Ablation of atrial flutter by the femoral approach in the absence of inferior vena cava

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This report describes a case of isthmus-dependent atrial flutter ablation by the femoral approach in a 77-year-old patient with a previously unknown absence of the inferior vena cava (IVC). Multi-row detector CT angiography indicated the absence of the perihepatic IVC, whereas the venous blood is drained into the superior vena cava (SVC) via the vena azygos. An ablation catheter could be advanced through the right femoral vein reaching the right heart via vena azygos and SVC. Despite looping of the catheter, ablation and termination of atrial flutter were performed successfully. This is the first report of an inferior-to-superior approach for ablation of atrial flutter in the absence of the perihepatic IVC.

Keywords Atrial flutter ablation; Venous anomaly; Absence of inferior vena cava; Femoral approach

Case report

A 77-year-old male presenting with atrial flutter was scheduled for radio frequency ablation of symptomatic atrial flutter. After puncture of the right subclavian vein, a coronary sinus (CS) catheter (Bard, Lowell, MA, USA) was placed into the CS. After puncture of the right femoral vein, advancement of the guidewire for placement of the ablation catheter indicated an uncommon venous path towards the right heart. Therefore, a pigtail catheter was introduced into the right femoral vein, which could be advanced into the CS. The catheter was looping above the heart before coming down to the right heart via the superior vena cava (SVC), indicating communication between the inferior vena cava (IVC) and SVC via the azygos vein. An ablation catheter (Celsius DS, Biosense Webster, Waterloo, Belgium) with an 8 mm tip was introduced by the femoral access and stabilized for the ablation procedure (Figure 1). Because the common pullback approach was impossible, the ablation line was created point by point with a total of 24 radio frequency lesions.

Figure 1  Positioning of the ablation catheter: right anterior oblique view (18°).
During ablation, the tachycardia terminated indicating procedural success. A bidirectional block was demonstrated with a delay time of 167 ms between the CS catheter and the ablation catheter (Figure 2) and vice versa (data not shown). At 2 months of follow-up, the patient had a stable sinus rhythm.

Following successful ablation, duplex ultrasound examinations as well as a multi-row detector CT-angiography (64-row MDCT, Philips, Da Best, The Netherlands) revealed the absence of the upper (perihepatic) parts of the IVC proximal to the entrance of the renal veins, most likely congenital. Blood from the lower segments of the IVC is drained into the vena azygos, which continues retrocardially and connects with the SVC.

Discussion

Malformations or anomalies of thoracic or abdominal veins are not uncommon, whereas interruptions of the IVC with azygos or hemiazygos continuation have a reported prevalence of ~0.5%. Several cases of atrial flutter ablation in patients with abdominal venous anomalies have been reported, all of which were addressed by the superior approach via the jugular or subclavian veins. Reasons to choose the superior approach are often the absence of an inferior access or the expected technical difficulties using anomalous inferior paths. In our case, even with the uncommon approach, a stable catheter position and successful ablation could be achieved. Since at the time of femoral vein puncture the anomalous anatomy was unknown, the procedure was continued via the inferior approach in order to avoid an additional puncture. We had in mind that in case the procedure was not successful, the direct superior approach would have been an alternative.

To the best of our knowledge, this is the first report on radio frequency catheter ablation of atrial flutter by the inferior approach in a patient with interruption of the IVC (inferior-to-superior approach). Previously, Guerra Ramos et al. reported on a successful ablation of an accessory pathway (Wolf–Parkinson–White-syndrome) by the inferior approach in a patient with a similar abdominal venous anomaly.

As radio frequency ablation is considered the therapy of choice for patients with common atrial flutter, it should be pursued even in a challenging anatomical situation.

Conflict of interest: none declared.