Ventricular septal hematoma caused by left bundle branch pacing electrode implantation. The role of coils in closing abnormal vascular connections

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Conduction system pacing is the most physiological mode of ventricular stimulation [1]. The procedure requires penetrating the significant depth of the interventricular septum (IVS) with an electrode to capture conduction fibers. Ventricular septal hematoma is a rare, but rapidly growing, complication of interventional procedures; it can lead to symptoms of tamponade and heart failure [2, 3]. The most frequent approach is "watchful waiting", however, other approaches should be considered even at early stages of this complication [3].

We present a case of a 69-year-old male patient with hypertension who underwent pacemaker implantation due to complex forms of conduction system disturbances (first-degree block, left anterior hemiblock, intermittent right bundle branch block, and left bundle branch block at Holter recordings). A Selectra 3D-65-39 sheath was used and a 5.6F Solia S 60 cm electrode (Biotronik SE & Co, Berlin, Germany) was implanted according to current recommendations [5]. The bundle of His was localized, but the stimulation threshold was high. Mapping of the septal region was performed, and at the 4th attempt, the electrode was implanted in the inferior part of the IVS with left septal fascicle pacing (QRS complex 132 ms, R-wave 14 mV, pacing threshold 0.9 V, impedance 1447 Ohm). After that, an atrial lead (Solia S 53 cm) was implanted (Figure 1A). The procedure lasted 45 minutes, with a fluoroscopy time of 8 minutes. After the procedure, an electrocardiogram (ECG) was performed and documented QRS morphology consistent with LBB pacing (Figure 1B).

After 6 hours, the patient reported chest pain. ECG revealed ST-segment elevation in leads V1–V3 (Figure 1D). Echocardiography showed thickening of the IVS up to 3 cm with signs of a small hematoma (Figure 1C). Coronary angiography showed a perforation of the IVS with extravasation of contrast from two small septal branches. Conservative treatment was used. In the following days, the patient had a fever but no significant cardiac symptoms. We did not observe the growth of the hematoma on echocardiography. On day 5, computed tomography angiography revealed contrast flow between the septal branch and the interventricular septum suggesting a fistula formation. Repeated coronary angiography confirmed blood flow between the two branches of the septal artery and the cavity in the septum communicating with the coronary sinus and the right atrium (absent on the first angiography, Figure 1E). After insertion of an angioplasty guidewire (Whisper ES) and a dedicated microcatheter into the individual branches, coil implantation was performed, with one OPTIMA coil deployed into the first branch and three Optima coils into the second branch. That procedure achieved complete closure of vascular connections (Figure 1F). A 1-year follow-up was without complications.

An IVS hematoma can be a consequence of left bundle branch pacing lead implantation, which is considered a benign complication, but it is a potentially life-threatening situation with unknown long-term sequelae. If interventricular hematoma is suspected,

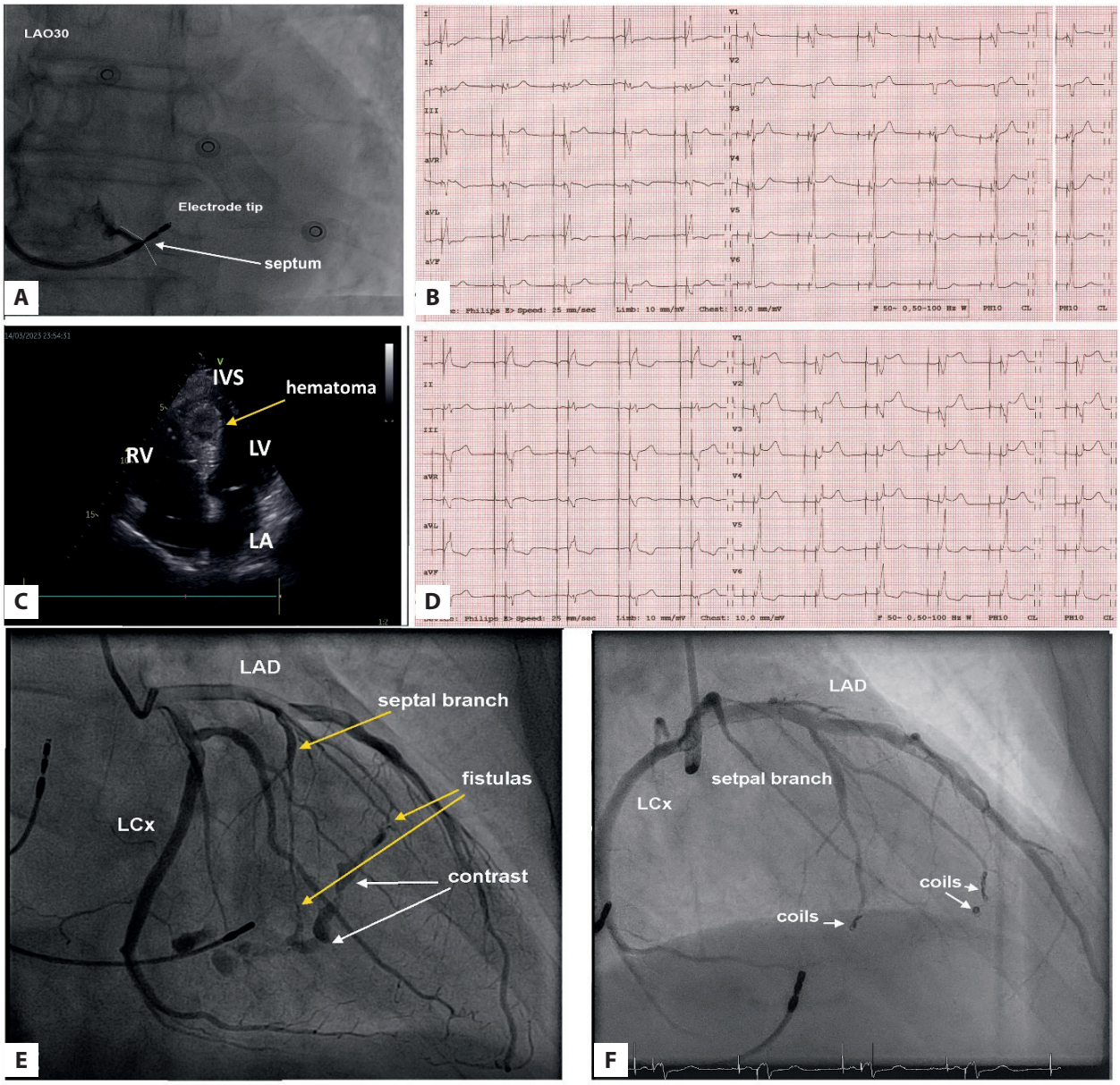

Figure 1. A. Location of the ventricular electrode. Contrast injection presents the position of the septum. **B.** Twelve-lead ECG after implantation. **C.** Echocardiographic image presenting a septal hematoma. **D.** Twelve-lead ECG presenting S-segment elevation in the precordial leads. **E.** Coronary angiography presenting the fistulas between the septal branches and a blood pool within the IVS. **F.** Final result of coil implantation

Abbreviations: IVS, interventricular septum; ECG, electrocardiogram; LA, left atrium; LAD, left anterior descending artery; LCx, left circumflex artery; LV, left ventricle; RV, right ventricle

echocardiography and computed tomography angiography should be performed to exclude progression or fistula formation. Similar complications have been reported during retrograde chronic total occlusion procedures leading to dramatic clinical scenarios [2]. The closure of the artery responsible for IVS bleeding with coils can be necessary at an early stage of treatment. Cardiologists with various experience in implanting electrodes for the conduction system should be aware of the risk of such a complication even later, after the procedure, and a management algorithm should be worked out [3, 5].

Article information

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