Atrial Fibrillation Research Review™

Making Education Easy

Issue 46 - 2020

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Abbreviations used in this issue:

AF = atrial fibrillation; **BMI** = body mass index; **CV** = cardiovascular; **EF** = ejection fraction; **HR** = hazard ratio; **ICD** = implantable cardioverter defibrillator; **ICH** = intracranial haemorrhage; **LA/LAA** = left atrial (appendage); **LV** = left ventricular; **NOAC** = nonvitamin K antagonist oral anticoagulant; **OR** = odds ratio; **PVI** = pulmonary vein isolation.

Welcome to issue 46 of Atrial Fibrillation Research Review.

This issue begins with research from Australia investigating whether atrial transit time is prolonged in patients with paroxysmal AF during sinus rhythm, consistent with underlying atrial stasis. Another team of Australian researchers have evaluated the cost effectiveness of combined catheter ablation and LAA closure, versus catheter ablation and standard oral anticoagulation, in patients with symptomatic AF.

With the importance of early AF detection in elderly patients increasing due to its increasing prevalence, another study selected for this issue, from the UK, offers hope that clinical pharmacists in primary care using a single-lead ECG were able to detect additional cases in elderly patients attending for influenza vaccinations. On a similar note, a portable AF screening device was also shown to be useful for detecting cases of AF among primary care patients referred for echocardiography.

I hope you enjoy this update in AF research, and I look forward to your comments and feedback.

Kind Regards,

Dr Andrei Catanchin

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Measuring atrial stasis during sinus rhythm in patients with paroxysmal atrial fibrillation using 4 dimensional flow imaging

Authors: Costello BT et al.

Summary: These researchers used 4-dimensional flow imaging to determine if atrial transit time was prolonged in 91 patients with paroxysmal AF in sinus rhythm and 18 healthy sex-matched controls. They calculated residence time distributions of velocity fields by seeding virtual 'particles' at the right upper pulmonary vein, and then counting them as they left the mitral valve. Atrial stasis was expressed as RTD_{TC}, the derived constant of the residence time of particles in the left atrium, based on heartbeats. Compared with controls, patients with paroxysmal AF had higher RTD_{TC} values, indicative of greater atrial stasis (1.68 vs. 1.51 beats [p=0.005]), and patients with paroxysmal AF with CHA_2DS_2VASc scores ≥2 had greater atrial stasis with a greater median RDT_{TC} (1.72 vs. 1.52 [p=0.03]). Only female gender and LVEF were significant contributors to atrial RTD_{TC} (respective p values 0.006 and 0.023).

Comment: We know the higher stroke risk in AF patients applies even when in sinus rhythm, and there is often no clear temporal relationship between AF episodes and stroke/transient ischaemic attack events with anticoagulation decisions based on the CHA_2DS_2VASc score rather than AF burden or timing.

Reference: Int J Cardiol 2020;315:45–50
Abstract

Efficacy of antibacterial envelope in prevention of cardiovascular implantable electronic device infections in high-risk patients

Authors: Ullah W et al.

Summary: This was a systematic review and meta-analysis of six studies comparing patients with antibacterial enveloped (n=5844) versus conventional (n=6053) implanted CV electronic devices. Compared with the conventional devices, implantation of the antibacterial enveloped devices was associated with a lower likelihood of acquiring a major device infection (OR 0.34 [95% CI 0.13–0.86]); a propensity matched analysis revealed a consistent finding (0.29 [0.10–0.82]), as did stratified analyses according to retrospective versus prospective studies and follow-up durations of 6 vs. >6 months. A lower likelihood of mortality with antibacterial enveloped versus conventional devices did not achieve statistical significance (OR 0.55 [95% CI 0.16–1.91]).

Comment: While not strictly AF-related, this literature review supports the use of the antibacterial envelope for device insertion. Costs need to be considered before routine use is recommended, but there do not appear to be any related adverse events.

Reference: Int J Cardiol 2020;315:51–6
Abstract

Integrated management of atrial fibrillation in primary care

Authors: van den Dries CJ et al.

Summary: Fifteen primary-care practices in the Netherlands were assigned to integrated care for AF (n=527) and 11 to usual care (n=713) in the randomised, open-label, pragmatic noninferiority ALL-IN trial; integrated care consisted of: i) quarterly AF check-ups by trained primary care nurses, focusing on possible interfering comorbidities; ii) anticoagulation therapy monitoring in primary care; and iii) easy access to cardiologist consultations and anticoagulation clinics. Compared with usual care, the integrated care intervention significantly reduced the 2-year all-cause mortality rate (primary endpoint; 3.5 vs 6.7 per 100 patient-years; adjusted HR 0.55 [95% CI 0.37–0.82]) and the 2-year non-CV-related mortality rate (adjusted HR 0.47 [0.27–0.82]), with no significant between-group difference for other adverse events.

Comment: The benefits of an 'AF clinic' approach go well beyond AF management, and in fact here the anticoagulation, ischaemic stroke and major bleeding were very similar between the two groups. And yet we see almost halving of all-cause mortality with an intervention that even in COVID times may be effectively delivered by phone. I'd strongly recommend reading the full paper (free online).

Reference: Eur Heart J 2020;41:2836–44
Abstract

Rhythm control for patients with atrial fibrillation complicated with heart failure in the contemporary era of catheter ablation

Authors: Chen S et al.

Summary: A stratified pooled analysis of randomised data from 11 studies was undertaken to assess the efficacy and safety of antiarrhythmic drugs versus rate control (n=2486) or rhythm control using catheter ablation versus medical therapy (n=1112) for AF complicated by heart failure, with focus on hard clinical endpoints. No significant difference was seen between rhythm control with antiarrhythmics and medical rate control for all-cause mortality (OR 0.96 [p=0.65]) or stroke/thromboembolic events (0.91 [p=0.76]), but rhythm control with antiarrhythmics was associated with a significantly higher rate of rehospitalisation (1.25 [p=0.01]); however, compared with medical therapy, rhythm control via catheter ablation was associated with lower risks of death from any cause (0.51 [p=0.0003]), rehospitalisation (0.44 [p=0.003]) and arrhythmia recurrence (0.04 [p<0.00001]), no significant difference for stroke events (0.59 [p=0.27]), and greater improvements in LVEF (weighted mean difference, 6.8% [p=0.0004]) and quality of life (p=0.007).

Comment: Although a pooled analysis, these important results are highly compelling and strongly support catheter ablation for AF management in these complex patients. In this paper, antiarrhythmic drugs (e.g. amiodarone) were no more effective than simple rate control therapy but led to more re-admissions.

Reference: Eur Heart J 2020;41:2863–73
Abstract

Cost-effectiveness of combined catheter ablation and left atrial appendage closure for symptomatic atrial fibrillation in patients with high stroke and bleeding risk

Authors: Kawakami H et al.

Summary: These Australian researchers used a Markov model to assess the cost effectiveness of combined catheter ablation with LAA closure versus catheter ablation followed by standard oral anticoagulation for symptomatic AF. The base-case used a 10-year time horizon for a hypothetical cohort of 10,000 patients aged 65 years with symptomatic AF, a CHA_2DS_2VASc score of 3 and a HAS-BLED score of 3. The respective total costs for the LAA closure and oral anticoagulation strategies were (US)$29,027 and $27,896, with the LAA closure strategy associated with 122 fewer disabling strokes and 203 fewer ICHs per 10,000 patients than the oral anticoagulation strategy, and an incremental cost-effectiveness ratio for the LAA closure strategy of $11,072 per quality-adjusted life-year. Although cost effectiveness was highly dependent on ICH risk with the LAA closure strategy and the cost of the combined procedure in sensitivity analyses, LAA closure remained superior to the oral anticoagulation strategy under most circumstances. Scenario analyses revealed that combined catheter ablation and LAA closure was more cost effective in patients with higher stroke risk.

Comment: While this combined approach may be attractive, it's important to remember we don't yet have firm equivalence or superiority data for LAA closure versus continued NOAC therapy, and LA thrombus can originate from outside the appendage (and indeed from the closure device itself).

Reference: Am Heart J; Published online Aug 19, 2020
Abstract

Non-vitamin K antagonist oral anticoagulants in very elderly East Asians with atrial fibrillation

Authors: Kwon S et al.

Summary: This nationwide population-based study reported on the effectiveness and safety of NOACs (n=20,573) versus warfarin (n=4086) for Korean patients aged ≥80 years with AF; the two groups were balanced using inverse probability of treatment weighting. Compared with warfarin, NOAC use was associated with lower risks of ischaemic stroke (HR 0.739 [95% CI 0.617–0.892]) and a composite outcome of ischaemic stroke, major bleeding (including ICH) and gastrointestinal bleeding (0.783 [0.685–0.899]); there were also nonsignificant lower risks of gastrointestinal bleeding and major bleeding when assessed separately, whereas the ICH risk was similar. Apixaban and edoxaban were the NOACs associated with the greatest benefit for the composite outcome. Ischaemic stroke and the composite outcome were the only clinical outcomes for which a significant interaction was seen for age subgroups (80–89 years and ≥90 years, respective p values for interactions, 0.097 and 0.040).

Comment: Traditionally, this patient age group is poorly represented in large-scale trials and is at the highest risk of both ischaemic stroke and bleeding, even more so in the East Asian population where low dose NOACs are generally used. This study suggests NOACs are the preferred alternative in this population, in line with current AF guidelines for other age groups.

Reference: Am Heart J 2020;229;81–91
Abstract

Opportunistic screening for atrial fibrillation by clinical pharmacists in UK general practice during the influenza vaccination season

Authors: Savickas V et al.

Summary: This cross-sectional study assessed the feasibility of clinical pharmacists based in UK GP practices to screen for AF using digital technology and pulse palpation in individuals aged >65 years attending for influenza vaccination during the 2017–2018 and 2018–2019 seasons. Among 604 individuals screened, the AF prevalence was 4.3%. All those with AF qualified for anticoagulation, 57% were male and they were more likely to be older, have an increased BMI and have a CHA_2DS_2VASc score ≥3. The respective sensitivity and specificity values for the clinical pharmacists diagnosing AF using pulse palpation were 76.9% and 92.2%, and the respective values using single-lead ECG were 88.5% and 97.2%. Four individuals were diagnosed with new AF at follow-up and three were started on anticoagulation. Single-lead ECG screening also helped detect other CV diagnoses, including LV hypertrophy, in 28 individuals. The screening strategy was deemed to be cost effective, and participant feedback was generally positive.

Comment: Influenza vaccination is free and strongly recommended in >65-year-old patients in Australia, even more so in the current SARS-CoV-2 climate, and the Kardia device is widely available, affordable and provides good quality ECG traces with generally accurate interpretation. This might serve as an ideal opportunity for AF screening in our society.

Reference: PLoS Med 2020;17:e1003197
Abstract

Independent commentary by Dr Andrei Catanchin, a cardiologist/electrophysiologist specialising in the management of AF and other arrhythmias at Epworth HealthCare in Melbourne. He performs catheter ablation, implants pacemakers and ICDs (defibrillators) and his research interests include alternatives to warfarin (e.g. NOACs) in AF management. Dr Catanchin is a Senior Lecturer with the University of Melbourne, teaches at all levels and regularly presents at local and national meetings.

Atrial fibrillation detection with a portable device during cardiovascular screening in primary care

Authors: Diamantino AC et al.

Summary: The performance of an AF screening device, which has a light indicator for rhythm irregularities and single-lead ECG, was evaluated in 1518 patients from primary care who had been referred for echocardiography. The participants held the device for 1 minute, and 12-lead ECG was performed for all patients positive for AF along with 250 who were negative. Complete echocardiograms were obtained for all high-risk patients and a sample of low-risk patients; intermediate-risk patients also initially underwent screening echocardiography with a complete study performed if an abnormality was suspected. The AF screening device returned a positive result for 6.4% of the participants, with 12.6% being high risk, 6.1% intermediate risk and 2.2% low risk, and a higher positivity rate in participants aged >65 vs. <65 years (9.3% vs. 4.8% [p=0.001]). An independent association was seen between AF screening device positivity and heart disease on echocardiography (OR 3.9 [95% CI 2.1–7.2]). Based on 12-lead ECG results, the respective sensitivity and specificity values for the AF screening device to detect AF were 90.2% and 84.0%.

Comment: Here we have another very quick and simple yet sophisticated and accurate device with potential utility in large-scale AF screening of at-risk patients presenting for another reason (e.g. while waiting for echocardiography).

Reference: Heart 2020;106:1261–6
Abstract

Cryoballoon ablation in patients with paroxysmal atrial fibrillation

Authors: Perego GB et al., on behalf of ClinicalService 1STOP project investigators

Summary: Acute procedural results and 1-year recurrence rates were reported for patients with paroxysmal AF who had undergone a single cryoballoon PVI procedure at Italian cardiology centres, comparing patients with (n=282) versus without (n=1170) structural heart disease. Compared with patients without structural heart disease, those with structural heart disease were older (mean age 62.9 vs 58.2 years [p<0.001]), were more likely to be male (79.1% vs. 69.8% [p<0.002]), were more likely to have a CHA_2DS_2VASc score ≥2 (63.4% vs. 40.2% [p<0.001]), had higher BMI (27.7 vs. 26.4 kg/m^2 [p<0.001]), had greater atrial diameter (43.8 vs. 40.2mm [p<0.001]) and had a lower LVEF (57.2 vs. 60.7% [p<0.001]). Nearly three-quarters of patients (73%) were receiving a class Ic or III antiarrhythmic drug at the time of ablation. There was no significant difference between the patients with versus without structural heart disease for procedure time (106.9 vs. 112.1 min [p=0.248]), fluoroscopic time (28.7 vs. 28.6 min [p=0.819]), complication rate (3.9% vs. 4.8% [p=0.525]) or freedom from symptom recurrence over 13.4 ±12.8 months of follow-up (78.0% vs. 78.4% [p=0.895]), but those with structural heart disease had a higher acute success rate (98.9% vs. 97.7% [p=0.016]). Recurrence rate was not related to LVEF or LA size. Among patients with structural heart disease, there was a decrease in the proportion receiving class Ic or III antiarrhythmic drugs from 70.7% pre-ablation to 28.7% after cryoballoon PVI (p=0.001).

Comment: The 78% 'success rate' at 12 months was seen in both groups (i.e. structural heart disease versus none) suggesting the important point is these were all paroxysmal AF patients (as opposed to persistent AF with more severe atrial substrate disease); the degree of comorbidity and structural heart disease was also relatively modest. Longer-term follow-up of both groups would be very interesting looking for progression.

Reference: Heart Lung Circ 2020;29:1078–86
Abstract

Pulsed field ablation in patients with persistent atrial fibrillation

Authors: Reddy VY et al.

Summary: Twenty-five patients with persistent AF underwent biphasic, bipolar pulsed-field ablation using a multispline catheter for PVI (96 pulmonary veins) and LA posterior wall ablation (24 patients) under intracardiac echocardiographic guidance in the single-arm PersAFOne study. The acute success rates for both procedures were 100% with the multispline pulsed-field ablation catheter alone. Acute cavotricuspid isthmus block was achieved using the focal pulsed-field ablation catheter in 13/13 patients. The median total procedure time was 125 minutes, including a median of 28 minutes for voltage mapping, with a median of 16 minutes for fluoroscopy. No postprocedural mucosal lesions or pulmonary vein narrowing was seen. Durable isolation (defined by entrance block) was evident in 96% of pulmonary veins and in 100% of LA posterior walls treated with the pentaspline catheter. Three patients had localised scar regression of the LA posterior wall ablation, albeit without conduction breakthrough.

Comment: This very exciting ablation modality made headlines owing to its very high tissue selectivity (i.e. transmural and effective atrial ablation without 'collateral damage' (e.g. oesophagus, phrenic nerve), rapidity and high efficacy for PVI. Here the authors extended the ablation beyond PVI, including more extensive substrate modification in persistent AF with similar results.

Reference: J Am Coll Cardiol 2020;76:1068–80
Abstract

Randomized trial comparing the effectiveness of internal (through implantable cardioverter defibrillator) versus external cardioversion of atrial fibrillation

Authors: Elayi CS et al.

Summary: Consecutive patients with a single-coil ICD who presented with symptomatic AF of <1 year duration (45.2% with nonischaemic cardiomyopathies, mean EF 28.6% and 45.2% with biventricular ICDs) were randomised to maximum energy internal shock via their ICD (n=16) or an external direct current cardioversion at 200J using transcutaneous pads (n=15); crossover was permitted in the event success was not achieved with the first shock. Compared with the external cardioversion group, a significantly smaller proportion of the internal cardioversion group achieved conversion to sinus rhythm after a single shock (primary endpoint; 31.3% vs. 93.3% [p<0.001]), with all first failures achieving successful subsequent external cardioversion.

Comment: Although it may seem more attractive, simpler, more direct, possibly safer and theoretically more effective to use the implanted ICD lead and generator to cardiovert AF, in fact the reverse is true here. External pads can be positioned to deliver energy to the (likely enlarged) atria more directly; the anteroposterior orientation is recommended. Note these were all single coil leads (a lead with a superior vena cava coil and vectors programmed appropriately may have yielded different results).

Reference: J Interv Card Electrophysiol 2020;58:261–7
Abstract

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