

Prompt diagnosis of AF lowers risk of complications

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FIGURE 1
AliveCor recording
showing atrial
fibrillation



ATRIAL FIBRILLATION (AF) IS THE MOST COMMON SUSTAINED HEART RHYTHM DISTURBANCE.

It results from chaotic electrical activation of the top chambers of the heart, with a consequent loss of normal atrial contractility and an irregular and often fast ventricular rate.

The presentation of AF ranges from an unexpected finding in an individual with complete absence of symptoms (in up to one in three cases), through non-specific symptoms of lethargy and fatigue, to obvious and distressing palpitations and haemodynamic compromise. The lack of an organised atrial contraction during AF can also result in significantly reduced blood flow

in the left atrium and activation of clotting factors, which in turn may lead to formation of a thrombus which can subsequently become dislodged. Patients with AF have a five-fold increased risk of ischaemic stroke, transient ischaemic attack or systemic embolism.

Estimates suggest an AF prevalence of 2% in adults with an exponential relationship with increasing age.¹ Although a large minority of AF sufferers may have no obvious associated comorbidities, there is a strong relationship with hypertension, heart failure, coronary artery disease (CAD), valvular heart disease, obesity, diabetes mellitus, chronic obstructive pulmonary disease, obstructive sleep

How should AF be diagnosed?

How should patients be assessed?

What are the management strategies?

apnoea, chronic kidney disease and lifestyle factors such as increased alcohol intake, strenuous physical exercise and smoking.²

AF is associated with a 1.5-2 fold increased risk of death,^{3,4} and is responsible for 20-30% of all strokes.^{5,6} A recent meta-analysis has also documented an increased risk of cardiovascular disease and renal disease in patients with AF.⁷ White matter lesions in the brain, cognitive impairment, reduced quality of life, and depressed mood are also common in AF patients. Between 10 and 40% of AF patients are hospitalised each year.⁸

A new version of the European Society of Cardiology (ESC) guidelines has just been published to meet the »

growing demand for effective care of patients with AF.⁹ Following on from the clinical guideline CG180,¹⁰ NICE has also recently published a quality standard (QS93)¹¹ where six main high priority areas for AF management are identified in order to reduce morbidity, mortality and acute admissions while improving quality of life, see table 1, below.

DIAGNOSIS

As emphasised in the recent ESC guidelines, early diagnosis of AF is the only way to prevent complications such as stroke. GPs have a fundamental role in detecting AF and subsequently delivering appropriate care.

Opportunistic screening for silent AF is cost effective and therefore recommended in patients at risk, such as those 65 and over with hypertension, diabetes or a history of stroke. It can be performed using simple pulse palpation followed by ECG if an irregularity is detected. The Arrhythmia Alliance 'Know Your Pulse' campaign promotes routine pulse checks in GP surgeries and during flu clinics. Many new blood

pressure monitors e.g. WatchBP Home¹² can simultaneously detect pulse irregularity and display an AF icon.

In patients with intermittent palpitations suggestive of AF, prolonged ECG monitoring, ideally with 7-28 day event monitors, can be used to increase the likelihood of diagnosis. The type of monitor should be based on the frequency of symptoms e.g. a 24-hour monitor should only be used if symptoms occur every day. In patients with implanted defibrillators or pacemakers with an atrial lead, the atrial rhythm can be monitored continuously with an early diagnosis of atrial high rate episodes and/or AF.

New technologies, such as smartphone cases with ECG electrodes and smart watches, are now available. Despite not being formally evaluated against an established arrhythmia detection method, they seem to represent a practical and cost-effective way for correlation of symptoms with ECG and early AF detection.

A NICE Medtech innovation briefing has recently become available on the

AliveCor Kardia technology for detection of AF to provide objective information on this new diagnostic tool.¹³ Recorders are relatively inexpensive and allow an engaged patient to take ownership of the investigation and management of their condition, see figure 1, p11.

MANAGEMENT

Once the diagnosis of AF has been made, a comprehensive assessment and initial management of the patient should be undertaken at the point of first medical contact. The patient should be given advice on lifestyle and risk factor management and key information to facilitate shared decision making. Referral to secondary care should be undertaken if treatment fails to control symptoms or ventricular rate, or if more specialised management is needed, for example in the case of difficult decisions regarding the balance of risks and benefits of anticoagulation. GPs and specialists should work together as part of a multidisciplinary AF team. Assessment should include

Table 1

NICE (QS93). Quality Improvement statements on atrial fibrillation¹¹

Statement	Authors' comments
1 Adults with non-valvular atrial fibrillation and a CHA ₂ DS ₂ -VASc stroke risk score ≥ 2 are offered anticoagulation	Even those with a score of 1 should have the risks and benefits discussed as ESC guidelines encourage treatment in this group. Written protocols required Valvular AF describes those with rheumatic mitral valve stenosis and metallic heart valve replacements. All such patients should be prescribed warfarin
2 Adults with atrial fibrillation are not prescribed aspirin as monotherapy for stroke prevention	Aspirin does not prevent AF-related strokes. In patients with stable, chronic coronary disease (no stent or acute coronary syndrome in past 12 months) aspirin can be stopped if warfarin, apixaban or rivaroxaban started
3 Adults with atrial fibrillation who are prescribed anticoagulation discuss the options with their healthcare professional at least once a year	Patients on NOACs need renal function monitoring. It is important to check time in the therapeutic range for warfarin patients and compliance with those on NOACs
4 Adults with atrial fibrillation taking a vitamin K antagonist who have poor anticoagulation control have their anticoagulation reassessed	NOACs are increasingly becoming the anticoagulant of choice. They are superior to warfarin, particularly if < 65% of INRs are within the desired therapeutic range, with both a lower incidence of ischaemic stroke and intracranial haemorrhage. Other markers of poor control include: 2 INR values > 5, 1 INR value > 8 or 2 INR values < 1.5 within the past 6 months
5 Adults with atrial fibrillation whose treatment fails to control their symptoms are referred for specialised management within 4 weeks	Primarily aimed at alleviating symptoms and avoiding tachycardia cardiomyopathy and heart failure in susceptible individuals
6 Adults with atrial fibrillation on long-term vitamin K antagonist therapy are supported to self-manage with a coagulometer	Enabling patients to self-manage their coagulation using a coagulometer can help to optimise their treatment. As well as reducing the frequency of hospital or clinic visits, it can improve outcomes such as risk of stroke and bleeding. May be less relevant with increasing uptake of NOACs

physical examination (blood pressure measurement, cardiovascular examination for valvular heart disease or heart failure and lung examination for signs of lung disease or pulmonary oedema), blood tests, including urea and electrolytes, liver function tests, full blood count, blood glucose and thyroid function tests.

The following five aspects should be considered:

Haemodynamic instability or severe symptoms

Signs of haemodynamic instability or severe symptoms (unstable angina, evolving TIA or stroke, heart failure or severe bradycardia) should be promptly identified and lead to urgent referral of the patient to specialist care.

Precipitating factors

Precipitating factors (e.g. thyrotoxicosis, sepsis, pneumonia or postoperative AF) and underlying cardiovascular conditions should be identified. Transthoracic echocardiography is often used to investigate underlying causes and guide management. It is recommended if a rhythm control strategy is contemplated, when there is suspicion of underlying heart disease (heart murmur, abnormal ECG or symptoms), to guide anticoagulation risk stratification or in patient groups where AF is less common, e.g. in the younger patient. It may not be required in asymptomatic individuals in whom anticoagulation is mandated for other reasons.

As understanding of the pathophysiology of AF and the number of known aetiologies has increased together with improvements in the ability to image and diagnose heart disease, any underlying concealed or manifest heart disease can be identified in most cases of AF, with progressive reduction in the number of cases that could be defined as lone AF. For this reason, the new ESC guidelines recommend avoiding using this term.

Stroke and bleeding risks

The patient's stroke and bleeding risks and their need for anticoagulation should be defined. The CHA₂DS₂-VASc score, see table 2, above right, is recommended to assess stroke risk. Oral anticoagulation (OAC) should be offered to patients with a CHA₂DS₂-VASc score ≥ 2 , and considered for men with a score of 1 and women with a score of 2, balancing the expected stroke reduction, bleeding risk, and patient preference.

Importantly, age > 65 conveys a

relatively high and continuously increasing stroke risk that also potentiates other risk factors (such as heart failure and male gender), while female gender does not appear to increase stroke risk in the absence of other stroke risk factors.

The risk of severe bleeding with warfarin should be assessed using the HAS-BLED score, see table 3, below. A score ≥ 3 indicates that caution is required when starting anticoagulant therapy, however a high bleeding risk score or a perceived high risk of bleeding (cognitive dysfunction, frequent falls, frailty) should generally not result in withholding OAC as a net benefit from OAC often persists. Ideally, bleeding risk factors should be identified and treatable factors corrected.

OAC should be used in all patients with increased stroke risk as it can prevent up to two-thirds of ischaemic strokes in AF patients and can reduce mortality by a quarter.^{14,15}

The need for regular monitoring and dose adjustments with warfarin, and the potential for multiple food and drug interactions, results in suboptimal time in the therapeutic range and a high rate of non-compliance and treatment cessation. A range of non-vitamin K oral anticoagulants (NOACs)¹⁶⁻¹⁹ have been approved for use in non-valvular AF, see table 4, p14. Edoxaban is the most recent NOAC to be approved by NICE.¹⁹

The NOACs do not require regular

monitoring as their anticoagulant effect is predictable. As their excretion is affected by renal function, dose adjustment is required in cases of renal failure. The only NOAC with an available antidote is dabigatran, although antidotes to the other NOACs are under development. The lack of antidote has not been shown to be detrimental and a number of studies have shown that following severe bleeds patients on NOACs have better outcomes than those on warfarin.²⁰

Deciding between warfarin and the different NOACs is a complex process that should take into account not only >>

Table 2

CHA₂DS₂-VASc score

Risk factors	Score
Congestive heart failure/ LV dysfunction	1
Hypertension	1
Age ≥ 75 years	2
Diabetes mellitus	1
Stroke/TIA	2
Vascular disease (prior MI, PAD, aortic plaque)	1
Age 65-74 years	1
Sex category (female gender)	1
Maximum	9

Table 3

HAS-BLED score

Risk factors	Score	Modifiable?
Uncontrolled Hypertension	1	Modifiable
Abnormal renal and/or abnormal liver function	1	Potentially modifiable (except in the case of dialysis-dependent renal failure or kidney transplant) Potentially modifiable (except in the case of cirrhotic liver disease)
Stroke	1	Non-modifiable
Bleeding tendency or predisposition	1	- Genetic: Non-modifiable - Anaemia: Potentially modifiable - Reduced platelet count/function: Potentially modifiable - Malignancy: Non-modifiable - History of previous bleeding: Non-modifiable - Vascular malformations: Potentially modifiable
Labile INR	1	Modifiable
Elderly (age > 65 years)	1	Non-modifiable
Drugs (concomitant aspirin or NSAID) and/or alcohol (>8 drinks/week)	1	Modifiable
Total	9	

Table 4**Head-to-head comparison of available anticoagulant drugs**

	Warfarin	Dabigatran	Rivaroxaban	Apixaban	Edoxaban
Target	Vitamin K-dependent clotting factors (II, VII, IX, X)	Thrombin	Factor Xa	Factor Xa	Factor Xa
Dose	Variable	- 150 mg bd - 110 mg bd (age 80 or older, on verapamil, HAS-BLED ≥ 3 , CrCl 30-49 ml/min)	- 20 mg od - 15 mg od (HAS-BLED ≥ 3 , CrCl 30-49 ml/min)	- 5 mg bd - 2.5 mg bd (age 80 or older, CrCl ≥ 1.5 mg/dl, weight ≤ 60 kg)	- 60 mg od - 30 mg od (CrCl 15-50 ml/min, weight ≤ 60 kg, on verapamil, quinidine, dronedarone)
Blood tests	Required	Not required	Not required	Not required	Not required
Antagonist	IV vitamin K (takes 8 hrs to have effect) IV Beriplex/Octaplex (very expensive)	Idarucizumab	Not available	Not available	Not available
Drug interactions	Cimetidine, fibrates, propafenone, amiodarone, tramadol, NSAIDs, many classes of antibiotics, azole antifungals, carbamazepine, levothyroxine	Amiodarone, dronedarone, verapamil, ketoconazole, itraconazole, voriconazole, quinidine, clarithromycin, rifampicin, carbamazepine, phenytoin, St John's wort	Quinidine, ketoconazole, itraconazole, ritonavir, clarithromycin, rifampicin, carbamazepine, phenytoin, St John's wort	Diltiazem, ketoconazole, itraconazole, ritonavir, clarithromycin, rifampicin, carbamazepine, phenytoin, St John's wort	Dronedarone, quinidine or verapamil, erythromycin, azithromycin, clarithromycin, ketoconazole, itraconazole, rifampicin, carbamazepine, St John's wort
Food interactions	Green leafy vegetables, liver, cranberry juice, grapefruit juice, garlic, asparagus, alcohol	- No interaction with food - Should be taken with a full glass of water while sitting upright - Take with food to minimise dyspepsia	To be taken with food	No interaction with food	No interaction with food
Adverse reactions	Major bleeding, skin rashes, jaundice, fever, purple toe syndrome, warfarin necrosis, osteoporosis	Major bleeding, dyspepsia, nausea, upper abdominal pain, diarrhoea, gastritis, hypersensitivity reaction	Major bleeding, abdominal pain, dyspepsia, toothache, fatigue, back pain, hypersensitivity, angioedema, Stevens-Johnson syndrome, cholestasis/jaundice	Major bleeding, drug hypersensitivity, nausea, transaminitis, ocular haemorrhage, gingival bleeding	Major bleeding, headache, fever, nausea, vomiting, confusion
NICE indications		Nonvalvular AF with 1 or more risk factors - previous stroke or TIA - LVEF $< 40\%$ - NYHA class \geq II - age 75 or older - age 65 or older with one of the following (diabetes, CAD, hypertension) ¹⁶	Nonvalvular AF with 1 or more risk factors - congestive heart failure - hypertension - age 75 or older - diabetes mellitus - prior stroke or TIA ¹⁷	Nonvalvular AF with 1 or more risk factors - prior stroke or TIA - age 75 or older - hypertension - diabetes, - symptomatic heart failure ¹⁸	Nonvalvular AF with 1 or more risk factors - congestive heart failure - hypertension - age 75 or older - diabetes mellitus - prior stroke or TIA ¹⁹
When to choose	- Mechanical valves/valvular AF - Breast feeding - Active significant bleeding/bleeding diathesis - CrCl < 30 ml/min - Patient preference	- High risk of ischaemic stroke and low bleeding risk - HAS-BLED ≥ 3 (110 mg bd) - Patient preference	- Renal impairment - GI upset/disorders - CAD/prior MI or high risk - Previous stroke - Single dose - Patient preference	- Previous GI bleeding or high risk - GI upset/disorders - Previous stroke - HAS-BLED ≥ 3 - Patient preference	Previous GI bleeding or high risk - GI upset/disorders - Previous stroke - HAS-BLED ≥ 3 - Patient preference
When to avoid	Unstable INR because of drug or food/alcohol interactions	- CrCl < 30 ml/min - Hepatic impairment or liver enzymes > 2 x upper limit of normal	- CrCl < 30 ml/min - Hepatic disease	- CrCl < 30 ml/min - Severe hepatic impairment	- CrCl < 15 ml/min

the patient's age and comorbidities, but also NICE guidance based on trial entry criteria, patient preference and compliance. The new 2016 ESC guidelines recommend NOACs as the first-line anticoagulant in eligible patients because they prevent strokes as effectively or slightly better than warfarin and are associated with less intracranial bleeding and fewer deaths. Warfarin still remains a valid treatment for stroke prevention in AF and should be the first choice in patients ineligible for NOACs, such as those with mechanical heart valves, or who are intolerant.

Aspirin is not an option for thromboembolic stroke prevention in AF. It is not as effective as anticoagulants at preventing stroke. In the very old it has a similar rate of bleeding as warfarin. In patients with high stroke risk and contraindications to anticoagulation due to high risk of bleeding.

NHS England is currently evaluating percutaneous left atrial appendage occlusion.²¹ This approach has recently

been demonstrated in randomised controlled trials and large registries to be as effective as warfarin at lowering the risk of stroke but does not increase bleeding risk.

Rate control

The heart rate in AF should be promptly evaluated and a rate control strategy should be adopted in the first instance.

Rate control is an integral part of AF management to prevent tachycardia cardiomyopathy in persistent AF and it may be sufficient to improve AF-related symptoms. It should be adopted as a first-line strategy, aiming for a target resting heart rate of <100 bpm.

Standard beta blockers e.g. bisoprolol, or the calcium antagonists verapamil or diltiazem are equally effective as initial monotherapy, while digoxin is useful only in combination with other drugs. Calcium antagonists should be avoided in patients with left ventricular dysfunction.

Catheter ablation of the atrioventricular node to create complete heart block

combined with insertion of a permanent pacemaker is a final resource in cases of poor ventricular control in the elderly.

Rhythm control

Symptoms should be reassessed after the achievement of rate control to evaluate the need for rhythm control.

The Modified EHRA symptoms score, see table 5, below, is now recommended to describe symptom severity. A score of 2b or higher might identify patients benefiting from a rhythm control strategy.

A rhythm control strategy should be strongly considered when symptoms persist despite good rate control, especially for newly diagnosed AF and in the case of a reversible cause. Rhythm control strives to restore and maintain sinus rhythm, preserving atrial contractility as well as a normal heart rate.

The options for rhythm control include electrical cardioversion if the AF is persistent, plus antiarrhythmic drugs and catheter ablation. External or internal electrical cardioversion can acutely restore sinus rhythm in 90-95% of patients.

If AF has been continuous for 48 hours or more, a minimum of three weeks of therapeutic anticoagulation is required before cardioversion can be safely performed. Unfortunately, only 20-30% of patients are still in sinus rhythm one year after cardioversion. This percentage can be increased by catheter ablation and/or addition of a long-term antiarrhythmic drug.

Antiarrhythmic drugs for long-term rhythm control include standard beta blockers (e.g. bisoprolol), flecainide, propafenone, amiodarone, sotalol or dronedarone, see table 6, below. »

Table 5

Modified EHRA symptoms score

Modified EHRA score	Symptoms	Description
1	None	AF does not cause any symptoms
2a	Mild	Normal daily activity not affected by symptoms related to AF
2b	Moderate	Normal daily activity not affected by symptoms related to AF, but patient troubled by symptoms
3	Severe	Normal daily activity affected by symptoms related to AF
4	Disabling	Normal daily activity discontinued

Table 6

Antiarrhythmic drugs

Antiarrhythmic drug	Suitable for the following groups	Avoid in the following groups	Side effects
Sotalol (minimum dose 80 mg bd)	Hypertension, previous ischaemic heart disease	Severe lung disease or heart failure	Lethargy, fatigue, bradycardia, wheeze
Flecainide (50-150 mg bd)	Patients intolerant of beta-blockers, structurally normal heart	Ischaemic heart disease, structural heart disease, Brugada syndrome, atrial flutter	Headache, paraesthesia, visual disturbances
Dronedarone (400 mg bd)	Hypertension, age >70, diabetes, previous stroke/TIA, LA diameter > 50 mm, LVEF 35-40%	Persistent AF, LVEF < 35%, moderate to severe heart failure	GI disturbances. Need to monitor liver function
Amiodarone (200 mg od)	Heart failure, structural heart disease	Younger patients, liver disease thyroid disease, outdoor workers	Photosensitivity (common), thyroid dysfunction, liver toxicity, pulmonary toxicity, corneal deposits, peripheral neuropathy (all rare)

key points

SELECTED BY

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Atrial fibrillation (AF) is the most common sustained heart rhythm disturbance. Estimates suggest an AF prevalence as high as 2% in adults with an exponential relationship with increasing age. There are strong relationships with hypertension, heart failure, coronary artery disease (CAD), valvular heart disease, obesity, diabetes mellitus, COPD, obstructive sleep apnoea, chronic kidney disease and lifestyle factors such as increased alcohol intake, strenuous physical exercise and smoking. AF is associated with a 1.5-2 fold increased risk of death, and is responsible for 20-30% of all strokes.

Assessment should include physical examination (blood pressure measurement, cardiovascular examination to look for valvular heart disease or heart failure and lung examination looking for signs of lung disease or pulmonary oedema), blood tests, including urea and electrolytes, liver function tests, full blood count, blood glucose and thyroid function tests. Signs of haemodynamic instability or severe symptoms (unstable angina, evolving TIA or stroke, heart failure or severe bradycardia) should be promptly identified and lead to urgent referral of the patient to specialist care.

The CHA₂DS₂-VASc risk stratification score is recommended to assess stroke risk in patients with AF. Oral anticoagulation should be offered to patients with a CHA₂DS₂-VASc score ≥ 2 , and considered for men with a score of 1 and women with a score of 2. Risk of severe bleeding with warfarin should also be assessed using the HAS-BLED score.

Oral anticoagulation should be used in all patients with increased stroke risk because it can prevent the majority of ischaemic strokes in AF patients (up to two-thirds) and can reduce mortality by one quarter. Making the choice between warfarin and the different NOACs is a complex process that should take into account not only the patient's age and comorbidities, but also NICE guidance based on trial entry criteria, patient preference and compliance. Aspirin is not an option for thromboembolic stroke prevention in AF. It is not as effective as anticoagulants at preventing stroke, and in the very old has a similar rate of intracranial bleeding as warfarin.

Rate control is an integral part of the management of AF to prevent tachycardia cardiomyopathy in persistent AF and it may be sufficient to improve AF-related symptoms. It should be adopted as a first-line strategy, aiming for a target resting heart rate of < 100 bpm. A rhythm control strategy should be strongly considered when symptoms persist despite good rate control, especially for newly diagnosed AF and in the case of a reversible cause. Options for rhythm control include electrical cardioversion if the AF is persistent, plus antiarrhythmic drugs and catheter ablation. Only 20-30% of patients are still in sinus rhythm one year after cardioversion.

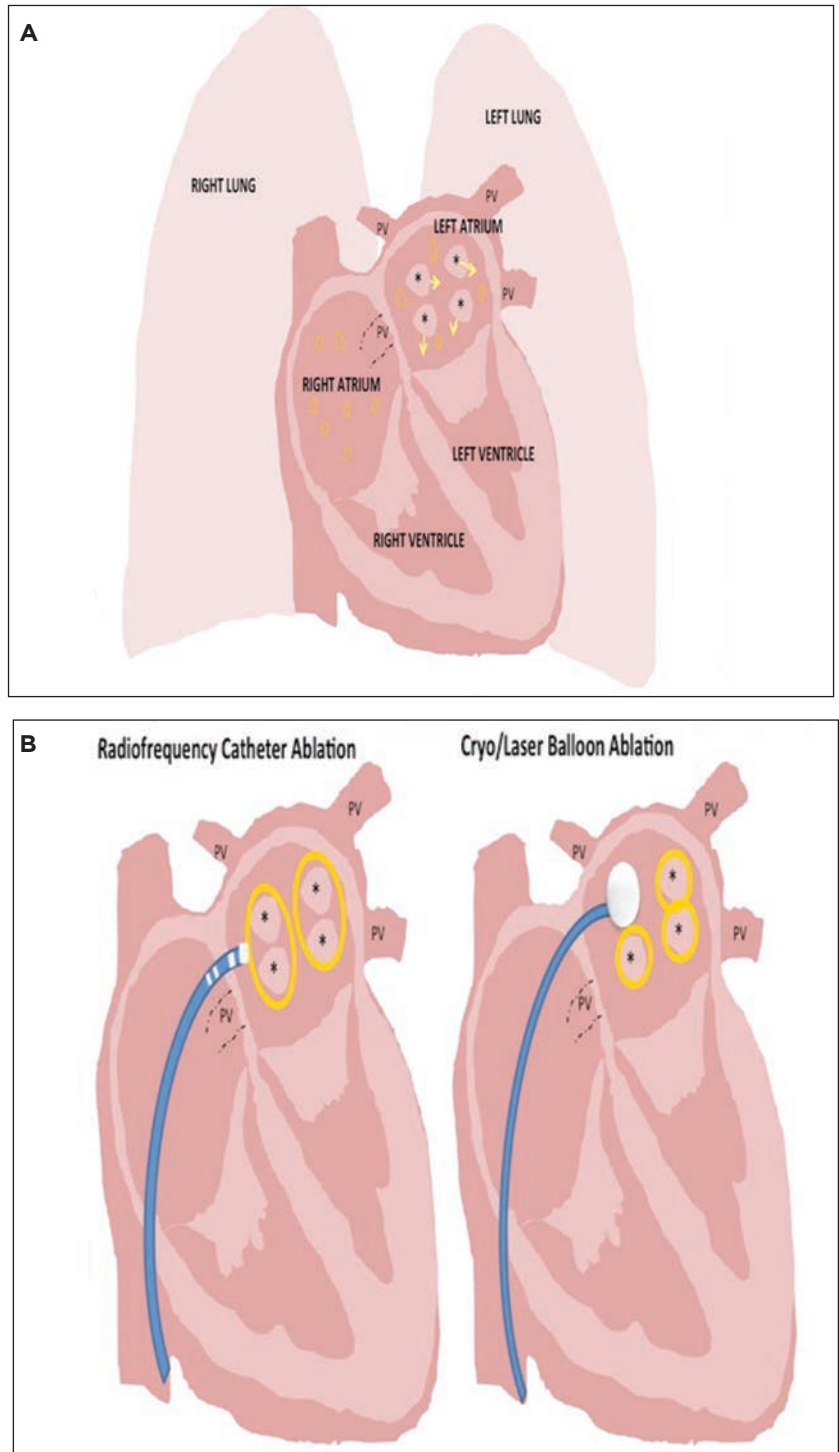


FIGURE 2
A Mechanisms of atrial fibrillation (AF). Abnormal electrical activity (yellow arrows) from any of the pulmonary veins can cause AF (abnormal and chaotic heart rhythm that occurs in the atria)
B Principles of catheter ablation for AF. Full thickness lesions at the junction between the pulmonary veins and the left atrium (yellow lines) can isolate electrically the pulmonary veins thus preventing AF. This can be achieved through radiofrequency energy delivery around the left and the right pulmonary veins ostia in pairs (left image) or through cryo energy or laser energy delivery²⁴ with balloon positioned at the entrance of each vein (right image)

PV = Pulmonary vein; * = Pulmonary vein ostia

Flecainide can also be used as a 'pill in the pocket strategy' (a single 200-300 mg dose taken at the onset of the attack) in patients with infrequent, long-lasting episodes of AF, and no left ventricular dysfunction or valvular or ischaemic heart disease. Unfortunately, most drugs merely reduce the frequency of AF rather than eliminate it entirely and are commonly accompanied by limiting side effects.

Catheter ablation is an invasive rhythm control strategy performed through femoral vein needle punctures. It aims to isolate the pulmonary veins from the left atrium electrically, see figure 2, opposite. The veins are often the source of ectopics that act as electrical triggers, initiating and perpetuating AF. Catheter ablation is indicated in highly symptomatic patients with paroxysmal or persistent AF in whom drug therapy has failed and a rhythm control strategy is preferred. Current techniques have a 90% success rate for paroxysmal AF and a 70-80% success rate for persistent AF but this is often only achieved after multiple procedures.^{22,23} There is a small but real risk of serious complications, such as tamponade, stroke, vascular complications and death, even in the hands of experienced clinicians.

CONCLUSION

AF is a very common condition associated with an increased risk of morbidity and mortality. Prompt diagnosis and management is fundamental to prevent complications, particularly stroke, and alleviate symptoms.

Opportunistic screening for silent AF is recommended in at-risk patients. In addition to prolonged ECG monitoring, new technologies such as smartphone cases with ECG electrodes and smart watches can increase the likelihood of diagnosis in patients with paroxysmal palpitations.

Rate control and anticoagulation, with rhythm control in symptomatically limited patients, are cornerstones of AF management. A variety of anticoagulants are now available for stroke prevention. Catheter ablation and/or medications are feasible options for rhythm control.

The patient should have a central role in their care process and be given appropriate information to facilitate shared decision making. Care should be integrated, with close and continuous interaction between GPs and specialists working as a multidisciplinary team.

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Useful information

Atrial Fibrillation Association
www.atrialfibrillation.org.uk

NICE

A decision aid for patients with atrial fibrillation is available from the website <http://guidance.nice.org.uk/CG180/PatientDecisionAid/pdf/English>

Arrhythmia Alliance

www.arrythmiaalliance.org.uk

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