

Abstract

Background

Cut and sew Cox-Maze III is an effective surgical therapy for atrial fibrillation (AF). Newer technologies are being developed to assist with the intra-operative treatment of AF. We sought to examine the early efficacy and safety of cryoablation for the treatment of patients with AF as a concomitant surgical procedure.

Methods

We retrospectively reviewed the charts of patients with AF who received cryoablation using the CryoCath Technologies Surgifrost System as a concomitant surgical procedure between 1/03 and 10/03 (n=17). Follow-up was obtained from medical records, by telephone calls to the patients, or records from cardiology offices.

Results

There were 9 males (53%) and 8 females (47%) in the study group. The average age for these patients was 68.5 years (45 – 91). 14 patients had chronic AF (83%), while 3 patients had paroxysmal AF (17%). 11 patients received a Cox-MAZE III cryolesion set, and 6 patients received a left-sided cryolesion set. 11/13 (84.6%) patients alive at 3 months were without AF.

Conclusions

Cryoablation for AF can be performed safely as a concomitant procedure. Longer follow-up is needed, and additional studies are necessary to determine the efficacy and safety of cryoablation in patients with chronic, paroxysmal and lone AF.

Introduction

The operative management of atrial fibrillation (AF) is evolving. Currently, multiple operative strategies exist for treating paroxysmal and continuous AF, with the most effective surgical approach being the Cox-Maze III procedure¹. This operation has excellent long-term results², but can be technically demanding. As a result, newer less time consuming technologies for the intra-operative treatment of AF have been developed.

One such method for the treatment of AF that has been described is the Surgifrost CryoCath (Endocare Inc, Irvine, CA)³. This system involves the creation of a specific set of thermally induced transmural lesions to interrupt the circuits required to propagate (AF). The object of this report is to present our early experience using endocardial application of this new technology.

Materials and Methods

After the study received Institutional Review Board approval, the medical records of patients who received concomitant cryoablation for AF between January 2003 and October 2003 were reviewed for this study. Follow-up was obtained from medical records, by telephone calls to the patients, or records from cardiology offices.

Cryoablation was performed as previously described using a flexible-tip, argon-gas based 60 mm probe that rapidly achieves temperatures between -120 and -160 degrees Celsius³. The cryolesion set was created by applying the probe for a 1 minute dosing time to achieve an atrial temperature of -100 degrees Celsius. Post-operatively, all patients received amiodarone for a minimum of 3 months, and early post-operative atrial fibrillation was treated aggressively.



Figure 1: CryoCath Console

Results

A total of 17 patients were identified as having received cryoablation for AF as a concomitant surgical procedure between January 2003 and October 2003. There were 9 males (53%) and 8 females (47%) in the study group. The average age for these patients was 68.5 years (range 45 – 91).

Fourteen patients had chronic AF (83%), while 3 patients had paroxysmal AF (17%). Concomitant procedures included:

- 1 with coronary artery bypass grafting (CABG) alone
- 7 with CABG + single valve repair/replacement
- 1 with CABG + double valve repair/replacement
- 4 with single valve repair/replacement alone
- 3 with double valve repair/replacement and
- 1 with triple valve repair/replacement.

Eleven patients received a full Cox-MAZE III cryolesion set (11/11 chronic AF), and 6 patients received a left-sided cryolesion set (3/6 chronic AF, 3/6 paroxysmal AF).

There were 3 peri-operative mortalities and 1 death which occurred greater than 30 days post-operatively. Outcomes data was available for 13/13 (100%) patients who were alive at 3 months. At 3 months,

- 11/13 (84.6%) patients were without AF (Graph 1), including
 - 3/11 patients without AF and off anti-arrhythmic medications
 - 6/11 patients without AF who required anti-arrhythmic medications
 - 2/11 patients without AF, who required a permanent pacemaker

One patient without AF at 3 months required an early electrical cardioversion which was successful.

Graph 1

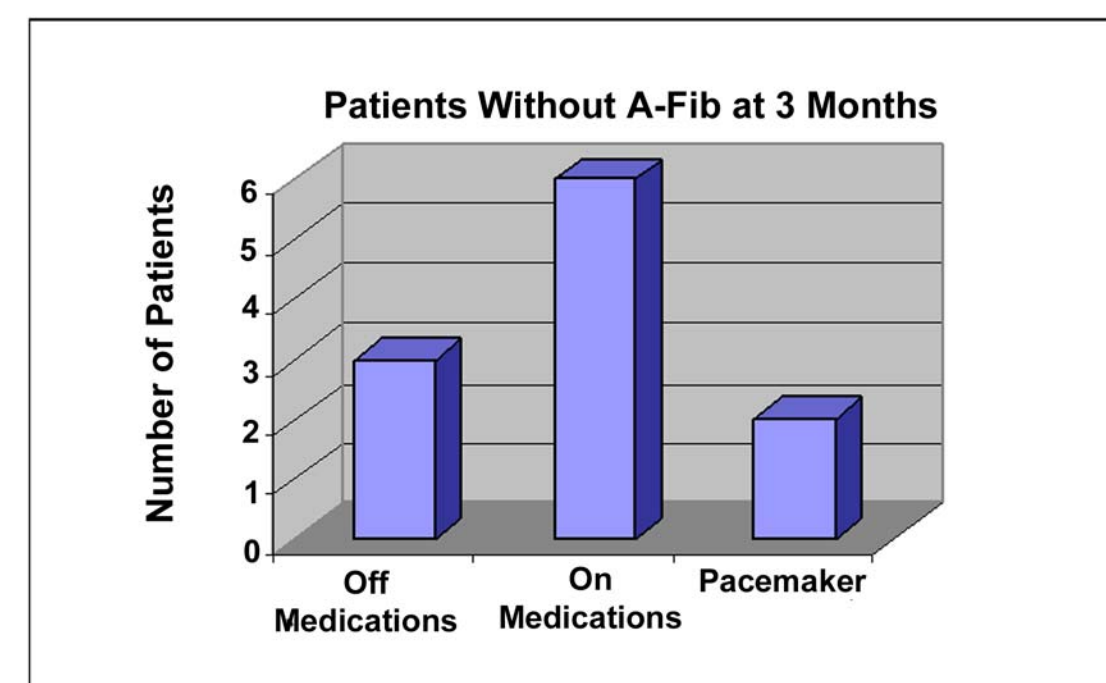


Figure 2: CryoCath Flexible Probe

Discussion

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia encountered in clinical practice. With the rising incidence of AF in the general population, there has been an associated increase in annual hospital admissions for AF^{4,5}. The effects of AF on cardiovascular morbidity and mortality are significant, and include a 5-fold increase in the incidence of embolic stroke⁶.

The cut and sew Cox-Maze III procedure successfully eliminates AF in 90% of patients with lone AF, with AF associated with valvular disease and in selected patients with AF and ischemic heart disease^{2,7,8}. Morbidity and mortality are comparable to equivalent procedures performed without concomitant Maze. Despite these superb results, widespread acceptance is limited by additional cross clamp time, perceived increases in morbidity and mortality, and by surgical selection limited to better risk patients.

New alternatives for creating the Cox-Maze III lesion sets and new empiric data reducing the number of lesions required to cure earlier AF can be expected to reduce morbidity and mortality and make both stand alone and concomitant Maze more widely accepted⁹.

This study has several limitations. It is a retrospective review of selected patients. The lesion set was not standardized among patients in the chronic or paroxysmal AF groups. Many patients were high risk and the mortality rate eliminated these patients from follow-up. The high mortality rate in this study group of patients can be partly explained by the fact that it contained a disproportionately high number of high risk patients who underwent complex concomitant procedures along with their cryoablation procedure. Follow-up was available in 100% of the patients alive at 3 months, but did not include EKG documented normal sinus rhythm in all patients who stated they were in normal sinus rhythm.

The study employs new technology. There is a "learning curve" with any new technology that becomes available, likely leading to an underestimation of the efficacy of "second generation" devices. Use of the CryoCath Surgifrost system was not standardized and varied by surgeon. In addition, longer follow-up is needed in these patients, and additional studies are necessary to determine the efficacy and safety of cryoablation in patients with chronic, paroxysmal and lone AF.

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