Cardiology Practice Review™

Making Education Easy

Issue 29 - 2023

In this issue:

Abbreviations used in this issue:

ACC = American College of Cardiology;
ACRA = Australian Cardiovascular Health and Rehabilitation Association;
AF = atrial fibrillation; **APN** = advanced practitioner nurse;
BiVP = biventricular pacing; **CPP** = cardiac physiologic pacing;
CRT = cardiac resynchronisation therapy;
CSANZ = Cardiac Society of Australia and New Zealand;
CVD = cardiovascular disease; **DALYs** = disability-adjusted life years;
ESC = European Society of Cardiology; **FDR** = false discovery rate;
HF = heart failure; **HRS** = Heart Rhythm Society;
LBBAP = left bundle branch area pacing; **MBS** = Medicare Benefits Schedule;
PAH = pulmonary arterial hypertension; **PVR** = pulmonary valve replacement;
rTOF = repaired tetralogy of Fallot; **SCD** = sudden cardiac death;
SGLT = sodium-glucose cotransporter-2; **VT** = ventricular tachycardia.

Welcome to the 29th issue of Cardiology Practice Review.

This Review covers news and issues relevant to clinical practice in cardiology. It will bring you the latest updates, both locally and from around the globe, in relation to topics such as new and updated treatment guidelines, changes to medicines reimbursement and licensing, educational, professional body news and more. Finally, on the back cover you will find our COVID-19 resources for Cardiologists and a summary of upcoming local and international educational opportunities including workshops, webinars, and conferences.

We hope you enjoy this Research Review publication and look forward to hearing your comments and feedback.

Kind Regards,

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Clinical Practice

A dual-chamber leadless pacemaker

Single-chamber ventricular leadless pacemakers do not support atrial pacing or consistent atrioventricular synchrony. A dual-chamber leadless pacemaker system consisting of two devices implanted percutaneously, one in the right atrium and one in the right ventricle, would make leadless pacemaker therapy a treatment option for a wider range of indications. A recent prospective, multicentre, single-group study assessed the safety and performance of a dual-chamber leadless pacemaker system. Patients with a conventional indication for dual-chamber pacing were eligible for participation.

Out of 300 patients, 98.3% had successful implantation with established communication between the pacemakers. A total of 90.3% of patients met the primary safety endpoint, freedom from complications (i.e., device- or procedure-related serious adverse events) at 90 days, exceeding the goal of 78% ($p<0.001$). The first primary performance endpoint, involving a combination of adequate atrial capture threshold and sensing amplitude at 3 months, was met by 90.2% of patients. This exceeded the performance goal of 82.5% ($p<0.001$), indicating the system's ability to provide reliable pacing in the atrial chamber. Furthermore, the second primary performance endpoint, which evaluated achieving at least 70% atrioventricular synchrony while the patient was sitting, was met by an impressive 97.3% of patients. This result significantly surpassed the performance goal of 83% ($p<0.001$), highlighting the system's effectiveness in maintaining synchrony between the atrial and ventricular chambers.

During the study, a total of 35 device- or procedure-related serious adverse events occurred in 29 patients. However, considering the high percentage of successful outcomes and the fact that none of the patients with a P-wave amplitude of less than 1.0 mV required device revision for inadequate sensing, the overall performance of the dual-chamber leadless pacemaker system was promising. Overall, these findings indicate that the dual-chamber leadless pacemaker system provides reliable atrial pacing and synchrony for at least three months after implantation.

https://tinyurl.com/3apwsukf

Improved outcomes after pulmonary valve replacement in repaired tetralogy of Fallot

The impact pulmonary valve replacement (PVR) on major adverse clinical outcomes in patients with repaired tetralogy of Fallot (rTOF) is not well understood. A recent observational cohort study aimed to investigate whether PVR improved survival and freedom from sustained ventricular tachycardia (VT) in individuals with rTOF.

Using data from patients enrolled in the International Multicentre TOF Registry, a PVR propensity score was created to account for baseline differences between patients who had received PVR and those who had not. The primary outcome of interest was the time it took for the earliest occurrence of death or sustained VT. The study included a matched cohort where PVR and non-PVR patients were paired 1:1 based on their PVR propensity score, and analyses were conducted in the full cohort with propensity score adjustments.

A total of 1,143 patients with rTOF were included in the study. On average, patients were 27 ± 14 years, with a mean follow-up of 8.3 ± 5.2 years. A total of 47% of patients had undergone a PVR. Death or sustained VT occurred in 82 patients. After adjusting for confounding factors, the hazard ratio for the primary outcome in the matched cohort (n = 524) indicated a significantly lower risk for PVR patients compared with those without PVR (p=0.010). Similar results were observed in the full cohort analysis. Subgroup analysis revealed potential benefits of PVR in patients with advanced right ventricular dilatation, particularly those with a higher right ventricular end-systolic volume index (>80 mL/m^2). For this subgroup, PVR was associated with a lower risk of the primary outcome (p<0.001). However, no significant association was found between PVR and the primary outcome in patients with a right ventricular end-systolic volume index ≤80 mL/m^2 (p=0.70).

Overall, this is the first study to demonstrate a survival benefit for PVR in patients with rTOF. Although the findings highlight potential benefits of PVR in improving clinical outcomes for individuals with rTOF, further research is warranted to validate these findings and guide clinical decision-making in this patient population.

https://tinyurl.com/yc7e47t7

Left bundle branch area pacing versus biventricular pacing as initial strategy for cardiac resynchronisation

Left bundle branch area pacing (LBBAP) is gaining recognition as an alternative to biventricular pacing (BiVp) for cardiac resynchronisation therapy (CRT). A recent prospective, multicentre study aimed to compare the outcomes of LBBAP and BiVp as initial implant strategies for CRT. The primary efficacy outcome focused on a composite of heart failure (HF)-related hospitalisation and all-cause mortality, while primary safety outcomes assessed acute and long-term complications. Secondary outcomes included postprocedural functional class, electrocardiographic, and echocardiographic parameters.

A total of 371 patients were included, with a median follow-up of 340 days. LBBAP showed superior outcomes compared with BiVp as it led a lower occurrence of HF-related hospitalisation and all-cause mortality (p=0.021). This difference was driven by a reduction in HF-related hospitalisations (p=0.021). There were no significant differences in all-cause mortality (p=0.19) or long-term complications (p=0.146). LBBAP was associated with shorter procedural and fluoroscopy times (p<0.001), a shorter QRS duration (p<0.001), and higher postprocedural left ventricular ejection fraction (p=0.041) compared with BiVp.

The findings from this study supports LBBAP as an initial CRT strategy, showing a lower risk of HF-related hospitalisations compared with BiVp. LBBAP offers the advantages of reduced procedure times, shorter QRS duration, and improved left ventricular ejection fraction. These findings contribute to the growing understanding of optimal CRT approaches, enabling health care professionals to make informed decisions for better patient outcomes.

https://tinyurl.com/54uwsszw

SGLT2 inhibitors reduce sudden cardiac death risk in heart failure

Several randomised controlled trials have consistently shown that sodium-glucose cotransporter-2 (SGLT2) inhibitors have a positive effect on reducing the risk of cardiovascular death (CVD) or hospitalisations due to HF. However, the impact of SGLT2 inhibitors on the risk of sudden cardiac death (SCD) in patients with HF remains uncertain. A recent meta-analysis aimed to provide further insight by assessing relevant data from clinical trials published up until August 28, 2022.

The inclusion criteria for trials were as follows: (1) assessed patients with clinical HF, (2) compared SGLT2 inhibitors with a placebo, (3) all patients were also administered conventional medical therapy, and (4) reporting of outcomes related to interest, such as SCD, ventricular arrhythmias, and atrial arrhythmias. Among the eleven trials meeting the selection criteria, seven trials reported data on SCD. The analysis included a total of 10,796 patients who received SGLT2 inhibitors and 10,796 patients who received a placebo. The results revealed a significant reduction in the risk of SCD among patients treated with SGLT2 inhibitors (p=0.03). However, without dedicated rhythm monitoring, no significant differences were observed in the incidence of sustained ventricular arrhythmias not associated with SCD (p=0.77) or atrial arrhythmias (p=0.31) between patients receiving SGLT2 inhibitors and those receiving a placebo.

The findings suggest that SGLT2 inhibitor therapy is associated with a reduced risk of SCD in patients with HF who are receiving contemporary medical therapy. However, further prospective trials will be important to ascertain the long-term impact of SGLT2 inhibitors on the occurrence of atrial and ventricular arrhythmias.

https://tinyurl.com/ycku28pk

Gut microbiome and atrial fibrillation

The potential relationship between the gut microbiome and CVD risk factors has been demonstrated. However, the association between the gut microbial profile and the risk of atrial fibrillation (AF), a significant heart rhythm disorder prevalent among aging populations, remains largely unknown. To investigate this association, researchers conducted a comprehensive population-based study using data from the FINRISK 2002 study. The study examined a random sample of 6,763 individuals to assess the associations between prevalent and incident AF and the composition of the gut microbiota. To validate their findings, the researchers replicated the study using an independent case-control cohort of 138 individuals in Hamburg, Germany.

Through multivariable-adjusted regression models, the researchers discovered that prevalent AF (116 cases) showed associations with nine microbial genera. Similarly, incident AF (539 cases) over a median follow-up period of 15 years exhibited associations with eight microbial genera, with statistically significant results corrected for false discovery rate (FDR) at p<0.05. Notably, both prevalent and incident AF were consistently associated with the genera *Enorma* and *Bifidobacterium* (FDR-corrected p<0.001). However, no significant associations were found between AF and bacterial diversity measures.

To validate their initial findings, the researchers conducted Cox regression analyses on an independent AF case-control cohort used for replication. The results indicated that 75% of the top genera identified (including *Enorma, Paraprevotella, Odoribacter, Collinsella, Barnesiella*, and *Alistipes*) consistently exhibited a shifted abundance in the same direction. This finding further strengthens the association between the distinct gut microbial genera and prevalent, prospective AF.

These findings lay the foundation for the potential use of microbiome profiles to predict the risk of AF. Understanding the intricate relationship between the gut microbiome and AF risk holds promising implications for personalised health care. However, it is important to note that further extensive research is necessary before microbiome sequencing can be effectively utilised for mitigating AF and optimising patient care.

https://tinyurl.com/mpdsybnb

Nurse-led care after ablation of atrial fibrillation

A recent study aimed to explore the impact of advanced practitioner nurse (APN)-led care on patients who underwent AF ablation. A total of 65 enrolled patients who underwent AF ablation were randomly assigned to either the usual care group or the intervention group. The intervention group received additional care, including an educational session, three consultations over six months, and telephone accessibility coordinated by the APN. The primary focus was on the AF recurrence rate at the six-month follow-up. Secondary outcomes examined lifestyle factors (such as alcohol intake, exercise, body mass index, and smoking), patient satisfaction, and AF knowledge at one and six months.

After one month, although the study demographics were similar between the two groups, patients in the intervention group demonstrated higher knowledge about AF compared with the usual care group. At the six-month mark, AF recurrence was significantly lower in the intervention group (13.5% vs. 39.4% recurrence rate; p=0.014). Further, patient satisfaction and AF knowledge were also significantly higher in the intervention group compared with the usual care group (p<0.001). Within the intervention group, patients experienced positive lifestyle changes. Alcohol intake significantly decreased (p=0.031), while physical activity levels significantly increased (p=0.048). Conversely, no significant changes occurred within the usual care group. Multivariable-adjusted analysis revealed that assignment to the intervention group was the only protective factor against AF recurrence (p=0.04).

This study demonstrates that integrating APN-led care into post-AF ablation management yields substantial benefits. Patients receiving this additional care experienced improved clinical outcomes, higher satisfaction levels, increased physical activity, and reduced alcohol intake. The findings emphasise the importance of considering APNs as valuable members of the health care team. Their expertise and specialised care contribute to enhanced patient outcomes and overall satisfaction. Further research on the implementation of APN-led care in post-AF ablation settings can provide valuable insights into optimising patient care and improving long-term outcomes.

https://tinyurl.com/5n92zkfp

Cardiovascular disease burden attributable to non-optimal temperature

The effects of climate change are causing extreme temperatures to become more prevalent worldwide, and these temperature fluctuations have been linked to CVD. A recent study examined the trends in temperature-related CVD burden over the past three decades.

The authors explored the impact of non-optimal temperatures on CVD deaths and disability-adjusted life years (DALYs) globally using data from 1990-2019. Non-optimal temperatures were defined as temperatures exceeding the location-specific minimum-risk exposure level or the temperature associated with the lowest mortality rates. The analysis also considered sociodemographic index and world regions as stratification factors.

In 2019 alone, non-optimal temperatures were responsible for approximately 1,194,196 CVD deaths and 21,799,370 DALYs globally. Among these, low temperatures contributed to 1,104,200 CVD deaths and 19,768,986 DALYs, while high temperatures contributed to 93,095 CVD deaths and 2,098,989 DALYs. Between 1990 and 2019, CVD deaths associated with non-optimal temperatures increased by 45%, low temperature-related deaths rose by 36%, and high temperature-related deaths skyrocketed by 600%. Notably, countries with lower income levels experienced a greater increase in non-optimal temperature and high temperature-related CVD deaths compared with higher income countries.

Overall, the findings highlight the significant impact of non-optimal temperatures on global cardiovascular mortality and DALYs between 1990 and 2019. Further, individuals residing in lower socioeconomic regions are more vulnerable to the adverse effects of non-optimal temperatures on cardiovascular health. These results underscore the urgent need to address the influence of temperature on public health and implement targeted interventions to mitigate the CVD risk associated with non-optimal temperatures. Understanding the relationship between climate change, temperature variations, and cardiovascular health is crucial for health care providers and policymakers to develop effective strategies for prevention and management.

https://tinyurl.com/tzxmvth4

Regulatory News

Medicare Benefits Schedule (MBS): Cardiac items announced in federal budget

The recent Australian Federal Budget announcement outlined updates to the MBS with regards to cardiac services. Effective from November 1, 2023, four new MBS items will be introduced specifically for leadless permanent cardiac pacemakers. These items are intended for the treatment of patients with bradyarrhythmia, including those who require cardiac electrophysiological services but are unable to undergo transvenous pacemaker placement due to reasons such as an inaccessible upper extremity venous system, an increased risk of infection, or a history of venous thrombosis. The revision to incorporate the new leadless pacemaker service, will allow a cardiothoracic surgeon to be present for immediate surgical support when an interventional cardiologist performs percutaneous extraction.

Starting from March 1, 2024, new MBS items will be introduced for intravascular ultrasound-guided coronary stent insertion, and exercise electrocardiogram testing. Additionally, an amended item for complex replacement or repair of the aortic arch will facilitate separate component completion by two surgeons during complex aortic procedures and enable individual claiming for their respective contributions.

https://tinyurl.com/59cvfwdj

News in Brief

Expert consensus statement on the management of arrhythmias during pregnancy

During its 44th annual meeting, which took place in New Orleans from 19 – 21 May 2023, the Heart Rhythm Society (HRS) released a new international multidisciplinary expert consensus statement on managing cardiac arrhythmias in pregnant patients and foetuses. The consensus statement comprehensively covers various aspects including diagnosis, treatment options, and considerations for risk stratification. It also identifies knowledge gaps and suggests future research directions.

https://tinyurl.com/2p9chsuy

Guideline of cardiac physiologic pacing for the avoidance and mitigation of heart failure

Cardiac physiologic pacing (CPP), which comprises of CRT and conduction system pacing, helps prevent or alleviate HF in patients with ventricular dyssynchrony or pacing-induced cardiomyopathy. A new guideline, which was developed by the HRS in partnership with the Asia Pacific HRS and the Latin American HRS, covers CRT and CPP indications, patient selection, evaluation, implant management, follow-up, optimisation, and paediatric use. It also outlines research gaps, highlighting new directions for future research.

https://tinyurl.com/y2fnp4mr

Time and event-specific deep learning for personalised risk assessment after cardiac perfusion imaging

In a recent publication, researchers developed an explainable deep learning model for predicting time-specific risks of all-cause death, acute coronary syndrome, and revascularisation using myocardial perfusion imaging and clinical features. The model demonstrated strong performance, outperforming conventional measures, particularly in short-term prediction. Improvements gradually increased over time. This approach could help facilitate patient understanding of individualise post-scan risks and shared decision-making.

https://tinyurl.com/y2sz9mk4

COVID-19 Resources for Cardiologists

CSANZ https://tinyurl.com/y3xp2729

ACC https://tinyurl.com/y68aud3a

ESC https://tinyurl.com/wn3fsts

Conferences, Workshops, and CPD

Please click on the links below for upcoming local and international cardiology meetings, workshops, and CPD.

ACRA https://tinyurl.com/y4yj8xb5

CSANZ https://tinyurl.com/3mwt5ttr

Cardiac Skills Australia https://tinyurl.com/7hx6zmdt

Heart Foundation https://tinyurl.com/y34smdoz

Australian Centre for Heart Health https://tinyurl.com/e2yjcreu

ACC https://tinyurl.com/y2khytpz

AHA https://tinyurl.com/zajc9a7

ESC Congresses and Events https://tinyurl.com/y6ko68yf

ESC Education https://tinyurl.com/y3zkjp3o

Research Review Publications

Acute Coronary Syndrome Research Review with Professor John French

Atrial Fibrillation Research Review with Dr Andre Catanchin

Cardiology Research Review with Associate Professor John Amerena

Heart Failure Research Review with Professor John Atherton, Professor Andrew Coats, and Dr Mark Nolan

Interventional Cardiology Research Review with Conjoint Professor Craig Juergens

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