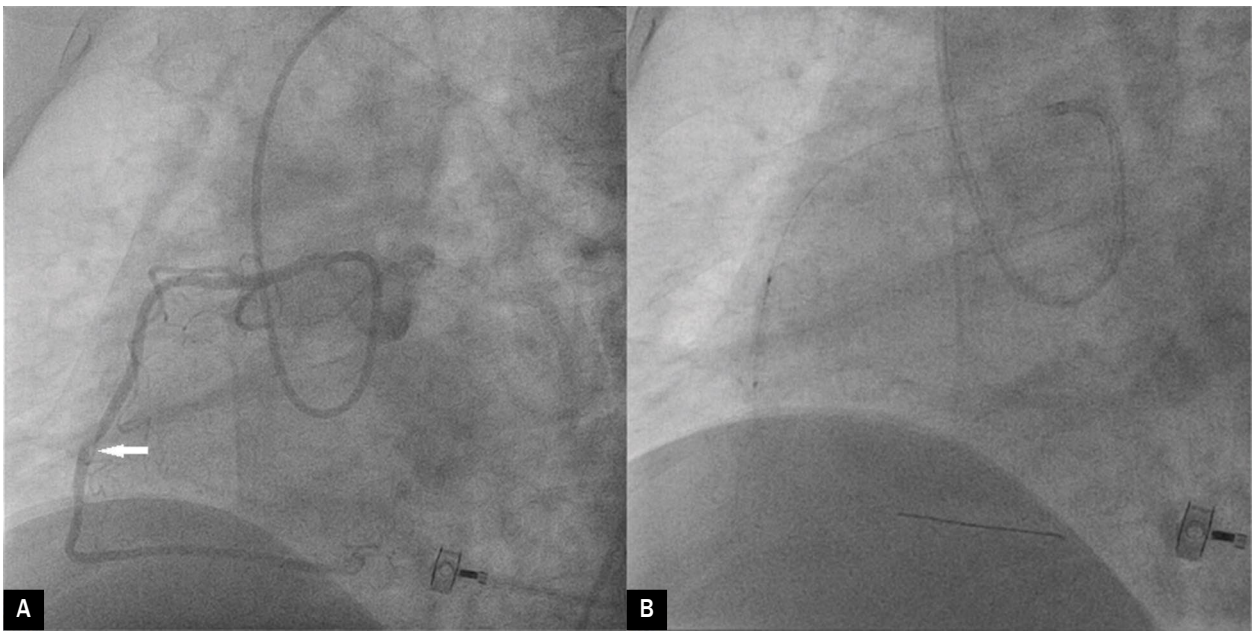

Figure 4A, B. Left anterior oblique view showing Judkins left (JL) — 3.5 guiding catheter being gradually pushed and manoeuvred clockwise to bring its tip close to the ostium. When slightly pulled, it successfully cannulated the right coronary artery (RCA). It was wired (**A**) and lesion was predilated with 2.5 × 10 mm sapphire balloon (Orbus Neisch, PRC)

(Terumo, Japan). Lesion was predilated with a 2.5 × 10 mm sapphire balloon (Orbus Neisch, PRC) (Figure 4B), and stented with a 2.75 × 18 mm Promus Premier stent (everolimus-eluting stent, Boston Scientific, USA) at 12 atm pressure achieving TIMI III flow (Figure 2B). Multidetector coronary computer tomography angiogram (MDCT) showed the anomalous RCA arising from left coronary sinus near left main ostium (Figure 5, 6). He was discharged on the third day with aspirin — 75 mg/day, clopidogrel — 75 mg/ /day, atorvastatin — 40 mg/day, metoprolol — 200 mg/day

Figure 5. Multidetector coronary computer tomography (MDCT) showing anomalously arising right coronary artery (RCA) from anterior surface of left sinus

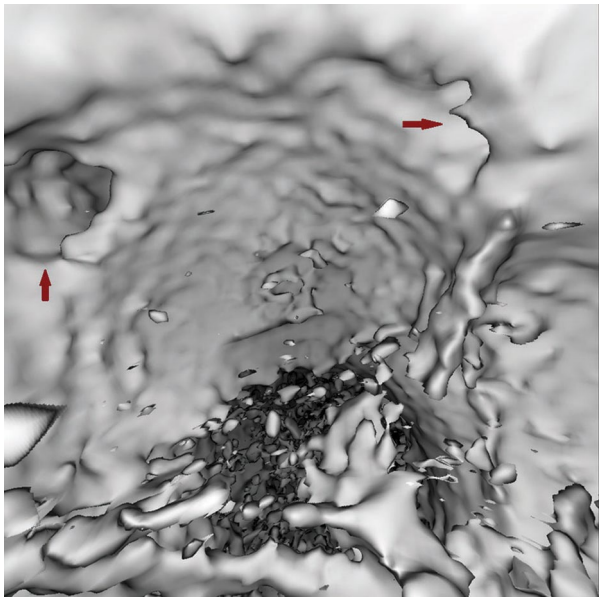

Figure 6. Volume rendered reconstruction from inside aorta showing right coronary artery (RCA) ostium (horizontal red arrow) lying in close vicinity to base of left main trunk (vertical red arrow)

and ramipril — 5 mg/day. The patient has been doing excellently since then, with regular follow-ups at our institute.

Discussion

An anomalous RCA from the left aortic sinus comes out from an antero-superior direction, the site of which may be the left sinus itself, or directly from the left main coronary artery or its vicinity [3–5]. They can be cannulated by various diagnostic catheters such as Judkins right (JR 3.5–4), Amplatz right (AR 1–2), unconventional Williams no-torque curves, or Tiger catheter, to name but a few. Rarely, they can be seen by non-selective sinus root injection in difficult cases, as coaxial alignment is not required for diagnostic purposes.

While doing percutaneous coronary intervention (PCI) of an anomalous RCA, certain factors need consideration such as configuration of the ostium, dimensions of the aortic root, level of backup support, angle at takeoff, location and complexities of lesions, and type of hardware to be used. All of these should be sought in detail from the basal angiogram to ensure adequate selection of equipment during intervention, and to later enable the operator to exercise the appropriate caution during manipulations with guiding catheters, wires, and balloon catheters.

Data regarding successful percutaneous revascularisation of anomalous RCA from left sinus is limited, and mostly derived from small case series [6–8]. RCA intervention using Amplatz guiding catheters have excellent support but at the cost of the risk of too deep an intubation causing haemodynamic compromise and rarely ostial dissection. On the other hand, using Judkins guiding catheters gives one the opportunity for easy manipulation although the back-up support may be somewhat compromised.

In one of the largest series of anomalous RCA, Sarkar et al. used JL, JR, Q-curve, and Voda catheters for RCA cannulation depending on its anatomy [9]. For angioplasty of an anomalous RCA originating from the left aortic sinus, we successfully utilised a Judkins-type catheter, a result similar to that reported by Mooss et al. [10].

It needs to be stressed that there exists a pronounced learning curve in approaching these types of cases because improper selection of the guiding catheter can make things worse, for example increasing fluoroscopy and procedure times, or even leading to total failure. Furthermore, besides other anatomic factors, catheter selection for PCI is influenced to a certain degree by operator preference, familiarity, and institutional availability. The Judkins catheters we have described are commonly used and easily available in most cathlabs.

Even though each individual case may require a slightly different approach, we believe that the use of a Judkins left guiding catheter provides a simple and effective solution to successfully engage the anomalous vessel with reduced expenditure of contrast agent and radiation exposure, thus increasing the likelihood of technical success.

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Conflict(s) of interest

The authors report no conflict of interest.

Streszczenie

Anomalie tętnic wieńcowych w angiogramie diagnostycznym obserwuje się u 1–2% chorych. Ektopowe odejście prawej tętnicy wieńcowej z przeciwległej zatoki jest jedną z najczęstszych anomalii. Zwykle powoduje ona łagodne następstwa, ale w niektórych przypadkach jej skutki mogą być poważne. W niniejszej pracy opisano przypadek 72-letniego mężczyzny poddanego przezskórnej interwencji wieńcowej z powodu przewlekłej stabilnej dławicy piersiowej, u którego w koronarografii stwierdzono krytyczne zwężenie gałęzi brzeżnej oraz nieprawidłowe odejście prawej tętnicy wieńcowej (RCA) od lewej zatoki aortalnej, a także napotkano na różne problemy techniczne w trakcie zabiegu. Wykonano kaniulację RCA za pomocą lewego cewnika prowadzącego typu Judkins, a następnie w celu rewaskularyzacji umieszczono w niej stent Promus Premier 2,75 × 18 mm (stent uwalniający ewerolimus, Boston Scientific, USA), stosując ciśnienie 12 atm.

Słowa kluczowe: nieprawidłowa prawa tętnica wieńcowa, przewlekła dławica piersiowa, lewy cewnik prowadzący typu Judkins

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