

Reviewer A

The paper titled “Effects of catheter ablation of focal atrial tachycardia using the visualized steerable sheath” is interesting. Arrhythmia-free survival following catheter ablation for FAT can be improved using the Vizigo sheath when compared to non-visualized steerable or other conventional sheaths. Additional advantages include a reduction in fluoroscopy exposure and an increase in CF. However, there are several minor issues that if addressed would significantly improve the manuscript.

1) In the introduction of the manuscript, it is necessary to clearly indicate the knowledge gaps and limitations of prior study and the clinical significance of this study.

Reply:

Thank you for your comment, we have added relevant content. The revision could be found in Line 81 to 84 on page 3.

2) How to control catheter positioning and stability? What impact will it have on the surgical results? Suggest adding relevant content.

Reply:

Thank you for your comments, we have added relevant content. Previous studies have suggested that precise control of position and catheter stability can help improve the success rate of ablation. The revision could be found in Line 86 to 90 on page 3.

3) It is recommended to increase the analysis of initial pulmonary vein isolation rate, which may make the entire analysis process more complete.

Reply:

Thank you very much for this suggestion. Sorry, our research is mainly on catheter ablation of focal atrial tachycardia, not ablation of atrial fibrillation, and we cannot provide initial pulmonary vein isolation rate. In our previous study on atrial fibrillation ablation using the Vizigo sheath, we described the pulmonary vein isolation rate. We found that using the Vizigo sheath improved initial pulmonary vein isolation rates.

4) There are many uncertainties in retrospective research, which increase the deviation of research results. How to explain and solve this problem?

Reply:

Thank you very much for your comment. As you mentioned, retrospective studies do have many problems, including Recall Bias, Inconsistent Information Sources, Selection Bias, Temporal Ambiguity, Confounding Variables, Survivorship Bias, Informational Bias, etc. In order to minimize the above errors, each of our patient's information is exported from the electronic medical record system and checked repeatedly. We will summarize the patient's medical records and medical information in our hospital, and conduct telephone follow-up for patients who do not lack certain information.

5) The manuscript lacks information on the author and affiliation. Please supplement.

Reply:

Thanks for your comments and valuable suggestions. We have added some content information on the author and affiliation. The revision could be found in Line 4 to 10 on page 1.

6) The introduction part of this paper is not comprehensive enough, and the similar papers have not been cited, such as “Utilization of steerable sheath improves the efficiency of atrial fibrillation ablation guided by robotic magnetic navigation compared with fixed-curve sheath, PMID: 35195273”. It is recommended to quote this article.

Reply:

Thanks for your comments and valuable suggestions. Thank you very much for providing valuable literature, which is of great help to us to further improve the manuscript. We have cited it. References 7.

7) It is recommended to increase the analysis of risk factors for recurrence after surgical minimally invasive atrial tachycardia ablation.

Reply:

Table 2. Logistic regression analyses of predictors of atrial tachycardia after catheter ablation

Variable	Univariate analysis		Multivariate analysis	
	OR(95%CI)	<i>P</i>	OR(95%CI)	<i>P</i>
Male gender	1.20(0.58-2.48)	0.622		
Hypertension	3.60(1.39-9.32)	0.008	2.50(1.20-5.78)	0.010
Age	1.00(0.98-1.02)	0.910		
Diabetes mellitus	0.68(0.50-2.98)	0.336		
Heart Failure	1.10(0.35-3.43)	0.009	1.54(0.46-5.20)	0.486
Left atrial diameter	0.98(0.92-1.04)	0.488		

Body mass index	0.90(0.90-1.01)	0.073		
Estimated GFR	1.00(0.98-1.02)	0.872		
Vizigo sheath	0.22(0.04-1.00)	0.051	0.90(0.85-0.95)	0.028

OR: odds ratio, CI: confidence interval, GFR: glomerular filtration rate

Reviewer B

- 1) First, the title needs to indicate the comparisons across Vizigo sheath, non-visualized steerable sheath, and other conventional sheath, as well as the clinical research design of this study, i.e., a retrospective cohort study.

Reply:

Thank you very much for pointing out this shortcoming. We have changed the title of the article based on your suggestion. The revised title is as follows: Comparison of safety and effectiveness of different sheaths in ablation of focal atrial tachycardia: a retrospective study. The revision could be found in Line 2 to 3 on page 1.

- 2) Second, the abstract is not adequate. In the background, the authors need to clearly describe what “has not been systematically assessed for FAT” is and why Vizigo is effective and safe. The methods need to describe the inclusion of the three cohorts, the assessment of baseline clinical factors, follow up procedures, and efficacy and safety outcomes. The results need to first describe the baseline comparability across the three groups. The conclusion should not repeat the main findings and please have detailed comments for the clinical implications of the findings.

Reply:

Thanks for your comments and valuable suggestions. Based on your suggestions, we have modified the abstract. We have made changes and additions to the background section of the abstract. Taking into account the word limit in the abstract, the inclusion of the three cohorts, the assessment of baseline clinical factors, follow up procedures, and efficacy and safety outcomes have been described in further detail in the main text. In the results section, we have supplemented the baseline comparability across the three groups. In the conclusion section, we have made changes to the presentation of the conclusion. The revision could be found in Line 38 to 43, 48 to 49, and 61-63 on page 2.

- 3) Third, in the introduction, the authors need to explain why “they have not previously been systematically studied for FAT” and explain more on the clinical needs for this research focus. The authors need to analyze the limitations and

knowledge gaps of prior studies on the efficacy of Vizigo for FAT to support the necessity of this study.

Reply:

Thank you very much for this suggestion.

First, the Vizigo sheath is a new catheter, and we found no studies on this new sheath in focal atrial tachycardia (FAT). Previous studies have suggested that this sheath shows great benefit in atrial fibrillation ablation. The sheath is also an important tool in FAT ablation. Therefore, we initiated the current study in order to discover the use of this sheath in atrial tachycardia. The revision could be found in Line 77-78 on page 3.

4) Fourth, in the methodology, the authors need to describe the sample size estimation, follow up details, assessment of baseline clinical factors, and explain why the comparisons of the three groups, in particular the group of other conventional sheath, could indicate the efficacy and safety of visualized steerable sheath. The authors need to specify the safety outcome. In statistics, please describe the test of the baseline comparability across the three groups and the multiple adjustment method for the imbalanced baseline factors.

Reply:

Thanks for your comments and valuable suggestions. Focal atrial tachycardia (FAT) is a relatively uncommon cardiac arrhythmia that accounts for up to 10% of supraventricular tachycardias. Previous similar studies only included 70 patients, or even 40 patients. Considering that our study was a retrospective study, we included all patients who met the criteria during a period of time, up to 164 people. Compared with previous similar studies, I think our sample size is sufficient.

Other conventional sheath is mainly fixed curve sheath (NaviEase, Synaptic Medical). In current clinical practice, these three sheaths are commonly used, so we compare these three sheaths.

Details of follow-up and assessment of baseline clinical factors have been similarly described in the methodology section of the manuscript. The relevant statistical methods have been described in detail in the statistics section.

The primary safety outcomes refer to complications related to surgery, including puncture, cardiac tamponade, bradycardia, atrioesophageal fistula, and stroke, which we have added in the original manuscript.

The revision could be found in Line 144-146 on page 4.

5) Finally, please cite several related papers: 1. Ghosn M, Elsakka AS, Ridouani F, Doustaly R, Mingione L, Royalty K, Ziv E, Alexander E, Maxwell A, Monette S, Kim HS, Short RF, Tam AL, Suh RD, Solomon SB. Augmented fluoroscopy

guided transbronchial pulmonary microwave ablation using a steerable sheath. *Transl Lung Cancer Res* 2022;11(2):150-164. doi: 10.21037/tlcr-21-864. 2. Zhao Y, Zhang C, Peng L, Xie Q, Chen C, Yan L, Chen W. Clinical effectiveness and efficiency of a new steerable sheath technology for radiofrequency ablation in Chinese patients with atrial fibrillation: a retrospective comparative cohort study. *J Thorac Dis* 2023;15(7):3953-3964. doi: 10.21037/jtd-23-1021.

Reply:

Thank you very much for providing valuable literature, which is of great help to us to further improve the manuscript. We have cited it. References 6 and 17 respectively.

Reviewer C

The authors present a retrospective study of catheter ablation of focal atrial tachycardias comparing the use of the Vizigo visualizable steerable sheath with non-visualizable and non-steerable sheaths. Overall, 164 consecutive patients were included in the study and divided in 3 groups: 42 patients treated with the Vizigo sheath, 36 patients treated with a non-visualized sheath and 86 with a conventional non-steerable non-visualizable sheath. The study was conducted at a single center from March 2019 to 2022.

The key finding is, that the use of the Vizigo sheath was associated with lower fluoroscopy times, higher contact force and “superior” arrhythmia-free survival.

General comments: While the first finding is not surprising, the latter are somewhat confusing, especially the conclusion that CF is higher compared to a non-visualizable but steerable sheath. Because the contact force is monitored continuously independent of the use of a visualizable and non-visualizable sheath, the operator can react to weak contact forces by using the steerable mechanism. In the case of the non-visualizable sheath this could mainly lead to more radiation exposure, but how do the authors explain this difference in CF ? This should be discussed in more detail in the discussion section. The discussion section covers only the Vizigo compared to the non-steerable sheath. The improvement of CF with a steerable sheath during ablation is not new and well known.

The weakest point of the study is the analysis of arrhythmia-free survival. This is critical to the conclusions. The study was designed retrospectively and the selection of patients to the different groups was not randomized but based on the financial status of the patients. In addition, the distribution of patients between the two groups with non-visualizable and visualizable sheaths is unclear. The authors describe group assignment only in general terms. A more detailed description of the distribution

process is missing. It is unclear as well which other sheaths were used (company, type, long or short sheaths, always the same sheath used?).

Reply:

Thank you very much for pointing out our shortcomings. Other conventional sheaths are mainly fixed sheath (Swartz sheath).

The revision could be found in Line 112 to 113 on page 4.

Against this background, statements such as superiority of the sheath, improvement in long-term survival or other conclusive language must be viewed critically from a statistical point of view, because the study was not randomized and not designed for superiority findings. Thus, I recommend calming down the statements as exploratory findings and associations.

Reply:

Thanks for your suggestion, we've made the changes accordingly.

The revision could be found in Line 61 to 63 on page 2.

Language concerns: Throughout the text there are many linguistic and typographical errors,

For example: Line 4 and 8: visible instead of visualizable L72: patients enrolled instead of enrolled patients, L149 between (the) groups. L179 Vizio L191 this tool was (missing verb) in our cohort L192 multipoint instead of multipolar L210 an in increase in

Reply:

Thank you for pointing out our error. We have corrected the relevant errors and carefully checked the original text again to eliminate grammatical errors.

Comments:

1. Key findings: Description is too general: "...significantly improve the rate of successful ablation..", but in the text, acute success rates were the same between the three groups. In regard of long-term success rates the conclusion is too strong based on the study design.

Reply:

Thank you for your comment, we have added relevant content. The revision could be found in Line 61 to 63 on page 2.

2. "... recurrences rates remain high". Unprecise, recommend being more specific, see introduction section

Reply:

Thank you for your comment, we have modified the relevant content.

The revision could be found in Line 39 to 41 on page 2.

3. The statements “improves long-term arrhythmia free survival”, “decreases fluoroscopy time” are too strong, in regard of the study design, better use more descriptive language: like “Vizigo sheath is associated with... “

Reply:

Thank you for your comment, we have changed the expression and described it in detail in the introduction section.

The revision could be found in Line 61 to 63 on page 2.

4. Implication: The implication is too general, please be more specific.

Reply:

Thanks for your comments and valuable suggestions.

The revision could be found in Line 61 to 63 on page 2.

5. Introduction:

- a. “FAT... relatively uncommon” is unspecific and misleading. The AT proportion of SVTs increase with age, less common in the young and more common (up to around 20%) in the older population. (Brembilla-Perrot et al., Porter et al.)

Reply:

Thanks for pointing out the error, we have changed our expression in the manuscript.

The revision could be found in Line 69 on page 2.

- b. “...other conventional sheath...” These sheaths should be described in more detail in the methods section.

Reply:

Thank you for your comment, we have added relevant content to the original manuscript. fixed sheath (Swartz sheath). The revision could be found in Line 112 to 113 on page 4.

6. Methods:

- a. Please specify inclusion and exclusion criteria? For example: In the limitations section the authors state, that only FAT with a single focus were included. This should be described in the methods section.

Reply:

Thank you for your comment, we have added relevant content to the original manuscript. The revision could be found in Line 195 to 208 on page 9.

- b. ECG parameters are mentioned in the methods section, but no further ECG data is presented elsewhere in the text.

Reply:

Thanks for your comments and valuable suggestions.

Because ECG is the main diagnostic criterion for atrial tachycardia, all patients we included underwent ECG or intracardiac electrophysiological testing to confirm the diagnosis. Among them, electrocardiogram is used as a tool for patient diagnosis. Studies similar to ours do not provide patients' electrocardiogram data, because ours is not a single case, but more than 100 patients.

c. Please precise LVD (LVEDD or LVESD?)

Reply:

LVD is left ventricular diameter (LVD), which can be seen in our Table 1.

d. Did you use 40 watts for all ATs in both the right atrium and the left atrium?

Reply:

Thanks for your comments. Try ablation in the right atrium with a power of 10~30W. The power level depends on the patient's tolerance. we have added relevant content to the original manuscript. The revision could be found in Line 134 to 135 on page 4.

7. Results:

a. The anatomical location of the AT focus influences the outcome. How are the locations distributed between the three groups?

Reply:

We very much agree with your view that location of the AT focus influences the outcome. we have added relevant content to the original manuscript. The revision could be found in Line 178 to 179 on page 5.

b. Are the three groups comparable in terms of structural heart diseases?

Reply:

Age, sex, BMI, presence of hypertension, history of heart failure, and prevalence of diabetes mellitus were not significantly different among the three groups. The revision could be found in Line 180 to 181 on page 5.

c. The description of the long-term arrhythmia free survival using a single endpoint instead of a time-dependent description like Kaplan-Meier curves can be problematic for several reasons: There is a lack of Time-to Event information not adequately capturing the dynamic nature. It remains unclear as well if the follow-up time was comparable between the three groups. Furthermore, it is in general problematic, that patients included later in the study have less "chance" to suffer from an event. In the worst-case scenario, the proportion of later included patients with the use of the

Vizigo sheath is higher and thus the event rate could be biased. Therefore, using Kaplan-Meier curves and comparison of the follow-up periods of the three groups could clarify this point.

Reply:

We very much agree with your point of view, and we also believe that it is necessary to provide a Kaplan-Meier curves. However, considering that our study is retrospective, we clarify whether the patient has relapsed by asking patients and related auxiliary examinations, but we did not record it in detail. The specific time of his postoperative recurrence.

d. Was there lost-to-follow up?

Reply:

No patients included in our analysis were lost to follow-up.

e. Please provide the reader with information of the distribution of ATs in the three groups.

Reply:

Considering the various origin sites of patients' atrial tachycardia and the limitation of sample size, we simply divided it into left and right atria, which can be seen in Table 2 and in Line 178 to 179 on page 5.

8. Discussion:

a. L189 is unclear: What is meant by "...the increased success rate..." The increased success rate of this study compared to other studies or the increased success rates comparing Vizigo and non-Vizigo sheaths?

Reply:

The increased success rate of this study is comparing Vizigo and non-Vizigo sheaths?

b. L221 I disagree with the authors opinion: Fluoroscopy is a real-time continuous imaging technique, but its use is limited by high radiation doses during prolonged application.

Reply:

We agree with your point of view and we have deleted the inappropriate sentences.

c. L227 "...AF experience" ?

Reply:

We have changed our expression in the manuscript. The revision could be found in Line 263 to 265 on page 8.

9. Limitations

a. L243 The identical follow-up protocol helps to control systematic bias and is only one component / strategy for ensuring internal validity (e.g. randomization, blinding, stratification). Thus, the statement is too strong.

Reply:

We're sorry for the error on this point. We have removed this imprecise expression.

10. Conclusion

a. As stated above, the conclusion is too strong and fundamentally not covered by the study design. Please describe the conclusions in a more exploratory manner.

Reply:

Thanks for your valuable opinion, we have modified this imprecise expression. The revision could be found in Line 288 to 291 on page 8.

Figure 1: Please provide the reader with more information about the shown structures, location of the AT, and information of the case in general (like a short case-report).

Reply:

All sites of origin of atrial tachycardia have been fully presented in our results section. The revision could be found in Line 178 to 179 on page 5.

Table 1: Diabetes I and II?

Reply:

Diabetes II.

Table 2: Why is the CF for OCS sheath missing? Please discuss

Reply:

Since our study is retrospective, although we try our best to ensure the completeness and accuracy of the data, it is inevitable that there may still be some missing data, which may be a shortcoming of our study.
