

Optimum Diagnosis to Ablation Time for Atrial Fibrillation and its Relationship with Recurrence

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ABSTRACT

Atrial Fibrillation (AF) is the most prevalent sustained supraventricular arrhythmia in the elderly population worldwide. Over the past decade, ablation has emerged as the preferred treatment option for AF patients. The time between the first AF diagnosis and the index ablation procedure is referred to as the Diagnosis to Ablation Time (DAT). This modifiable factor is crucial in managing the recurrence of the disease. Shorter DAT is associated with reduced recurrence rates and improved patient outcomes, particularly in those with persistent AF. Conversely, prolonged DAT, especially beyond three years, is linked to higher recurrence rates and less favorable outcomes from the ablation procedure. This review aims to evaluate the impact of varying DAT on the recurrence of AF.

Keywords: Atrial fibrillation; Diagnosis to ablation time; Recurrence; Ablation

INTRODUCTION

Ablation, previously considered a last resort, has now become the preferred treatment for patients with AF. Different ablation techniques have proven to be more effective than antiarrhythmic drugs in treating atrial fibrillation and enhancing the quality of life for AF patients. Although there have been significant advancements and enhancements in the treatment of AF, the rate of its recurrence after index procedure remains around 50 percent [1]. The time between first diagnosis of AF and index ablation procedure, known as diagnosis to ablation time, has been a subject of interest among researchers in recent years. Many studies have demonstrated a direct link between DAT and AF recurrence, and have evaluated that a shorter DAT is associated with increased chances of maintaining sinus rhythm in long run, particularly in persistent AF patients. Longer DAT, on the other hand, is linked to higher recurrence rates [2]. The purpose of this review is to provide a concise overview of the concept of DAT, its impact on the long-term outcomes of ablation procedures, and the optimum DAT.

LITERATURE REVIEW

Diagnosis to ablation time is a modifiable factor that has demonstrated a strong impact on the outcomes of ablation in AF patients. With longer diagnosis to ablation time, there is evidence of more pronounced degree of atrial remodeling, as evidenced by the enlargement of the atria and elevated levels of inflammation and hemodynamic strain markers. These markers are involved in AF-related remodeling and are associated with AF recurrence [3]. On the contrary, when the duration of DAT is reduced, there is clear evidence of a notable decrease in the recurrence of arrhythmias, resulting in an enhanced quality of life and a reduced need for hospitalization [4]. This raises the question of what is the optimum DAT? Additionally, does DAT have the same impact on different AF subtypes?

First, let's explore the optimal DAT, which plays a crucial role in the success of AF ablation. Several studies have attempted to assess the ideal duration of DAT, and have employed various time comparisons, such as DAT less than 6 months *versus* more than 6 months, less than 1 year *versus* more than 1 year, less

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than 3 years versus more than 3 years, and so forth. When comparing DAT of <6 months to DAT of >6 months, Kwon et al., discovered no discernible differences at 2 years follow-up [5]. On the other hand, in a multicenter observational study conducted by Bisbal et al., it was found that if the DAT exceeds one year, there is a fourfold higher risk of AF recurrence [6]. Similarly, in another observational study with a follow-up period of about 5 years, it was found that a DAT of <1 year was associated with a lower recurrence of AF, with success rates gradually decreasing as the time interval increased [7]. Multiple studies have provided evidence in favor of the 1-year timeframe for DAT, demonstrating that prolonging DAT beyond 1 year is linked to increased rates of recurrence and thromboembolic events [8]. An important point to note is that delaying AF ablation by 1 year for Anti Arrhythmic Drugs (AADs) management did not diminish the efficacy of ablation compared to an early ablation approach [9]. Similarly, longer DAT and not diagnosis to referral time is linked with unfavorable results [10].

On the flip side, De-Greef et al., assessed that the relationship between DAT and AF recurrence does not have a minimum point ("the shorter, the better") [11]. However, extending DAT beyond 3 years offers minimal additional benefit ("the longer, the more irrelevant"), especially in patients of persistent AF [11]. Likewise, in a retrospective study conducted by Tønnesen et al., a total population of 7705 patients was divided into four groups based on the DAT: <1 year, 1-2 years, 2-3 years, and >3 years [12]. The study found that patients with DAT exceeding 3 years had the highest recurrence rate compared to the other groups after a 5-year follow-up period.

Moreover, DAT has a slight effect on the subtypes of AF as well. For new-onset paroxysmal AF, early ablation does not show any benefit as long as the AF remains paroxysmal. Conversely, for new-onset persistent AF, early ablation yields better outcomes compared to delayed ablation [13]. While DAT may not have a significant impact on patients with paroxysmal AF, patients with persistent AF appear to derive the greatest benefits from early AF intervention. This may be attributed to decreased atrial remodeling as well as various other factors. In a study conducted by Hussein et al., they examined a large population over a period of 3 years and discovered that patients with persistent AF experienced the greatest advantages from undergoing early ablation [3]. Furthermore, they observed a graded relationship between longer DAT and AF recurrence. Subsequently, patients who are diagnosed with early onset AF i.e., before the age of 45, and have a shorter DAT experience fewer instances of AF recurrence, regardless of the specific subtype of AF [14].

DISCUSSION

Diagnosis to ablation time in AF patients is a pivotal modifiable factor in reducing the risk of recurrence, making it a key focus in optimizing patient outcomes. A growing body of evidence suggests that the DAT can significantly impact AF recurrence rates, especially in patients with persistent AF. This review evaluates current research on the relationship between DAT and AF recurrence, highlighting key findings and areas for further investigation (Figure 1).

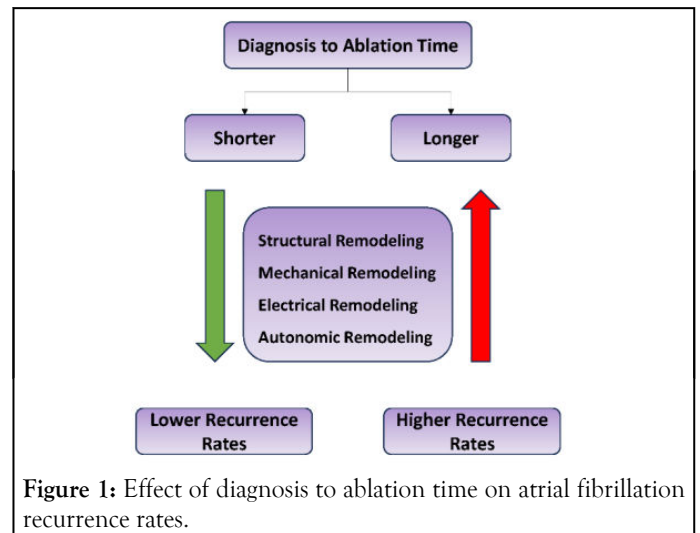


Figure 1: Effect of diagnosis to ablation time on atrial fibrillation recurrence rates.

Although current guidelines still advocate for the use of AADs as the first-line treatment for patients with AF, studies indicate that early ablation is believed to not only reduce the likelihood of AF recurrence but also to alleviate the progression of paroxysmal AF to persistent AF. However, optimal time between diagnosis and ablation remains a topic of debate, with some studies suggesting the optimum timeframe to be <1 year to get the best outcomes. As far as the minimum DAT limit is concerned, there seems to be a unanimous conclusion across studies i.e., the earlier the better, even for those patients with early onset AF. On the other hand, although certain studies have indicated that the time frame for ablation should be no longer than 1 year due to a higher likelihood of recurrences, a more extensive body of research indicates that 3 years is the maximum time frame for ablation. The evidence for 3 years DAT appears more robust, with several studies providing stronger or more comprehensive data. Pranata et al., performed a meta-analysis comparing DAT <3 years with DAT >3 years [15]. They discovered that patients in DAT <3 years group had a significantly lower rate of AF recurrence compared to patients in DAT >3 years group.

Furthermore, the impact of varying DAT on AF subtypes is closely linked to the disease's duration. In paroxysmal AF, the influence of shorter or longer DAT is relatively minimal compared to persistent AF due to the minor structural alterations in this subtype. Although both subtypes exhibit reduced recurrence with shorter DAT, persistent AF has been shown to benefit more significantly from shorter DAT, leading to a lower recurrence rate. In short, a longer disease duration correlates with a higher recurrence rate, with both AF subtypes deriving greater benefit from shorter DAT, and the reverse also holds true.

This review also underscores the need for future research to address a few gaps in the current literature. First, randomized control trials are required to establish definitive relationship between varying DAT and its impact on AF recurrence. Additionally, studies should also evaluate DAT as a continuous variable instead of categorical variable. Lastly, studies with longer duration of follow-up can also help to broaden the understanding of this relationship of DAT with recurrence of AF.

CONCLUSION

Diagnosis to ablation time is a critical modifiable factor in AF patients. AF patients, especially those with persistent AF, should be advised to undergo ablation procedure as early as possible in order to minimize the structural effects of AF. And also to lower the chances of its recurrence. Longer DAT, particularly greater than 3 years, is directly related to increased chances of atrial remodeling and higher chances of AF recurrence.

AUTHOR CONTRIBUTION

Authors Muhammad Arslan Ul Hassan (ORCID: 0009-0001-2147-9239) and Sana Mushtaq (ORCID: 0009-0008-0774-1916) have contributed equally to this article and hence are declared as first authors.

CONFLICT OF INTREST

The authors declare there is no conflicts of interests.

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REFERENCES

1. Ngo L, Lee XW, Elwashahy M, Arumugam P, Yang IA, Denman R, et al. Freedom from atrial arrhythmia and other clinical outcomes at 5 years and beyond after catheter ablation of atrial fibrillation: A systematic review and meta-analysis. *Eur Heart J Qual Care Clin Outcomes*. 2023;9(5):447-458.
2. Lin M, Rong B, Zhang K, Chen T, Wang J, Han W, et al. Optimal timing for atrial fibrillation patients to undergo catheter ablation: Insights from long-term outcome studies. 2024.
3. Hussein AA, Saliba WI, Barakat A, Bassiouny M, Chamsi-Pasha M, Al-Bawardy R, et al. Radiofrequency ablation of persistent atrial fibrillation: Diagnosis-to-ablation time, markers of pathways of atrial remodeling, and outcomes. *Circ Arrhythm Electrophysiol*. 2016;9(1):e003669.
4. Kawaji T, Shizuta S, Yamagami S, Aizawa T, Komasa A, Yoshizawa T, et al. Early choice for catheter ablation reduced readmission in management of atrial fibrillation: Impact of diagnosis-to-ablation time. *Int J Cardiol*. 2019;291(6):69-76.
5. Kwon CH, Choi JH, Oh IY, Lee SR, Kim JY, Lee SH, et al. The impact of early cryoballoon ablation on clinical outcome in patients with atrial fibrillation: From the Korean cryoballoon ablation registry. *J Cardiovasc Electrophysiol*. 2024 Jan;35(1):69-77.
6. Bisbal F, Alarcón F, Ferrero-De-Loma-Osorio A, González-Ferrer JJ, Alonso-Martín C, Pachón M, et al. Diagnosis-to-ablation time in atrial fibrillation: A modifiable factor relevant to clinical outcome. *J Cardiovasc Electrophysiol*. 2019;30(9):1483-1490.
7. de Greef Y, Schwagten B, Chierchia GB, de Asmundis C, Stockman D, Buyschaert I. Diagnosis-to-ablation time as a predictor of success: Early choice for pulmonary vein isolation and long-term outcome in atrial fibrillation: Results from the Middelheim-PVI Registry. *EP Europace*. 2018;20(4):589-595.
8. Chew DS, Jones KA, Loring Z, Black-Maier E, Noseworthy PA, Exner DV, et al. Diagnosis-to-ablation time predicts recurrent atrial fibrillation and rehospitalization following catheter ablation. *Heart Rhythm O2*. 2022;3(1):23-31.
9. Kalman JM, Al-Kaisey AM, Parameswaran R, Hawson J, Anderson RD, Lim M, et al. Impact of early vs. delayed atrial fibrillation catheter ablation on atrial arrhythmia recurrences. *Eur Heart J*. 2023;44(27):2447-2454.
10. Qeska D, Qiu F, Manoragavan R, Wijesundera HC, Cheung CC. Relationship between wait times and post-atrial fibrillation ablation outcomes: A population-based study. *Heart Rhythm*. 2024;21(9):02370-02371.
11. de Greef Y, Bogaerts K, Sofianos D, Buyschaert I. Impact of diagnosis-to-ablation time on AF recurrence: Pronounced the first 3 years, irrelevant thereafter. *Clin Electrophysiol*. 2023;9(11):2263-2272.
12. Tønnesen J, Ruwald MH, Pallisgaard J, Rasmussen PV, Johannessen A, Hansen J, et al. Lower recurrence rates of atrial fibrillation and maze events after early compared to late ablation: A danish nationwide register study. *J Am Heart Assoc*. 2024;13(7):e032722.
13. Winkle RA, Mead RH, Engel G, Salcedo J, Brodt C, Barberini P, et al. Early ablation of Newly diagnosed Paroxysmal Atrial Fibrillation (NEWPaAF) versus Newly diagnosed Persistent Atrial Fibrillation (NEWPeAF): Comparison of patient populations and ablation outcomes. *J Cardiovasc Electrophysiol*. 2024;35(5):984-993.
14. Zhou L, Kong Y, Sang C, Xia S, Jiang C, He L, et al. Impact of diagnosis-to-ablation time on clinical outcomes in patients with early-onset atrial fibrillation. *Clin Cardiol*. 2024;47(2):e24194.
15. Pranata R, Chintya V, Raharjo SB, Yamin M, Yuniadi Y. Longer diagnosis-to-ablation time is associated with recurrence of atrial fibrillation after catheter ablation-systematic review and meta-analysis. *J Arrhythm*. 2020;36(2):289-294.