Chronic total occlusion of left circumflex artery after radiofrequency ablation of left ventricular outflow tract tachycardia

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In this report, we present a 22-year-old female patient referred to our institution for evaluation of anginal chest pain. Her medical history revealed two ablation procedures of the left ventricular outflow tract tachycardia performed 1 month apart, 2 years ago. Coronary angiography revealed chronic total occlusion of the proximal left circumflex artery. To our knowledge, this is the first report of ablation-related chronic total occlusion of a coronary artery.

Presentation of the case

A 22-year-old female patient was admitted to our institution, with exercise chest pain (Canadian Cardiovascular Society Class III). Her medical records revealed that the patient had undergone two attempts of radiofrequency (RF) ablation of drug refractory left ventricular outflow tract tachycardia. Drug therapy with β-blockers, propafenon, sotalol, and amiodarone failed to control arrhythmia. The first procedure was performed with a standard 4 mm RF ablation catheter and the second procedure was performed with an irrigated tip ablation catheter. During the first ablation procedure, power was set at 25 W and the maximal achieved temperature was 52°C. It was noted that each procedure was performed with a catheter placed into the left coronary artery to provide guiding and to avoid ablation-related complications. During the second procedure with an irrigated ablation catheter, a power control mode was used with a maximal setting of 30 W. Radiofrequency ablation was performed only within the left coronary cusp during both procedures.

Her 12-lead electrocardiogram was unremarkable, and echocardiographic examination revealed a left ventricular ejection fraction of 53%, slight hypokinesia of inferolateral and inferior left ventricular wall, and normal both systolic and diastolic LV dimensions. Coronary angiography revealed total occlusion of proximal left circumflex artery (Cx) and a small diverticule in the anterior left ventricular wall (Figure 1A and B), and cardiac computed tomography confirmed above-mentioned factors and allowed more precise characterization of cardiac anatomy (Figure 1C). Owing to the absence of systolic dysfunction, percutaneous coronary intervention was postponed to evaluate patient’s response to maximal pharmacological anti-anginal and anti-ischaemic drug therapy. This therapy resulted in significant relief of symptoms and, based on this observation, the patient remains under close observation.

Discussion

Acute thrombosis of coronary arteries, secondary to RF ablation procedures, was reported in the earlier reports.1–3 These reports suggest that all coronary arteries, including left main, left anterior descending, left circumflex, and right coronary, may be involved. However, to our knowledge, this is the first report of chronic total occlusion associated with a previous RF ablation procedure. Owing to the fact that left ventriculography was not performed before the ablation procedure, one can only speculate about the origin of small left ventricular diverticulum.

Several mechanisms of coronary occlusion after RF ablation were reported before. These include direct thermal injury resulting in acute thrombosis, coronary artery spasm, dissection due to catheter manipulation, etc.4 However, these mechanisms may explain only an acute onset of coronary occlusion. In our patient, symptoms showed slow progression with the absence of chest pain during first two post-procedural months, with significant worsening 1 month before admission to our hospital. All these findings suggest that coronary occlusion showed slow progression and not an acute one. This point of view is supported by the presence of well-developed collateral circulation, preservation of left ventricular systolic function, and gradual worsening of anginal chest pain. This slow progression of coronary artery disease associated with previous ablation may be explained by the observations from the study of Sturm et al.5 These authors showed slow progression of intimal lesions in the 6 months following RF ablation performed at the lateral tricuspid annulus. This observation and our case make it possible to suggest that RF current may lead to the acceleration of intimal hyperplasia, which frequently results in the formation of intracoronary plaque and progression of coronary artery disease.

This case points to the fact that RF ablation even when performed with an irrigated catheter may result in chronic coronary artery disease, and that acute thrombosis is not the only one of its coronary manifestations. Presentation of this patient shows that the presence of chest pain in patients with a previous history of arrhythmias treated with RF ablation may point to the presence of significant coronary artery disease. We should also understand that formation of chronic coronary lesions has different underlying mechanism when compared with acute occlusion. For this moment, we do not have an exact feature of coronary plaques associated with the...
application of RF ablation in close vicinity of coronary arteries, because this point may have important implications during percutaneous intervention, and may affect both the technique and the selection of procedural equipment.

Conflict of interest: none declared.

References

Figure 1 (A) Angiographic images showing total occlusion of the proximal left circumflex artery. (B) Note the presence of small left ventricular diverticle of the anterior wall. (C) Coronary CT images help to understand the close relationship between ostium of circumflex artery and ascending aorta.