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Outcomes of Convergent Ablation Procedure using a Cryo-balloon catheter for treatment of Atrial Fibrillation

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Overview

Research Question: Does the use of a cryo-balloon catheter during the endocardial portion of a convergent procedure elicit greater success rates towards eliminating recurrent atrial fibrillation than using a radiofrequency catheter?

Background: Traditional catheter based treatment for atrial fibrillation (AF) uses radiofrequency as a source of energy for the ablation of atrial tissue. This is an endocardial (inside the heart) technique. The success rate of this technique at one year is around 50-60%¹. In the last three years, a novel technology using a combined/hybrid trans-diaphragmatic surgical epicardial (outside the heart) ablation with endocardial (inside the heart) ablation techniques have had one-year success rates close to 80%². This is called the Convergent Procedure (CP)³. The CP can be done with either radiofrequency ablation (RF), or with a cryo-balloon catheter to create the endocardial lesion set. The cryo-balloon technique may be a preferred approach, as it creates improved endocardial coverage of the pulmonary veins. Limited data is available on the cryo-balloon technique for CP.

Methods

From October 2013 to May 2015, 31 AF patients underwent the convergent procedure with cryo-balloon endocardial ablation at LVHN. Patients were managed postoperatively medically and followed up with in the office 1 month, 3 months, 6 months, and 12 months after the surgery. Most (89%) patients received an implantable monitoring device that was interrogated at each visit for arrhythmias. Medical records were reviewed to determine pre-operative comorbidities and post-operative outcomes.

Chronic Atrial Fibrillation

- AF patients are treated medically, through cardioversions, and/or with traditional ablations.
- If all these treatment options continue to fail, patients are considered appropriate candidates for the convergent procedure.

Epicardial Ablation

- A cardiothoracic surgeon enters the peritoneal cavity with a radiofrequency ablation device through a small incision approx. 2 cm below the xiphoid process.
- The surgeon ablates the posterior aspect of the heart in a linear fashion from the left pulmonary veins to the right pulmonary veins

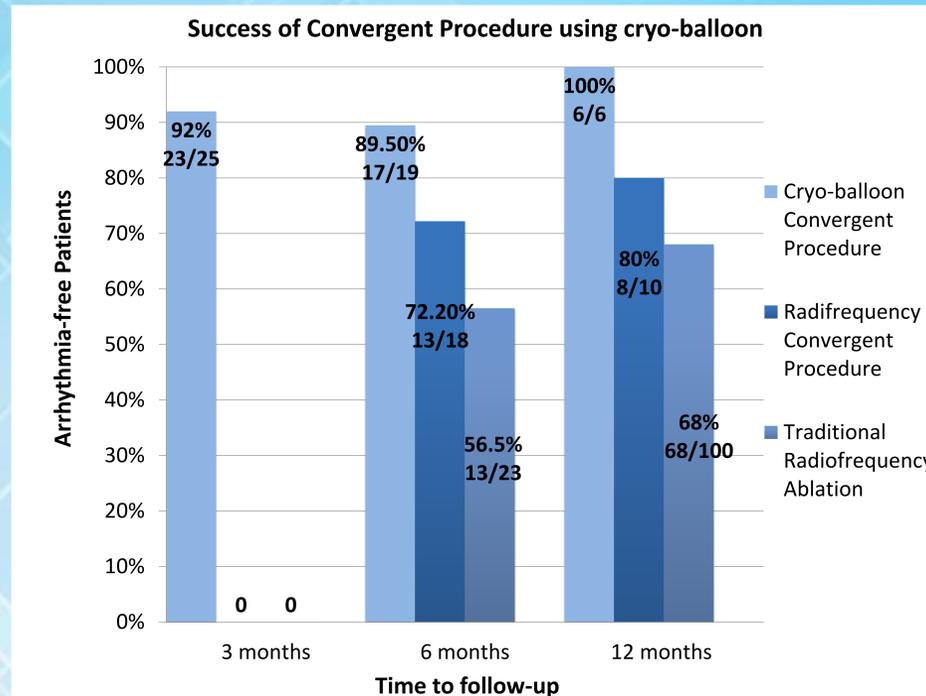
Endocardial Ablation

- An electrophysiologist positions a cryo-balloon catheter in each of the four ostia of the pulmonary veins, ensuring occlusion via ICE imaging and lack of color flow.
- The cryo-balloon is then inflated with a liquid refrigerant that evaporates and scars the tissue of the pulmonary vein, thus eliminating any electrical conduction that could interfere with electrical currents in the atria and cause atrial fibrillation

Post-operative Follow up

- After surgery, patients were started on amiodarone, steroids, anticoagulants, and anti-inflammatories
- At the follow-up, patients' monitoring devices were interrogated and ECGs were administered to determine heart rhythm.
- Medication was adjusted as needed.

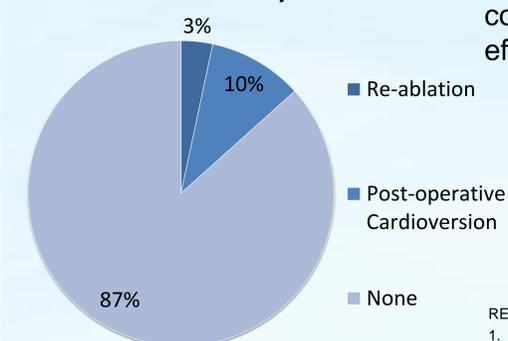
Results



Population Demographics and Comorbidities

Characteristic	Subjects
N	31
Age (years), mean (range)	66 (40-81)
Sex: Male, n (%)	23 (74.2)
Paroxysmal AF, n (%)	9 (30)
Persistent AF, n (%)	22 (70)
Hypertension, n (%)	23 (74.2)
Obesity, n (%)	8 (25.8)
Congestive Heart Failure, n (%)	9 (29)
Current/Past Tobacco Use, n (%)	14 (48.3)
Sleep Apnea, n (%)	11 (34.4)
Pacemaker, n (%)	7 (22.6)
Previous Ablation, n (%)	13 (38.7)
Previous Cardioversion, n (%)	17 (54.8)
Family Hist. HD, n (%)	13 (43.3)

Post-operative Therapies in response to Recurrent Arrhythmia



Discussion

Procedural Complications

- A total of two patients (6.4%) experienced rare adverse effects from the operation.
- One patient suffered from pericardial effusion and one from a hemoperitoneum with bleeding around trocar sites.
- Both patients recovered successfully.
- There were no procedural mortalities, no atriophogical fistulas, and no pericardial tamponade.

Study limitations

- A retrospective review of symptomatic AF patients that received Convergent Procedure with a cryo-balloon ablation
- No quality of life survey administered.
- No control group.
- Many patients underwent their CP less than a year before the conduction of study. Thus, limited follow-up data was available.

Conclusions

This study of 31 patients suggests that the use of a cyro-balloon catheter for endocardial ablation during the convergent procedure is a viable method to eliminate the recurrence of persistent atrial fibrillation and arrhythmias.

Further study is warranted that obtains a larger sample size of CP patients and allows more time post-operatively for follow-up data collection. Other data should be collected on the time and cost efficiency of the cryo-balloon versus radiofrequency technique.

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