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Long-standing Persistent Atrial Fibrillation Ablation in a Patient With High Risk of Bleeding

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ABSTRACT

A 57-year-old patient with dilated cardiomyopathy, long-standing persistent atrial fibrillation (AF), heart failure and episodes of gastrointestinal bleeding underwent AF ablation with pulmonary vein isolation, homogenization of septal scar, posterior wall isolation and also left atrial appendage (LAA) isolation. Additionally, he underwent left atrial appendage occlusion because of the high risk of embolism.

KEYWORDS: Atrial fibrillation; Radiofrequency ablation; Atrial appendage.

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PRESENTATION

A 57-year-old male patient with 10 years history of heart failure symptoms, NYHA III secondary to dilated cardiomyopathy, with no history of myocardial infarction, with persistent atrial fibrillation during all this period, underwent in 2017 to cardiac resynchronization therapy, with mild improvement in symptoms. Echocardiogram showed left atrium (LA) of 51 mm, left ventricle of 63 × 54 mm, ejection fraction of 20% and severe mitral regurgitation. The patient had also history of hypothyroidism, thalassemia and repetitive episodes of hemorrhoidal bleeding with periods becoming more intense, but with anticoagulation maintained. The patient had progressive declining in hemoglobin levels over the years.

He was in use of carvedilol 25 mg twice a day, spironolactone 25 mg, enalapril 5 mg bid, amiodarone 200 mg, rivaroxaban 20 mg and levothyroxine 50 micg. Had two prior attempts of external cardioversion with AF recurrence despite the use of amiodarone.

Because of this history in a young patient, it was decided to refer the patient for AF catheter ablation and same procedure left atrial appendage (LAA) occlusion. A transesophageal echocardiogram was performed excluding the presence of thrombus.

The patient underwent AF ablation under general anesthesia, after the triple femoral vein puncture, a double transseptal puncture was performed under fluoroscopic guidance, with two SL1 transeptal sheaths were positioned on the left atrium. After each transseptal puncture 5000 UI of heparin was infused in bolus through each sheath, totalizing 15000 UI of heparin and activated clotting time (ACT) was checked after each 30 min to maintain an ACT of at least 350 s.

After that, electroanatomical FAM (Carto 3, Biosense Webster) mapping was created showing a normal left atrium (LA) anatomy. So, radiofrequency (RF) applications were performed using an irrigated contact sensor enable catheter (Smarttouch SF) initially on right pulmonary veins and after on the left pulmonary veins, catheter contact was aimed for at least 8 grams, and was dragged when signals reduced on each spot using a power of 30W on anterior portions of the LA and 20 W on the posterior wall (Fig. 1).

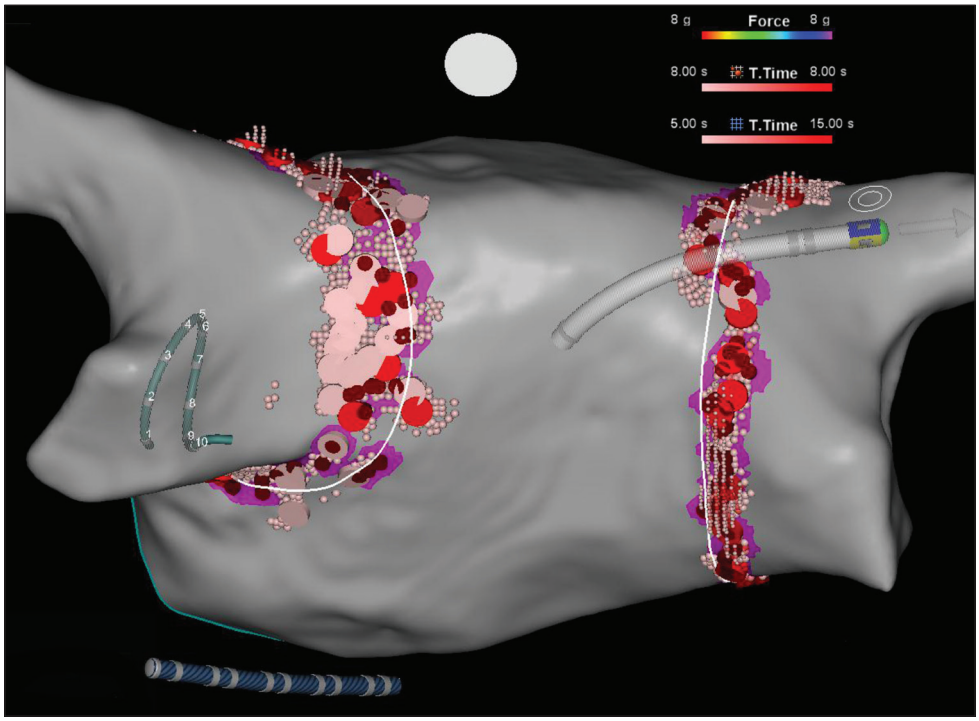

Figure 1. Circumferential pulmonary vein isolation done in atrial fibrillation. At the start of the procedure, only anatomy was constructed because the patient was in AF.

After pulmonary vein isolation, atrial fibrillation was reverted with electrical cardioversion, then LA voltage map with a linear 3.5 mm tip catheter was performed (Fig. 2) showing all four pulmonary veins isolated, but also showed septal, posterior

wall and roof scar (threshold 0.1 to 0.5 mV). Septal scar homogenization was performed due to the presence of scar on that area. After that, the Lasso catheter was positioned on the left atrium appendage and RF applications were performed in the border of the appendage resulting in its isolation (Fig. 3). Then, a posterior wall line was created, connecting the right and left inferior pulmonary veins line of isolation, resulting in posterior wall isolation. (Fig. 4) The transesophageal probe was used to displace esophagus away when RF application on posterior wall.

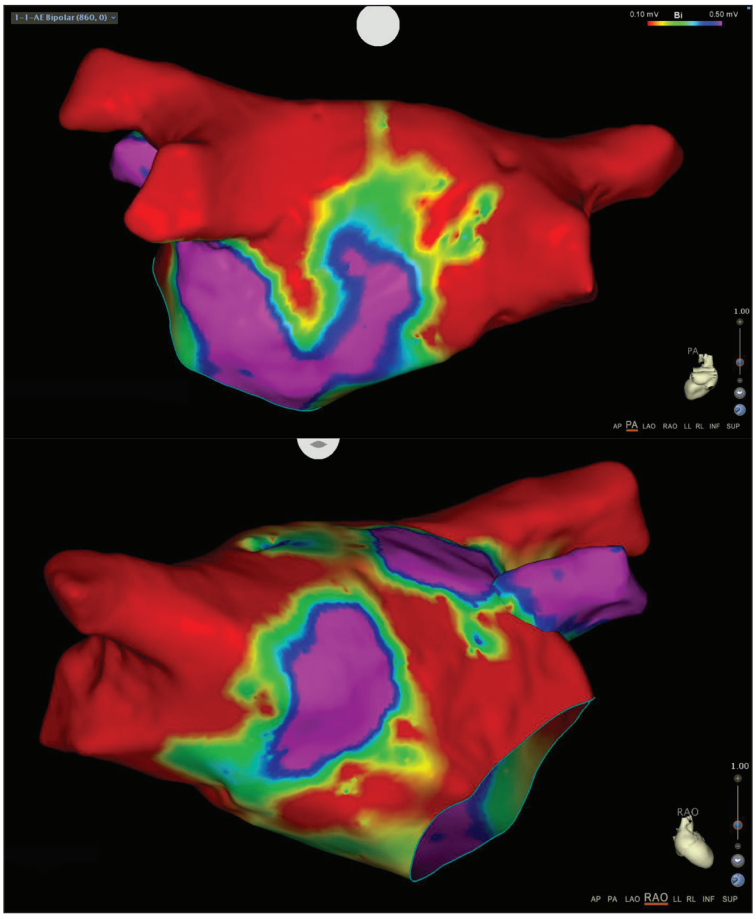

Figure 2. After pulmonary vein isolation, AF was reverted with DC external cardioversion, then voltage map was performed showing four PV isolated and septal, roof and posterior wall scar (cutoff: 0.1-0.5 mV).

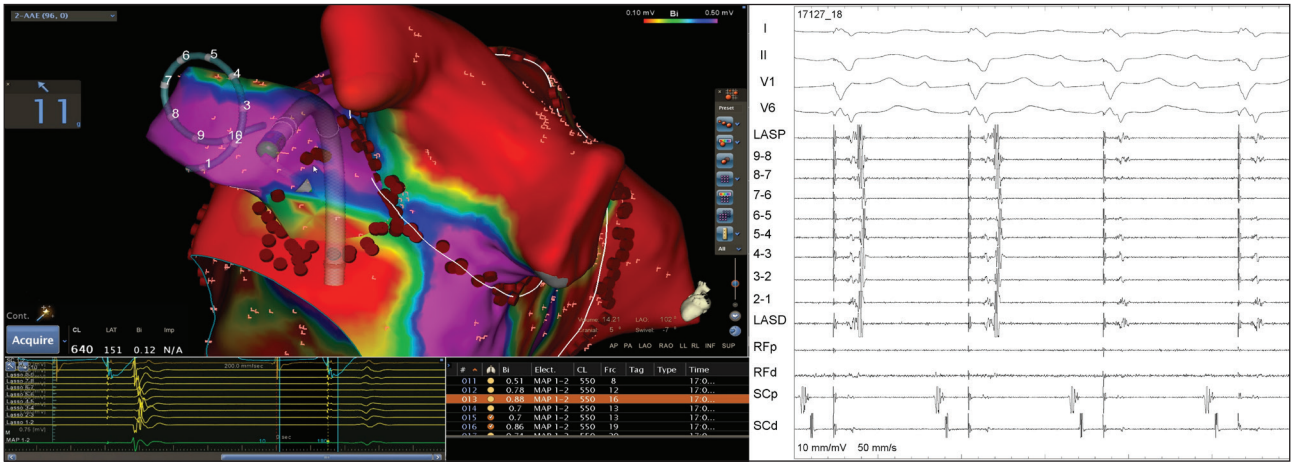

Figure 3. Left atrial appendage isolation performed during sinus rhythm. A circular catheter was positioned inside the LAA, showing elimination of the LAA appendage signals (entrance block), the RF applications for the isolation involved only the appendage.

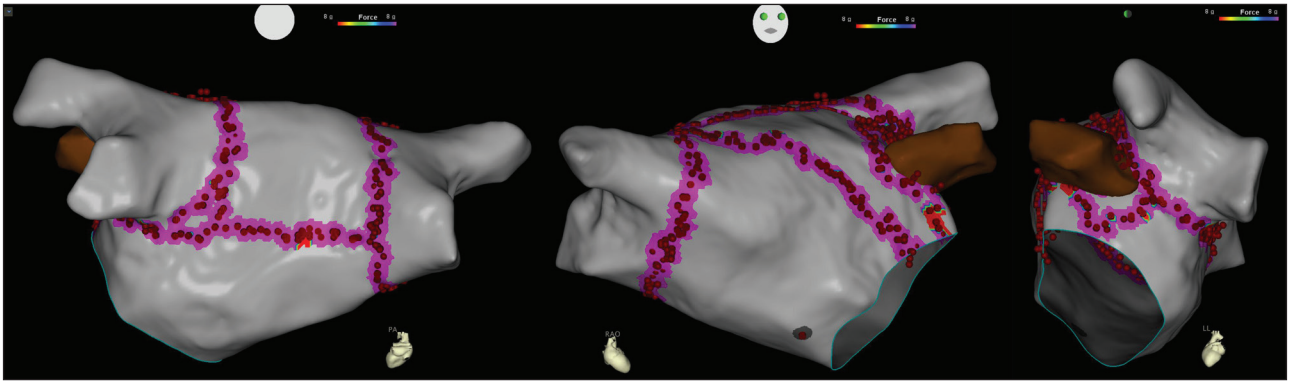

Figure 4. Final set of lesions, with isolation of the four PV, posterior wall isolation, septal line in a prior area of scar and LAA isolation. In brown LAA. Force map in the area of ablation, showing all lesions above 8g of force.

After LA ablation was completed, one transseptal sheath was withdrawal and the other was switched using a guidewire to a 14F sheath with radiopaque marker bands. Then appendage anatomy was identified by contrast infusion and a 30 mm Watchman device was deployed on the appendage guided also by transesophageal echocardiogram, with no complications (Fig. 5; Video 1). Endoscopy was performed on the following day with no esophageal lesions, patient presented transient acute renal failure (peak creatinine of 2.78) with improvement two days later.

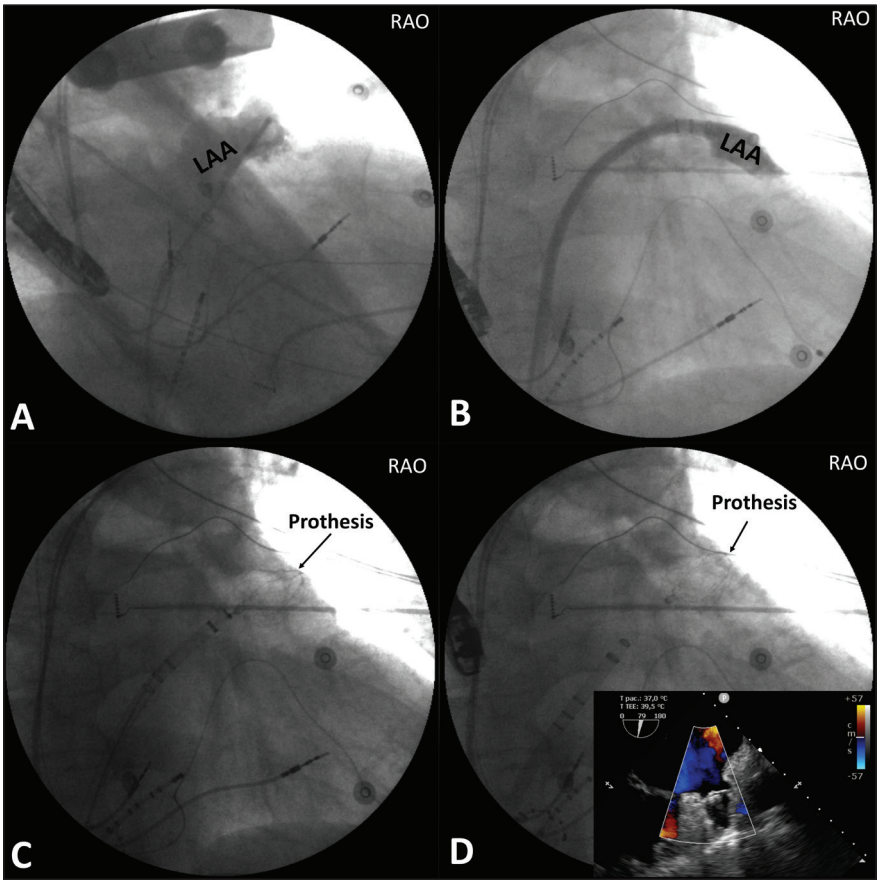

Figure 5. Left atrial appendage occlusion using a Watchman device. Left atrium appendage (A) morphology and position was identified using contrast injection using a pigtail catheter, (B) then the sheath with radiopaque markers was advanced on the appendage, (C) then the prothesis is advanced and checked the position on transesophageal echocardiogram (TEE) and using contrast injection, (D) and finally the prothesis is deployed and final position is checked on fluoroscopy and TEE.

Patient was discharged using rivaroxaban for two months and amiodarone, after that period, rivaroxaban was changed to aspirin and clopidogrel for the following four months, then only aspirin was maintained. After 17 months, the patient presented improvement of heart failure symptoms, was monitored by the pacemaker, maintained sinus rhythm, so amiodarone and aspirin were interrupted. The patient didn't present gastrointestinal bleedings anymore after rivaroxaban interruption, also not presenting any abnormal neurological symptoms. Heart failure improved, with the patient only presenting dyspnea related to intense exercise.

DISCUSSION

Atrial fibrillation ablation in patients with heart failure are usually complex procedures, but when performed could be related to a reduction in mortality even in patients with persistent AF[1]. Long-standing persistent AF is defined as a continuous AF greater than 12 months of duration[2]. Usually, the mechanism is not only related to pulmonary vein triggers, but the patients also presents atrial remodeling with fibrosis, making this procedure more complex, usually with the need of extended ablation. The technique for ablation in those patients is not consensus, one multicenter trial that compared only-PVI, with PVI plus ablation of complex fractionated electrograms (CFAE) and also compared with PVI plus additional linear ablation, showed no difference among the three different techniques with a recurrence rate of around 50%[3]. The main limitation of those techniques of linear ablation and CFAE is the occurrence of atrial tachycardias in the follow-up due to circuits created by ablation, since usually lines have reconnection in some portion and CFAE are random lesions through the atrial.

Left atrial appendage is a possible trigger for AF in patients with either paroxysmal or persistent AF, it can occur in up to 27% of patients when returning to a repeated procedure[4]. Left atrial appendage isolation in addition to conventional approach, which included pulmonary vein and posterior wall isolation and ablation on the roof and anterior septum, has been shown to reduce recurrence rates after AF ablation in patients with long-standing AF in the BELIEF trial[5]. At 12-month follow-up, 56% of the patients in which appendage isolation was performed and 28% in that conventional approach was performed, remained free of AF recurrence in a single procedure ($p < 0.001$; hazard ratio, HR 1.92). During repeat procedures, empirical electrical left atrial appendage isolation was performed in all patients. At 24-month follow-up and an average of 1.3 procedures, the cumulative success rate was 65 (76%) appendage isolation group and 49 (56%) in group in conventional approach.

Left atrium appendage isolation could lead to a decrease in appendage contractility and could lead to a higher risk of thrombus formation, but, interestingly in the BELIEF trial, no stroke or transient ischemic attack was reported with empirical LAA isolation, whereas 4 (4.5%) patients had stroke after standard ablation ($p = 0.12$). In patients that underwent LAA and repeated transesophageal echocardiogram (TEE), preserved LAA function was observed in 43.5% of the patients, in the patients that had impaired function, 45% had low peak filling and emptying velocities (< 0.4 m/s) and 6% had inconsistent A wave and 5% had both. The patients who underwent LAA isolation in the first procedure and repeated the procedure due to recurrence, 37% had LAA reconnection.

In a meta-analysis of seven studies including 1037 patients, LAA isolation was associated with a significantly lower rate of AF/AF recurrence in the primary analysis (odds ratio, OR: 0.38; $p = 0.02$), without association with increased risk of thromboembolism (OR: 0.50; $p = 0.18$)[6]. One study found that 10 of 50 patients had evidence of LAA thrombus on TEE after LAA isolation despite oral anticoagulation in 9 of the 10, but this could have occurred because LAA isolation was performed with anterior and posterior mitral isthmus line, since the area of isolation is wider not involving only LAA appendage, could lead to increase thrombus formation risk[7,8].

In our patient, as he presented heart failure and long-lasting persistent AF, but also frequent periods of gastrointestinal bleeding, LAA occlusion was planned because he also presented relative contraindication for continuous anticoagulation. This indication although not studied in clinical trials is presented in the consensus

as IIb. Randomized trials for LAA occlusion studied the device as an alternative to oral anticoagulation, showing noninferiority, but with higher complications rate[9].

Simultaneous AF ablation and LAA occlusion has been shown to be feasible, without increasing in the risk of complications either with the use of RF[10] or cryoablation[11]. Recently a series of 42 patients[12] with combined AF ablation including LAA isolation and LAA occlusion showed good results (66.7% free of recurrence) with no thromboembolism in the follow-up despite three patients presenting device related thrombi, but in 2 of 3 related to anticoagulation prematurely interrupted.

Our patient presented acute renal failure without the need of hemodialysis, probably related to increase amount of contrast used for the appendage occlusion, but for the AF ablation a minimal contrast is necessary for transseptal puncture, so we think that this could occur if the procedures were performed in different moments.

The patient did not present AF recurrence in a 17 months follow-up, with anticoagulant interruption being maintained only with aspirin, also presenting heart failure symptoms improving related to sinus rhythm maintained.

CONCLUSION

Atrial fibrillation ablation with LAA isolation combined with LAA occlusion is feasible and safe, with potential benefit for patients, especially the one that present long-standing AF and heart failure.

AUTHOR'S CONTRIBUTION

Writing – Original Draft, Pisani C. F.; Resources, Chokr M., Hardy C. and Lara S.; Writing – Review and Editing, Scanavacca M.; Supervision, Scanavacca M.

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