

Advances in Cardiology, Interventional Cardiology, Electrophysiology, and Structural Heart Disease: A Moving Target

Welcome to this special issue of *Annals of Translational Medicine* on the advances in cardiology, interventional cardiology, electrophysiology, and structural heart disease: a moving target.

Cardiovascular disease, listed as the underlying cause of death, accounts for nearly 801,000 deaths in the US. This translates into 1 out of every 3 deaths in the US. About 2,200 Americans die of cardiovascular disease each day, an average of 1 death every 40 seconds. Cardiovascular diseases claim more lives each year than all forms of cancer and chronic lower respiratory disease combined. About 92.1 million American adults are living with some form of cardiovascular disease or the after-effects of stroke. Coronary heart disease is the leading cause (45.1%) of deaths attributable to cardiovascular disease in the US, followed by stroke (16.5%), heart failure (8.5%), high blood pressure (9.1%), diseases of the arteries (3.2%), and other cardiovascular diseases. Heart disease accounts for 1 in 7 deaths in the US. Cardiovascular disease is the leading global cause of death, accounting for more than 17.3 million deaths per year in 2013, a number that is expected to rise to over 23.6 million by 2030. In 2013, cardiovascular deaths represented 31% of all global deaths. In 2010, the estimated global cost of cardiovascular disease was \$863 billion, and it is estimated to increase to \$1,044 billion by 2030 (1).

Transcatheter therapy of structural heart disease is advancing rapidly. Due to the less invasive approach, transcatheter techniques have replaced surgery as the standard procedure for atrial septal defect and patent foramen ovale (PFO) closure. Evolving interventional techniques allow treatment of paravalvular leaks, ventricular septal defects and valve replacement, especially the rapid evolution and newer indications for transcatheter aortic valve replacement (TAVR). Until recently, therapy for these diseases was limited to patients in whom severe comorbidities lead to contraindications to surgery. Techniques to treat heart failure and cardiogenic shock by percutaneous cardiac mechanical support devices are emerging. Multiple manuscripts of this special issue address and review current indications and recent developments in interventional treatment of structural heart disease, cardiac mechanical support devices potential complications, and current challenges (2).

(I) Coronary artery disease in rare populations and special situations:

- (i) *Asian-Indians: a review of coronary artery disease in this understudied cohort in the United States*, by Dr. Ardeshtna *et al.* Very few studies that looked at CAD risks in Asian Indians found an alarming rate of three times higher than the national average. Several studies that examined the CAD risk factors in this population showed interplay between the metabolic, genetic, environmental and social settings. Since the CAD risk in the immigrant Asian Indian population is high, strategies that reduce this risk and prolong survival should be implemented.
- (ii) *Stress-induced thrombus: role of anticoagulation in takotsubo cardiomyopathy*, by Dr. Heckle *et al.* While the occurrence of left ventricular (LV) thrombus in takotsubo cardiomyopathy is relatively high, the authors suggest that prophylactic anticoagulation until recovery may have a role in reducing the rate of LV thrombus.
- (iii) *Simultaneous acute cardio-cerebral infarction: is there a consensus for management?* By Dr. Akinseye *et al.* Acute ischemic stroke (AIS) and acute myocardial infarction (AMI) are both life-threatening medical conditions. The acute management of a simultaneous presentation of both AIS and AMI is unclear. This review paper examines the existing literature on the management of simultaneous acute cardio-cerebral infarction and highlights the existing challenges of that management.
- (iv) *Impact of family history of coronary artery disease on in-hospital clinical outcomes in ST-segment myocardial infarction (STEMI)*, by Dr. Agarwal *et al.* Using a large sample size study, the authors demonstrate that STEMI patients with family history of coronary artery disease had lower in-hospital mortality and adverse clinical events in comparison to those with no family history.
- (v) *The potential detrimental effects of calcium channel blockers' overdose and current available management*, by Dr. Agarwal *et al.* Here, the authors describe a rare and interesting fatal case of an amlodipine calcium channel blocker

overdose, which caused intractable acidosis and cardiovascular failure in a 51-year-old male.

(II) Interventional cardiology:

- (i) *Incidence and predictors of acute coronary syndrome within a year following a negative stress test—a false sense of security: is routine screening any useful?* by Dr. Pour-Ghaz *et al.* In this interesting review, the authors explore the fact that finding the optimal way for screening patients and the proper method of risk stratification could help achieve a better standardized system. Such routine could have a high specificity and sensitivity for ruling in and out acute myocardial ischemia, while reducing the burden on the healthcare system.
- (ii) *Occlusion of right coronary artery by micro emboli caused by excessive diagnostic catheter manipulation*, by Dr. Salem *et al.* In this case report, the authors present a rare complication of right coronary artery (RCA) microembolization by endothelial debris following excessive catheter manipulation due to a tortuous right brachiocephalic artery.

(III) Electrophysiology and general up-to-date cardiovascular topics:

- (i) *Double conduction through the atrioventricular node following acute medullary infarction: a case report*, by Dr. Salem *et al.* The authors present a case of an unusual pattern of cardiac arrhythmia as the first finding of lateral medullary syndrome (LMS) or Wallenberg's syndrome, caused by autonomic instability following infarction of vagus nerve nuclei in the medulla.
- (ii) *Electrocardiographic artifact potentially misleading to the wrong management*, by Dr. Sareen *et al.* This case illustrates the importance of recognizing artifact related EKG changes to prevent unnecessary treatment and hospital admissions.
- (iii) *Risks, predictors and outcomes of cardiac arrhythmias in severe sepsis*, by Dr. Shahreyar *et al.* Patients with severe sepsis are at high risk of atrial and life threatening ventricular arrhythmias. Despite the adjustment for potential confounding factors, patients hospitalized with severe sepsis carry a significantly higher risk of cardiac arrest and increased mortality.

(IV) Structural heart disease and current challenges:

- (i) *Permanent pacemaker insertion in patients with conduction abnormalities post transcatheter aortic valve replacement: a review and proposed guidelines*, by Dr. Bob-Manuel *et al.* In this manuscript, the authors discuss the fact that TAVR-related rates of conduction abnormalities are potentially higher than in surgical aortic valve replacement (SAVR). The exact indications, timing, and long-term outcomes of PPM implantation remain unclear and require a comprehensive review of current guidelines and clinical practices in this rapidly evolving area.
- (ii) *Impact of smoking in patients undergoing transcatheter aortic valve replacement*, by Dr. Agarwal *et al.* Herein, the authors explore in a very interesting study the paradox of smokers who despite having a higher cardiovascular disease burden, had better outcomes compared to non-smokers undergoing TAVR.
- (iii) *A review of racial disparities in transcatheter aortic valve replacement (TAVR): accessibility, referrals and implantation*, by Dr. Bob-Manuel *et al.* In this interesting manuscript, the authors conclude that racial disparities in TAVR implantation result from several factors, including socioeconomic disparities, inherent biases in healthcare provision, fewer referrals to specialists and language barriers in some minority populations.
- (iv) *Outcomes following transcatheter aortic valve replacement (TAVR) in patients with native aortic valve regurgitation*, by Dr. Bob-Manuel *et al.* The conclusion reached by the authors suggests that TAVR is associated with favorable pacemaker implantation and one-year mortality rates with a high 30-day mortality among selected patients with native aortic valve regurgitation.
- (v) *Access site complications in transcatheter aortic valve replacement: frequency, outcomes, prevention, and treatment*, by Dr. Bob-Manuel *et al.* In this thorough review, the authors go over access site complications that are rising with the increasing number of TAVR procedures performed. These complications can lead to increased hospitalization, cost, infections, and could eventually worsen the outcomes. In this manuscript, the authors provide a comprehensive review discussing the consequences, outcomes, frequency, predictors and some possible solutions to the complications set forth in these studies.
- (vi) *Peri-procedural antibiotic prophylaxis in ventricular septal defect: a case study to re-visit guidelines*, by Dr. Garg *et al.* The current American Heart Association/American College of Cardiology (AHA/ACC) guidelines do not recommend antibiotic prophylaxis for infective endocarditis in patients with acyanotic congenital valvular heart disease. As

recognized by the guidelines, some acyanotic congenital heart disease, such as ventricular septal defects, are associated with a high velocity jet and pose a greater risk of peri-procedural endocarditis. The authors suggest that acyanotic congenital heart disease with high velocity jet should be considered for antibiotic prophylaxis for infective endocarditis, and a possible review of the current guidelines.

- (vii) *Cerebral vascular accident and arterial embolus following a pulmonary embolus in the presence of a patent foramen ovale*, by Dr. Najib *et al.* Paradoxical embolism occurs when a venous thrombus passes through a PFO entering the arterial circulation and manifesting as an arterial embolus due to right-to-left shunting. The prevalence of PFO is estimated to be between 25–30% of the population based on an autopsy study and transesophageal echocardiogram (TEE) study. Herein, the authors describe a case of acute cerebral vascular accident (CVA) and right upper extremity arterial embolus in the setting of pulmonary embolus and PFO, where percutaneous PFO closure was opted as management.
- (V) Cardiac mechanical support and related issues:
 - (i) *Trends, predictors and outcomes of ischemic stroke and intracranial hemorrhage in patients with a left ventricular assist device*, by Dr. Shaheryar *et al.* Increasing comorbidity burden raises the risk of both ischemic stroke (IS) and intracranial hemorrhage (ICH) with LVAD significantly. In this cohort, the incidence of IS and ICH increases the mortality 4- and 18-fold, respectively. Renal disease, liver disease, and abnormal coagulation profile were independent predictors of mortality in LVAD patients with IS.
 - (ii) *Acute right ventricular failure after orthotopic liver transplantation*, by Dr. Goswami *et al.* This case highlights the complexities of patient management in the acute setting after OLT. Furthermore, it demonstrates the intricate role of careful preoperative evaluation and screening in patients undergoing workup for solid organ transplantation.
 - (iii) *When more is not better—appropriately excluding patients from mechanical circulatory support therapy*, by Dr. Nayyar *et al.* This review article was conducted to evaluate for possible prophylactic MCS in patients awaiting revascularization in high risk patients based on their coronary anatomy. A thorough review of the literature suggests that hemodynamically stable patients likely would not benefit from prophylactic placement MCS while awaiting revascularization.

In conclusion of this preface for this issue of *Annals of Translational Medicine* on “Advances in Cardiology, Interventional Cardiology, Electrophysiology, and Structural Heart Diseases: A Moving Target”, the authors are reviewing both interesting and up-to-date cardiovascular topics. There is a special emphasis on the rate of technological advances, especially in the field of cardiovascular diseases and sub-specialties, making the field grow exponentially, almost like a moving target. It seems inevitable that all physicians, and specifically cardiologists, continue to stay up-to-date and endure the race for the ever-moving target. Once again, we wish to thank the authors for their original and valuable contribution, hoping that this volume may be of substantial interest for the readership of the journal.

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References

1. Benjamin EJ, Blaha MJ, Chiuve SE. Heart Disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. *Circulation* 2017;135:e146-603.
2. Franke J, Steinberg DH, Sievert H. Interventional treatment of structural heart disease. *Minim Invasive Ther Allied Technol* 2009;18:110-21.



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