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Editorial

Catheter ablation in the role of rescuer in treatment of recurrent atrial fibrillation following surgical ablation

Atrial fibrillation (AF) is the most common cardiac arrhythmia in clinical practice, which can induce cardiac dysfunction and strokes, causing a substantial socioeconomic burden.[1,2] Patients with AF undergoing cardiac surgery have an increased risk of ventricular dysfunction, comorbidities, and mortality.[3] Eradicating AF during cardiac surgery could decrease the number of adverse cardiovascular events and improve clinical outcome. Although the Cox-Maze procedure is highly successful in maintaining sinus rhythm,[4] its difficulty and complexity reduces the procedure's utilization by cardiac surgeons in cardiovascular surgery.[5] Surgical ablation using a variety of energy sources such as radiofrequency (RF) energy, microwave, cryoablation, laser, and high-intensity ultrasound, has been widely utilized to create the linear lines which simplify the procedure, and thus is typically more feasible than the Cox-Maze procedure for most surgeons.[5] Bipolar RF delivers energy between two closely approximated electrodes embedded in the jaw of a clamp device, creating discrete linear lesions and is commonly applied in surgical ablation of AF. However, the limitation of bipolar RF ablation is that it can only clamp the tissue within the jaws of the device, and an incomplete block might occur in some linear lesions. The success rates in treatment of AF using bipolar ablation with concomitant cardiac surgery varied from 65% to 95% following a 6-month follow-up.[6] Surgical experience, differing ablation technologies, and inconsistent definitions of procedural success and follow-up could cause the discordant results. Pulmonary vein (PV) isolation with more extensive lesion sets including mitral isthmus line and biatrial lines, has been reported to provide a better long-term outcome than PV isolation only.[7] A recent meta-analysis study showed that surgical ablation had a lesser incidence of recurrent AF compared to catheter ablation at 6 months [73% vs. 61%; Odds Ratio (OR), 2.19; 95% confidence interval (CI) 1.21−3.96; $p = 0.01$] and 12 months (74% vs. 43%; OR, 3.91; 95% CI, 2.38−6.42; $p < 0.00001$).[8] The incidence of pacemaker implantation was higher in surgical ablation versus catheter ablation, but no difference in the frequency of stroke or cardiac tamponade was noted. A blinded, large, multicenter, randomized, control trial is needed to compare the efficacy of surgical and catheter ablation in the treatment of AF.

In this issue of the *JCMA*, Mamchur et al[9] reported the efficacy of catheter ablation for recurrent AF after surgical ablation in patients with mitral valve replacement by biological prosthesis. PV reconnection was found in all recurrent patients.

Interestingly, the reisolation of PVs contributed to sinus rhythm restoration in 4 of 10 patients, and additional ganglionic plexi ablation restored sinus rhythm in two cases. In the other four patients, AF transformed to atypical flutter and linear ablation was created at the left atrial (LA) roof to achieve restoration of sinus rhythm. No dysfunction of the prosthetic valve was detected. Wazni et al[10] studied 23 patients with recurrence of arrhythmia after Maze surgery, and reported that one-third of patients had recurrent AF due to PV reconnection, 22% had recurrent atrial tachycardia, and 43% had a recurrent atrial flutter. Ninety-six percent of patients were treated successfully with RF catheter ablation, and 83% of patients were free from AF without antiarrhythmic drug at 1-year follow-up. The conduction gap in the ablation or suture line is an important mechanism of recurrent atrial tachyarrhythmia. These nontransmural lesions could cause AF or reentrant atrial tachycardia.

PV reconduction was the major mechanism in patients with recurrent atrial tachyarrhythmia after catheter ablation.[5,11] Absence or dissociation of PV potentials recorded from a circular mapping catheter is the procedural endpoint of PV isolation.[5] Reduction of local bipolar amplitude of $\leq$90% or 0.05 mV inside the encircled area has been reported as an alternative endpoint for circumferential PV.[5,12] With three-dimensional anatomic mapping, higher bipolar voltage recording may reflect thick atrial musculature. The larger decrease in bipolar voltage could be suggestive of deeper ablation lesions.[12] Comprehensive electroanatomic mapping to identify the gap, reentrant circuit, or non-PV foci followed by RF ablation is still the most effective approach to eliminate recurrent tachyarrhythmias. Recurrent atrial tachyarrhythmias including AF, reentrant, and focal atrial tachycardia can be successfully eliminated by repeat catheter ablation with a desirable outcome.[11] Mamchur et al's[9] study provides a clinical significance to recurrent AF management after surgical ablation in patients with mitral valve replacement, suggesting that percutaneous catheter ablation and mapping for recurrent tachyarrhythmia is safe, efficient, and feasible with an excellent acute and long-term outcome. It can be offered to symptomatic AF patients who failed surgical ablation.

Surgical ablation plays an important role in AF patients with valvular heart disease undergoing operation.

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Percutaneous catheter ablation could play a role of rescuer, which can identify the gaps of linear lesions and confirm the complete block. With this modality, a better outcome can be achieved in AF patients with cardiac surgery.

Conflicts of interest

The authors declare that there are no conflicts of interest related to the subject matter or materials discussed in this article.

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Shih-Lin Chang
Shih-Ann Chen*
Department of Medicine, Taipei Veterans General Hospital, National Yang-Ming University School of Medicine, Taipei, Taiwan, ROC

*Corresponding author. Dr. Shih-Ann Chen, Department of Medicine, Taipei Veterans General Hospital, 201, Section 2, Shih-Pai Road, Taipei 112, Taiwan, ROC.
E-mail address: epsachen@ms41.hinet.net (S.-A. Chen)