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Rapid right atrial thrombus formation following cavo-tricuspid isthmus ablation despite uninterrupted anticoagulation and low thromboembolic risk

Powstanie skrzepliny w prawym przedsionku po zabiegu ablacji cieśni żylno-trójdzielnej mimo nieprzerwanej antykoagulacji i niskiego ryzyka zakrzepowo-zatorowego

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Abstract

A patient with CHA_2DS_2VASc score of 1, on warfarin with international normalized ratio (INR) of 2.2 was admitted for ablation of paroxysmal atrial fibrillation. In the catheter laboratory the patient was in atrial flutter (AFl). A cavo-tricuspid isthmus ablation resulted in restoration of sinus rhythm. Whilst 5-minute waiting period a mobile oval shaped right atrial mass was detected on transesophageal echocardiography (TOE). The most likely explanation for this phenomenon is a tissue overheating resulting in thrombus formation. The presented report documents that a thrombus formation during radiofrequency (RF) ablation for typical AFl could occur despite uninterrupted anticoagulation and low thromboembolic risk.

Key words: thrombus, atrial flutter, cavo-tricuspid isthmus, atrial fibrillation, transesophageal echocardiography, ablation

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Case report

A 69-year-old male was admitted for ablation of paroxysmal atrial fibrillation (AF) under general anesthesia and transesophageal echocardiography (TOE). There was no relevant cardiac history, however, because of a CHA_2DS_2VASc score of 1 the patient was permanently on warfarin maintaining effective anticoagulation. In the catheter laboratory the patient was in atrial flutter (AFl) and it was decided to ablate this initially before proceeding to AF ablation. Preprocedural TOE was performed to exclude right (RA) and left atrial (LA) thrombus (Figure 1A) and revealed large patent foramen ovale (PFO). The warfarin was not stopped prior to the ablation with international normalized ratio (INR) of 2.2. The TOE probe was left in situ while AFl ablation was being performed. An electrophysiological study was performed initially. Two decapolar catheters were introduced via short 6F sheaths one placed in antero-lateral RA and the other advanced into the coronary sinus. A temperature controlled 10 mm tip radiofrequency (RF) ablation catheter (Blazer II™, Biosense Webster Inc.) was advanced in an 8.5 F long sheath (Swartz SR0™, St. Jude Medical Inc.) to the right

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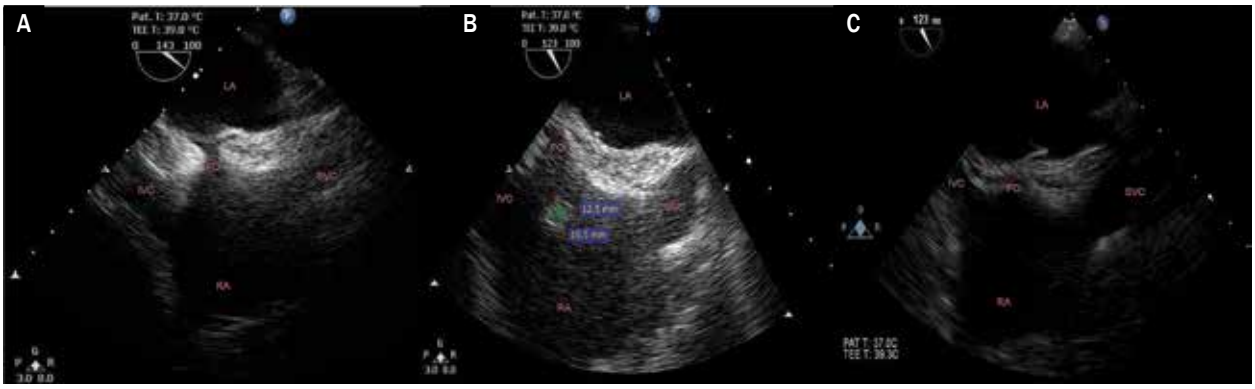

Figure 1A–C. Bicaval view on transesophageal echocardiography: fossa ovalis (FO) (**A**); preablation (**B**); postablation (**C**) at 8-weeks follow-up; IVC — inferior vena cava; SVC — superior vena cava; RA — right atrium; LA — left atrium

atrium. All sheaths were introduced via femoral access and flushed with heparinized saline (1 IU/mL) before advancing the catheters. Macroreentrant circuit consistent with typical anticlockwise RA flutter was documented and confirmed by entrainment from multiple sites. A single continuous ablation line with the parameters 60°C and 60 W was performed in the cavo-tricuspid isthmus (CTI), which resulted in restoration of sinus rhythm and bidirectional block along ablation line. Whilst 5-minute waiting period to assess the completeness of the isthmus line the operators were flushing the sheaths for transseptal access outside the patient to perform AF ablation. During this time a mobile oval shaped RA mass was detected on TOE (Figure 1B) not seen at the outset. It was not attached to any catheter or the long sheath as when these were moved and aspirated this did not change the position or disturb the mass. The mass appeared to be arising from and attached to the entrance of inferior vena cava. An initial diagnosis of a thrombus was made. However, a disrupted Chiari network (CN) or a thrombus caught in the disrupted CN were considered as a differential diagnosis. The procedure was abandoned at that point. The patient was discharged home advised not to stop anticoagulation. The TOE follow-up performed in 8 weeks revealed no previously seen mass (Figure 1C). Postprocedurally and during follow-up there were no clinical signs of either pulmonary or systemic thromboembolic events.

Discussion

Both the location and mobility of the detected RA mass were typical for the CN [1]. However, no evidence for its presence before the procedure and disappearance during follow-up makes that diagnosis unlikely. We believe that observed phenomenon was consistent with a thrombus formation related to the ablation procedure. The exact mechanism for that remains unclear. The most likely explanation could be a tissue overheating with an energy application and coagulum formation resulting in thrombus formation. This has been described with non-cooled large tip ablation catheters [2]. Moreover, the fact that the mass was formed shortly after RF application and was not attached to the long sheath or any catheter and was situated close to the site of the ablation lesion supports that diagnosis. However, the thrombus could have been created by post-ablation atrial stunning [3] or related to the placement of the catheters at that side particularly due to their stable position over time [4]. A short duration of the ablation procedure and continuous manipulation of the ablation catheter do not support the latter hypothesis. Furthermore, we cannot exclude that thrombus formation might have been due to intrinsic physical characteristics of either the sheath or catheters [5].

The presented report documents that a thrombus formation in the RA during RF catheter ablation for typical AFl could occur despite uninterrupted anticoagulation and low thromboembolic risk. This would be particularly important in the group of patients undergoing both AFl and AF ablation procedure during the same session, especially in the presence of PFO, where thrombus could potentially cause systemic embolism. This paper can provide a stimulus for vigilant continuous echocardiography monitoring or at least screening following CTI ablation for typical AFl before proceeding to AF ablation to increase patient safety. Moreover one should remember that large tip ablation catheters useful for the creation of long linear lesions within CTI increase the therapeutic success; however, could potentially be related to an increased risk of a thrombus formation.

Conflicts of interest(s)

None

Streszczenie

Pacjent cechujący się niskim ryzykiem zakrzepowo-zatorowym (1 pkt w skali CHA_2DS_2VASc), przewlekle przyjmujący warfarynę, z międzynarodowym wskaźnikiem znormalizowanym (INR) 2,2 w dniu zabiegu, został przyjęty w celu wykonania ablacji podłoża napadowego migotania przedsionków. W pracowni elektrofizjologii u pacjenta zdiagnozowano przetrwałe typowe trzepotanie przedsionków (AFl). Ablacja cieśni żylno-trójdzielnej przywróciła rytm zatokowy. W 5-minutowym okresie obserwacji w echokardiografii przezprzełykowej (TOE) zaobserwowano pojawienie się owalnej, ruchomej masy w prawym przedsionku. Najbardziej prawdopodobnym wyjaśnieniem zaobserwowanego zjawiska było wytworzenie skrzepliny wskutek lokalnego przegrzania tkanek. Przypadek ten pokazuje, że do wytworzenia skrzepliny podczas ablacji prądem o częstotliwości radiowej (RF) typowego AFl może dojść mimo nieprzerwanej antykoagulacji i niskiego ryzyka zakrzepowo-zatorowego.

Słowa kluczowe: skrzeplina, trzepotanie przedsionków, cieśń trójdzielno-żylna, migotanie przedsionków, echokardiografia przezprzełykowa, ablacja

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