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Simplified atrial fibrillation ablation technique benefits heart failure patients

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Cryoballoon (CB) ablation is as effective at reducing recurrences of atrial fibrillation (AF) and atrial tachycardia (AT) at 1-year, when compared to the current most widely used technique, radiofrequency

(RF) ablation, in heart failure patients with a reduced ejection fraction (HFrEF), according to late breaking research presented in a Hot Line Session on Sept. 2 at this year's ESC Congress 2024.

The study found that CB ablation has the added benefit that it can be performed with a shorter procedure time and less fluid volume during catheter ablation without increasing left atrium pulse pressure, indicating that the risk of worsening heart failure due to infusion load during ablation may be reduced.

"AF catheter ablation is increasingly performed worldwide in patients with heart failure, but is associated with increased risks of procedure-related complications and death. Yet little data exists on which of the most widely used ablation techniques best improves clinical outcomes, survival and quality of life," explained lead investigator Dr. Koji Miyamoto from the National Cerebral and Cardiovascular Center in Japan.

He added, "Our results show that CB ablation, a minimally invasive procedure that freezes out disruptive heart cells, is faster but as effective as the commonly used approach of burning the cells in order to put the heart back into a normal rhythm pattern. In addition, there was a very low risk of procedural complications in both groups, demonstrating that catheter ablation has become much safer over the years."

AF affects more than 37 million people worldwide and often co-exists with heart failure, which impairs the ability of the ventricle to fill with or eject blood. HFrEF occurs when left ventricular ejection fraction (LVEF) is reduced to 40% or less. The European Society of Cardiology estimates that in people with heart failure, around 60% have HFrEF. The presence of AF in patients with heart failure is associated with increased risks of hospitalization, stroke, and death.

The most widely used technique for AF ablation is RF ablation, which uses heat to destroy the tissue that's causing the heart rhythm disturbance. But its technical complexity demands a relatively long learning curve and procedure time. CB technology, that involves guiding a small tube into the heart to kill problematic tissue with cold temperatures, has been utilized to simplify the procedure.

"While there have been several trials comparing RF ablation and CB ablation in patients with both heart failure and atrial fibrillation, none have prospectively compared the outcome between CB and RF ablation," said Dr. Miyamoto. "There is an urgent need to generate high-quality evidence to guide clinical-decision-making for these ablation procedures in patients with HFrEF."

For the CRABL-HF trial, researchers enrolled 110 patients with HFrEF and AF (aged 20–85 years) at five sites across Japan who were randomized to receive RF ablation (55 patients) or CB ablation (55 patients). The median age was 69 years and 79% were men.

In patients with cardiac implantable electronic devices, home monitoring was adapted to allow the continuous monitoring of AF episodes. In patients without cardiac implantable electronic devices, ambulatory ECGs were recorded twice daily for 1-year after the procedure, after a blanking period of 90 days.

One year after the procedure, there was no significant difference in rates of atrial tachyarrhythmias (lasting 30 seconds or more), occurring in 21.8% of patients receiving RF ablation and 22.2% of CB patients.

Additionally, CB ablation could be performed with significantly shorter procedure time (median 101 vs. 165 minutes) , and less fluid volume during CA without increasing LA pulse pressure, indicating that the risk of worsening heart failure due to infusion load during ablation may be

reduced.

The left ventricular ejection fraction (LVEF; a measure of how well the left ventricle of the heart pumps with each contraction) improved and the left arterial volume index (LAVI; a measure of the volume of the left atrium divided by the body surface area) decreased significantly after the procedure in both groups, improving heart function.

There were also no significant differences in the overall safety profile of the two techniques. Procedure-related complications occurred in one patient in each group: a retroperitoneal hematoma in the CB group and an arteriovenous fistula in the RF group. No procedure-related exacerbation of heart failure, symptomatic cerebral infarctions, transient ischemic attacks, PV stenosis, atrio-esophageal fistulas, or procedure-related deaths were noted.

During the 1-year follow-up period, there were two deaths—one in each group. There were seven cases of hospitalizations due to heart failure: three patients (5.5%) in the CB group and four (7.3%) in the RF group (P=1.00). There was no difference in the composite endpoints of death from any cause and/or heart failure hospitalizations between the two groups.

There were also no significant differences in patient-reported quality of life (measured by the Atrial Fibrillation Effect on Quality of Life questionnaire; AFEQT) at 1 year, which improved after ablation in both groups (AFEQT: CB group: 68 [60–78] at baseline and 88 [80–94] at 1-year; RF group: 72 [56–81] at baseline and 90 [84–97] at 1-year).

"The underlying pathophysiology differs between patients with and without HFrEF, and the fundamental mechanisms of catheter ablation differ between CB and RF," said Dr. Miyamoto. "As our trial has shown that clinical outcomes and quality of life are similar after CB, this

simplified procedure should be warranted to treat AF in most patients with HFrEF."

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