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Position statement

National Heart Foundation of Australia consensus statement on catheter ablation as a therapy for atrial fibrillation

Atrial fibrillation (AF) affects 1%–2% of the population, although this may be an underestimation, as the condition is often asymptomatic. Factors that predispose towards the risk of developing AF include hypertension, valve disease, obesity, sleep apnoea, diabetes and renal disease.[1] The prevalence of AF increases with age — from rates lower than 0.5% among people aged 40–50 years, to 5%–15% among those aged 80 years — and is projected to double in the next 50 years, with the increasing age of the general population.[1] In 2009 there were about 240 000 people with AF in Australia, which is a conservative estimate of prevalence (1.1% of the population).[2] AF is associated with excess mortality, considerable morbidity and hospitalisations. It is increasing in prevalence and is responsible for a significant and growing societal financial burden.[1,3,4]

In recent times, a number of new medications and procedures to better manage this condition have been developed. Catheter ablation is an increasingly used therapeutic strategy for the management of AF. National Heart Foundation of Australia investigations suggested that confusion exists among those caring for patients with this condition about the role and optimal use of ablative treatments for AF. Our aim in this consensus statement is to guide the use of primary catheter ablation for AF in Australia on the basis of current evidence. This is not a guideline, but rather general recommendations to health care providers to assist them in the care of these patients. Our intended audience is health professionals in acute and primary care, including cardiologists, general practitioners and nurses.

The National Heart Foundation of Australia convened an expert working group to evaluate the evidence and provide guidance. Members of the expert working group performed relevant literature searches, limited to evidence from human studies published in English. This was complemented by reference lists from reviews and personal collections from the expert committee. Due to the limited evidence in this area, these consensus recommendations are largely based on expert opinion, and will likely evolve as the evidence base informing the practice of AF ablation grows. As a result, only one recommendation was graded according to the National Health and Medical Research Council (NHMRC) guidelines (Box).[5] We consulted the Board of the Cardiac Society of Australia and New Zealand (CSANZ) and the CSANZ Electrophysiology and Pacing Council during the development of this document, and the CSANZ has endorsed the content.

Summary

- Atrial fibrillation (AF) is estimated to affect 1%–2% of the population. It is increasing in prevalence and is associated with excess mortality, considerable morbidity and hospitalisations. AF is responsible for a significant and growing societal financial burden.
- Catheter ablation is an increasingly used therapeutic strategy for the management of AF; however, some confusion exists among those caring for patients with this condition about the role and optimal use of ablative treatments for AF.
- Our aim in this consensus statement is to provide recommendations on the use of primary catheter ablation for AF in Australia, on the basis of current evidence.
- Our consensus is that the primary indication for catheter ablation of AF is the presence of symptomatic AF that is refractory or intolerant to at least one Class 1 or Class 3 antiarrhythmic medication.
- In selecting patients for catheter ablation of AF, consideration should be given to the patient's age, duration of AF, left atrial size and the presence of significant structural heart disease. Best results are obtained in younger patients with paroxysmal AF, no structural heart disease and smaller atria.
- Ablation techniques for patients with persistent AF are still undergoing evaluation.
- Discontinuation of warfarin or equivalent therapies is not considered a sole indication for this procedure.
- After AF ablation, anticoagulation therapy is generally recommended for all patients for at least 1–3 months. Discontinuation of warfarin or equivalent therapies after ablation is generally not recommended in patients who have a $CHADS_2$ score (congestive heart failure, hypertension, age $\geq$ 75 years, diabetes, 1 point each; prior stroke or transient ischaemic attack, 2 points) of $\geq$ 2.

Rationale for catheter ablation of AF

Currently the primary justification for catheter ablation of AF is that of symptom control leading to improvement in quality of life.[1,6] Symptoms of AF can include palpitations, breathlessness, fatigue, light-headedness, presyncope and impaired exercise tolerance. A number of scoring systems have been developed to standardise assessment of symptom severity.[1] In addition, there exist several as yet unproven reasons to perform AF ablation, including decreased stroke risk, decreased heart failure risk and

improved survival.[6] However, there is insufficient evidence for AF ablation to be recommended for these indications at this time.

Indications and patient selection

The primary indication for catheter ablation of AF is the presence of symptomatic AF that is refractory or intolerant to at least one Class 1 or Class 3 antiarrhythmic medication.[6] However, it is recognised that in some highly select clinical situations, it may be appropriate to perform catheter ablation of AF as a first-line therapy. In some symptomatic patients who have heart failure and/or reduced ejection fraction, ablation of AF is also appropriate.[6] It should be acknowledged that catheter ablation of AF is a technically demanding procedure that may result in complications. Patients should only undergo catheter ablation of AF after careful assessment of the benefits and risks of the procedure.

In selecting patients for catheter ablation of AF, consideration should be given to the patient's age, duration of AF, left atrial size and the presence of significant structural heart disease.[1] The best results from AF ablation have been reported in younger patients with paroxysmal AF and without significant structural heart disease or marked atrial enlargement.

Asymptomatic patients

In clinical practice, many patients with AF may be asymptomatic but seek catheter ablation as an alternative to long-term anticoagulation medication. Although retrospective studies have shown that discontinuation of warfarin therapy after catheter ablation may be safe over medium-term follow-up in some subsets of patients, there is insufficient evidence to recommend AF ablation for this indication.[7,8] It is recognised that recurrence of symptomatic or asymptomatic AF may be found during long-term follow-up after ablation.[6] For these reasons, discontinuation of warfarin or equivalent therapies is not a primary ablation indication.

Techniques and end points

The pulmonary veins are the dominant source of triggers initiating AF.[9] In addition, in most patients with paroxysmal AF, these structures are responsible for the maintenance of AF. As such, pulmonary vein ablation forms the cornerstone for AF ablation.[10] Complete electrical isolation of these structures is considered essential. This strategy is sufficient for the vast majority of patients with paroxysmal AF. However, in patients with persistent AF, pulmonary vein isolation alone may not be sufficient.[11]

Several other ablation strategies may be used in patients with persistent AF, but their utility is still the subject of ongoing evaluation.[11] These include various forms of substrate modification using either linear ablation (joining anatomical structures) or electrogram-based strategies (with a view to potentially identifying sources maintaining AF). Regardless of the approach, there is an emphasis on achieving complete lesions with electrophysiologically proven end points.

In the sequence of the ablation, if a focal trigger is identified outside a pulmonary vein at the time of an AF ablation procedure, it should be targeted.[6]

Finally, if a patient has a history of typical atrial flutter, ablation of the cavotricuspid isthmus is recommended.[6]

Technologies

The goal of AF ablation is to produce myocardial lesions that bring about complete pulmonary vein isolation, or that modify the arrhythmogenic substrate responsible for re-entry.[6] The success of the procedure is dependent on reliably achieving lesions that include the full thickness of the atrial myocardium.

The primary technique used at most AF ablation centres is that of radiofrequency energy delivered via an irrigated ablation catheter.[6] In addition, three-dimensional catheter location systems, which may reduce x-ray use and facilitate the ablation procedure,[12] are used in many laboratories. The latter tool, while useful, is not an essential component of the procedure.

A variety of alternative energy sources for ablation have been evaluated. The main alternative available in Australia is cryoablation. The reported results with this technique have been variable.

Remote navigation has been under evaluation for some time.[6] The concept is extremely appealing for the operator because it reduces radiation exposure and allows these often lengthy procedures to be performed while seated. Technologies developed to meet these objectives include magnetic navigation systems or robotic controlled catheter systems. As yet, there are no randomised multicentre studies that have compared these technologies with manual catheter manipulation, and their true role in AF ablation remains uncertain.

Achieving full-thickness, complete and permanent lesions remains challenging, despite significant technological advances. As a result, a repeat procedure may be required in approximately one-third of patients.

When clinically indicated, AF ablation can also be performed as part of an open cardiac surgery procedure such as mitral valve surgery.[1] Minimally invasive surgical approaches for ablation of AF are under ongoing evaluation.

Prevention of thromboembolism

Careful attention to anticoagulation of patients before, during and after AF ablation is critical to prevent thromboembolism.[6] Ablation causes substantial damage to the endothelium, which may result in a nidus for thrombus formation. Atrial myocardial function may be impaired for several weeks after the reversion of AF. For these reasons, patients undergoing ablation require anticoagulation therapy during and after the procedure.

In general, we recommend adhering to the anticoagulation guidelines that pertain to cardioversion of AF in patients who present for AF ablation. In patients with a $CHADS_2$ (congestive heart failure, hypertension, age ≥ 75

National Heart Foundation of Australia recommendations on catheter ablation therapy for atrial fibrillation (AF) and levels of evidence and grades for recommendations*

1 The primary indication for catheter ablation of AF is the presence of symptomatic AF that is refractory or intolerant to at least one Class 1 or Class 3 antiarrhythmic medication. **(Level I, grade A*)**

2 In selecting patients for catheter ablation of AF, consideration should be given to the patient's age, duration of AF, left atrial size and the presence of significant structural heart disease. Best results are obtained in younger patients with paroxysmal AF and without structural heart disease or marked atrial enlargement. **(Consensus†)**

3 Discontinuation of warfarin or equivalent therapies is not considered a sole indication for this procedure. **(Consensus†)**

4 After ablation of AF, anticoagulation therapy is generally recommended for all patients for at least 1–3 months. Discontinuation of warfarin or equivalent therapies after ablation is generally not recommended in patients who have a $CHADS_2$ score of ⩾ 2. **(Consensus†)**

* Levels of evidence and grades for recommendations as defined by the National Health and Medical Research Council (NHMRC)) in *NHMRC levels of evidence and grades for recommendations for developers of clinical practice guidelines*.[5]
† Due to the limited number of randomised clinical trials in this area, these consensus recommendations are largely based on expert opinion, and will likely evolve as the evidence base informing the practice of AF ablation grows. As a result, only one recommendation was graded according to NHMRC guidelines. ◆

years, diabetes, 1 point each; prior stroke or transient ischaemic attack, 2 points) score of ⩾ 2 and/or persistent AF, anticoagulation therapy is recommended for at least 3 weeks before ablation.[13]

In addition, TOE (transoesophageal echocardiography) examination to exclude the presence of left atrial thrombus is considered mandatory in patients with persistent AF who are undergoing ablation.[1,13] Indeed, many centres undertake TOE in all patients undergoing AF ablation.

After AF ablation, anticoagulation therapy is generally recommended for all patients for at least 1–3 months. Discontinuation of warfarin or equivalent therapies after ablation is generally not recommended in patients who have a $CHADS_2$ score of ⩾ 2.[1,6,13] The CHA_2DS_2-VASc score (congestive heart failure, hypertension, 1 point each; age ⩾ 75 years, 2 points; diabetes, 1 point; prior stroke or transient ischaemic attack, 2 points; vascular disease, age 65–74 years, sex category [female], 1 point each) has been proposed as an alternative to the $CHADS_2$ score in an attempt to identify a truly low-risk group with minimal risk of thromboembolic events.[1]

Antiarrhythmic drugs and recurrences

Antiarrhythmic drugs are often used in the first months after ablation.[6,13] Early recurrences within the first 1–3 months after ablation are quite common and frequently represent proarrhythmia resulting from the inflammation caused by the procedure. These early recurrences do not necessarily predict later recurrences. Approximately one-third of patients will have a recurrence necessitating a repeat procedure.[14] There is a consensus that repeat ablation procedures should, however, be delayed for a minimum of 3 months, as early arrhythmias may settle spontaneously.[6,13]

Finally, there is evidence that conditions associated with an abnormal substrate, such as hypertension, sleep apnoea and obesity, are associated with later recurrence of arrhythmia.[5] There is emerging evidence that treating these modifiable risk factors in the general population reduces the frequency of AF.[1] Therefore, attention should be given to modifiable risk factors in patients undergoing ablation.

Success of ablation

A number of prospective randomised studies have compared radiofrequency ablation with antiarrhythmic drugs.[15-18] These studies consistently show a highly significant increase in freedom from AF in the ablation arm, with success rates of 70%–80%. Most of these studies included follow-up of around 12 months and were conducted in a younger group of patients with paroxysmal AF and without advanced structural heart disease. Ablation techniques and their role in patients with persistent AF are under ongoing evaluation.[11] Ablation for patients with long-lasting persistent AF (at least 12 months of continuous AF) has been less successful.

Clinical assessment and monitoring is routinely performed after an AF ablation procedure.[1,6] Follow-up should include clinical evaluation every 3 to 6 months with a 24-hour Holter monitor, and further evaluation using Holter, event or electrocardiograhic monitoring if symptoms arise. In a research protocol, more extensive monitoring would be required, including evaluation every 3 to 6 months with 7-day Holter monitors, 30-day event recorders and, more recently, implanted loop recorders.

Long-term outcomes

Recent studies at several centres have reported the long-term outcomes of AF ablation with variable results. Most of these studies provide data from mixed cohorts on the duration of AF, the degree of structural heart disease and the type of procedure performed. In addition, in most cases, the data represent the early experience of the centres. Overall, 5-year success rates ranged from 63% to 82%.[19-21]

Importantly, studies that have reported long-term follow-up in patients with paroxysmal AF and with a structurally normal heart show that most patients who are arrhythmia-free 1 year after ablation remain arrhythmia-free at 5 years after ablation.[19]

Complications

Several factors may contribute to the development of complications in AF ablation. Important contributors include a variety of patient factors related to the extent of structural heart disease, procedural factors, and physician and centre experience. In experienced centres, the risk of a major complication is < 1%–2%.[22] These serious complications include femoral vascular complications (such as large haematoma), thromboembolic events, tamponade, valvular injury, pulmonary vein stenosis, phrenic or gastric nerve injury, and atrio-oesophageal fistula (often fatal).

Conclusions

The expert consensus is that ablation of AF is an increasingly used strategy, predominantly in symptomatic

patients. Pulmonary vein isolation remains the cornerstone of the strategy employed. The best results are obtained in patients with paroxysmal AF, no structural heart disease and smaller atria.

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