Peer Review File

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Reviewer A

The article was well written with excellent attention to scientific method, reasonable numbers and appropriate twelve month follow up at a Centre that has established expertise in the hybrid management of atrial fibrillation. Most importantly, they identify a substantial paucity of data on quality-of-life outcomes, following hybrid surgery and in fact, are unable to find any articles outlining quality of life outcomes following open Cox maze for comparison.

The relatively high pacemaker rate preoperatively and the use of Zio-patches would assist in determining the effective rate of rhythm success and the patient demographic is appropriate with a mean of 5.5 years of predominantly long-standing persistent atrial fibrillation, preserved ventricular function and 47mm average left atrial chamber diameter.

The twenty questions proposed in the AF EQT score are appropriate and the outcomes weigh heavily in favour of the substantial improvement in symptoms, treatment concerns and treatment satisfaction.

My recommendation is that this article could be accepted in its current form. There are no grammatical or spelling corrections identified. It serves to fill a significant gap in our knowledge related to non-rhythm related outcomes following the intervention and further validates that hybrid therapy deserves a place in the management of atrial fibrillation as both the Cease AF and DEEP studies have achieved publication and confirm significant clinical benefit, both in terms of randomised controlled trial evidence, which should be interpreted as irrefutable.

My recommendation is to approve the paper in its current form for publication.

Reply: Thank you for your favorable review of this manuscript. We share your enthusiasm for the Hybrid approach and appreciate your support.

Reviewer B

This is an interesting and generally well written manuscript. Attention to the following should make it even better.

Minor comments:

1. Please provide references for: “Effective treatment strategies not only restore normal sinus rhythm, reduce atrial fibrillation burden, mitigate stroke risk, improve heart failure, decrease the risk of dementia, and increase long-term survival but importantly, also improve patient quality of life” written on lines 96-99.
   Reply: Thank you, we have included the references requested.

2. On line 107, change: “a paucity” to “there is a paucity”.
   Reply: Thank you, corrected.

3. On line 118, delete: “and fewer yet have utilized” and place a period after “approach”.
   Reply: Thank you, corrected.

4. On line 119, capitalize “the” to begin a new sentence. This change and the previous deletion will minimize repetition from the introduction.
   Reply: Thank you, corrected.

5. On line 167, Begin a new paragraph starting at: “iRhythm Zio patch monitoring is an…”.
   Reply: Thank you, corrected.

6. On line 172, change: “are” to “were”.
   Reply: Thank you, corrected.

7. On line 179, you have used the word “ligation” and on line 181, you have used the word “occlusion”. Given the use of the AtriClip, occlusion seems to be the better choice in each instance.
   Reply: Thank you, we changed ligation to occlusion on line 179.

8. On line 184, change: “caval-tricuspid isthmus” to cavo-tricuspid isthmus”.
   Reply: Thank you, corrected.

9. On line 197, delete: “gender”.
   Reply: Thank you, corrected.

10. On line 204, change: “by their referring physician” to “prescribed by their referring physician” or to “under the supervision of their referring physician”. Please choose the option that fits best.
    Reply: Thank you, we have selected “under the supervision of their referring physician.”

11. On line 216, change:” AFECT” to “AFEQT
    Reply: Thank you, corrected.

12. On line 220, 86.0-26.6 = 59.4 not 59.5. Was 26.6 actually 26.55? If so, 86.0-26.55 = 59.45 which could be rounded up to 59.5.
    Reply: Thank you, with 4 significant digits it was 86.03-26.58 = 59.46, which we rounded up to 59.5. No changes made.

13. On line 224, change: “provides a contemporary” to “provides a contemporary evaluation of the results of a non-sternotomy, non-thoracotomy”.
    Reply: Thank you, corrected.

14. On lines 294-295, change: 12-month post survey" to "post 12-month survey".
    Reply: Thank you, corrected.

15. On lines 302-303, change: "This corroboration of findings highlights the importance of continually and systematically…" to "Our findings highlight the importance of continually, systematically…".
    Reply: Thank you, corrected.

16. On line 311, change: "rhythm success" to "sinus rhythm restoration".
    Reply: Thank you, corrected.

Major comments:

1. When noting a manufacturer's product, it is customary to write name Atriclip® and add manufacturer's name plus the city state and country of the manufacturer in parentheses after the first mention of the product's name.
   Reply: Thank you, we have added this information to the first mention of AtriCure® (Mason, Ohio; USA) – Line 43

2. On lines 254-259, change: "The main limitation of our study is the small study cohort of seventy-four total patients, the majority of which achieved normal sinus rhythm (93%), and therefore we were not powered sufficiently to provide a clinically useful comparison of QOL outcomes between patients who achieved normal sinus restoration versus those that remained in atrial fibrillation" to "The main limitation of our study is the small study cohort of seventy-four total patients. Given that the majority of achieved normal sinus rhythm (93%), we were not powered sufficiently to provide a clinically useful comparison of QOL outcomes between patients achieving normal sinus rhythm versus those remaining in atrial fibrillation".
   Reply: Thank you, we have made these changes.

3. On lines 273-275, change: "…atrial fibrillation burden; with more impactful changes in QOL in patients who experiences less atrial fibrillation (8,9)" to "…atrial fibrillation burden. More impactful changes in QOL were noted in patients who experienced less atrial fibrillation (8,9)".
   Reply: Thank you, we have made these changes.

Reviewer C

The Authors described their results on patients QoL improvement after hybrid AF ablation.

The paper is well written and can be clearly read throughout the whole text. Limitations are correctly stated by the Authors, but should be implemented by

mentioning the retrospective nature of the study.

The manuscript could benefit from the following comments:

Introduction
- Line 113, the totally thoracoscopic hybrid AF ablation does not provide the same results of the Cox-Maze, as not all lesions are completed as described by the original technique. Therefore this sentence should be reformulated with this limitation.
Reply: Thank you, we have incorporated your suggestion into a new sentence, "The totally thoracoscopic hybrid ablation approach is a combination of epicardial and endocardial lesions that nearly replicates the traditional "Cut-N-Sew" Cox-Maze surgical elements(13). Key lesions often omitted from this hybrid approach include the intracaval ablation connecting the superior vena cava and the inferior vena cava; the right atrial appendage lesion; the right atrial free wall or "T" lesion; and the tricuspid isthmus lesion at the "2 o'clock" position."

Methods
- Was a 3-month blanking period considered after the operation? This information is not mentioned in the text and should be added.
Reply: Thank you, yes, you are correct a 3-month blanking period was considered after the operation and this has been added to the text in the Rhythm monitoring section. New Line 167- (after a 3-monthh blanking period).

Discussion
- I suggest adding also the studies evaluating the QoL after AF ablation when performed only through catheter ablation or more invasive strategies.
Reply: Thank you for this suggestion. Unfortunately, similar QoL AFEQT assessments in the catheter ablation space are also rare. We have included information regarding 2 contemporary studies by Samuel et al and Gupta et al in Section 4.3 Comparison with similar researches. Additionally, no studies exist to date that evaluate more invasive strategies (i.e., Open Cox-maze) with the AFEQT questionnaire. This is a severely under studied are of investigation.

Reviewer D
I would like to congratulate the authors on an important contribution to the literature on (thoracoscopic) hybrid AF ablation, especially because QOL is potentially a more important outcome parameter than rhythm outcome

I have only some minor comments
-please specify in the abstract and the highlight box that it concerns 'thoracoscopic' hybrid AF ablation. The hybrid Af ablation was started with a thoracoscopic approach, but the convergent approach is now also referred to as a hybrid approach, however is less successful.

Reply: Thank you, we have added Totally Thoracoscopic to the Abstract to clarify this important point.

-please mention off AAD results in the abstract according to HRS guidelines
Reply: Thank you, incorporated your suggestion into a revised statement in the abstract.

"12-month Overall rhythm success (<30 secs AF/AFl/AT with or without AAD) was 93% and Heart Rhythm Society defined rhythm success was 76% (<30 secs AF/AFl/AT without AAD)"

-were there any data on AF burden, explaining why the failures also improved in QOL? Any other explanations
Reply: Thank you for these questions.

AF burden? Unfortunately, we do not routinely input burden data for our patients into our AF database, although this is agreeably something we should capture moving forward.

Why failures also improved in QOL? This is an excellent question and it appears that there may be 2 plausible explanations. The patients who do not have complete NSR restoration 1) still gain QOL improvement from likely improvements in "Treatment Concerns," aka medication changes, i.e., less AAD usage and 2) a possible reduction in AF burden (as you previously noted is an additional parameter to measure moving forward). In addition, LAAO may allow them to feel "safer" about discontinuation/decreasing their OAC.

Reviewer E

The paper is well written and provides important insight into the technique.
however, the ablative technique (convergent?, pen?) needs to be explored further, please specify.
Reply: Thank you for this question regarding the technique utilized to perform the surgical ablation. Additional reviewers have also requested that we specify that the hybrid ablation performed was a totally thoracoscopic ablation so we have updated the manuscript to reflect this clarification. We have also provided a reference to our previous published article in VATS that provides a detailed description of our totally thoracoscopic technique.

Complications?
Reply: Thank you for this question. In Table 2. we have reported the complications in terms of 0% deaths, 0% strokes, and 4% PPM rate. We have also included a new statement regarding "one temporary phrenic nerve palsy" in Section 3.2. There were no AEFs, infections, conversions to sternotomy or thoracotomy or need for conversion to cardiopulmonary bypass.

Has any patient had an endocavitary study done again?
Reply: Thank you for this question. Two patients underwent 2nd endocardial

mapping studies after the planned complete Hybrid procedure (1st epicardial ablation and 1st endocardial ablation). We have included the additional endocardial findings below:

Patient 1: Re-ablation of Mitral isthmus ablation

Patient 2: Re-ablation of Mitral isthmus ablation and repeat CTI ablation

We have included this information in section 3.2 Procedural Outcomes.

One of the limitations is the impossibility of verifying stable disconnection.

Reply: Thank you for this comment. We agree that verification of disconnection is an important component of ablative procedures and is a clinically complex issue to resolve and is not unique to this patient cohort.