16th Annual Cardiac Physiologists Meeting

at

The Irish Cardiac Society

Friday October 9th, 2015

Program
## 16th Annual Cardiac Clinical Physiology Meeting
**Friday, 9 October 2015**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Session Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30–9.25</td>
<td>Registration</td>
<td>Opening of meeting</td>
</tr>
<tr>
<td>09.25</td>
<td></td>
<td>Remote monitoring – our experience</td>
</tr>
<tr>
<td>9.30–10.00</td>
<td>Session 1</td>
<td>Laura Deery, Cardiac Physiologist, Mater University Hospital, Dublin</td>
</tr>
<tr>
<td>10.00–10.30</td>
<td></td>
<td>Ajmaline testing and risk factor stratification in SCD</td>
</tr>
<tr>
<td>10.30–11.00</td>
<td>Coffee and trade stands</td>
<td></td>
</tr>
<tr>
<td>11.00–11.30</td>
<td>Session 2</td>
<td>Infective endocarditis – an overview</td>
</tr>
<tr>
<td>11.30–12.00</td>
<td></td>
<td>Constrictive restrictive cardiac disease</td>
</tr>
<tr>
<td>12.00–12.45</td>
<td>Cardiology Bursary Award</td>
<td>Lunch and trade stands</td>
</tr>
<tr>
<td>12.45–14.00</td>
<td></td>
<td>Setting up a physiologist led loop recorder implanting service</td>
</tr>
<tr>
<td>14.00–14.30</td>
<td></td>
<td>Cara Mercer, Senior Cardiac Physiologist, Grantham Hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supported by an unrestricted educational grant from Medtronic</td>
</tr>
<tr>
<td>14.30–15.00</td>
<td></td>
<td>Transoesophageal echocardiography</td>
</tr>
<tr>
<td>15.00–15.30</td>
<td></td>
<td>Dr David Moore, Consultant Cardiologist, AMNCH, Tallaght</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOE simulator session</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Put the previous talk into practice. Get your hands on the TOE probe and experience getting the views with this state of the art simulator</td>
</tr>
</tbody>
</table>
Evidence-based expansion of indications for cardiac implantable electronic devices (CIEDs) has led to a dramatic increase in the number of implants in the last decade. This translates into an ever-increasing burden of follow-up for device clinics.

In the recent The Lumos-T Safely Reduces Routine Office Device Follow-Up (TRUST) trial, only 6.6% of the scheduled 3-monthly checks were actionable, and a recent European study reported that 78% of the scheduled implantable cardioverter-defibrillator (ICD) follow-up visits did not involve reprogramming or medication change. The intermittent nature of in-person CIED follow-up also means that clinically important patient or device events may remain undetected for a considerable time between interrogations.

In contrast, remote interrogation evaluation monitoring provides full device interrogation, monitoring for arrhythmias, and CIED performance surveillance from the patient’s home. Recent trials have demonstrated that this can be achieved safely in a representative ICD population, with a reduction in office visits accompanied by improved adherence to scheduled follow-up, earlier detection of actionable events than conventional monitoring, and reduced health-care resource utilization. Indeed, data from one platform suggested that remote monitoring (RM) conferred a 50% relative reduction in the risk of death compared with clinic follow-up. RM is increasingly being adopted as an efficient way to replace many device clinic follow-up visits. It is still important to have programming evaluation visits at least annually, as delineated in the Heart Rhythm Society and European Heart Rhythm Association consensus statement. RM certainly reduces the number of office visits, and review of RM transmissions may be faster than performing in-office follow-up. However, remote transmissions must still be reviewed by a following physician or device specialist, and where necessary, in-person follow-up, medication changes, or procedures such as generator change must be arranged. Thus, whether RM reduces the overall burden of clinic follow-up by reducing the total time required for each device follow-up is unknown. We performed a time and activity analysis of RM to determine the time spent on each transmission, the frequency of clinically actionable events detected, and how this affects the overall device clinic workflow.

Five hundred remote transmissions were received from 422 patients during the study period: 346 ICD, 84 pacemaker, and 70 implantable loop recorder (ILR) transmissions. These were received on 4 RM platforms: CareLink 56.4%, Merlin.net 21.4%, LATITUDE 17.8%, and Home Monitoring 4.4%. The
mean number of transmissions per patient during the study period was 1.2 (range 1–11). More than 1 transmission was received from 58 (14.3%) patients. Fortythree (14.1%) devices included components that were under advisory, mostly the Sprint Fidelis lead.

Processing of remote interrogation transmissions was faster than in-person programming evaluations, taking 11.5+/−7.7 and 27.7+/−9.9 minutes, respectively. Remote interrogation evaluations that revealed clinically important findings took longer to process than those that did not (21.0+/−7.4 minutes vs 10.1+/−2.1 minutes.

Of 500 transmissions, 135 (27.0%) demonstrated a total of 172 clinically important events as defined above. More than 1 event was evident in several transmissions. However, only 41 (8.2%) required physician notification as per predefined protocols. This was due to the condition already being known (such as atrial fibrillation or elective replacement indicator) in most cases. The remaining transmissions (73.0%) were nonactionable. Atrial arrhythmias were the most common event, accounting for almost half of the actionable transmissions.

Of 500 transmissions, 138 (27.6%) were unscheduled: 114 (32.9%) ICD, 22 (26.2%) pacemaker, and 2 (2.9%) ILR transmissions. Unscheduled transmissions were more likely to contain a clinically important event than scheduled transmissions (56 of 138 [41%] vs 79 of 362 [22%]; P < .0001). In addition, 29 (5.8%; 22 ICD, 5 pacemaker, and 2 ILR) transmissions were duplicate transmissions.

A total of 49.2% of the scheduled remote transmissions were missed initially owing to patient noncompliance. Telephone follow-up of patients (mean 21 patients/d) who missed scheduled remote transmissions took a mean of 55.1(range 20–98) min/d.

Remote monitoring of CIEDs on currently available platforms is faster than in-person programming interrogations; while rapid for nonactionable transmissions, those with clinically important findings have significant implications for device clinic workflow. These findings were frequent, especially for atrial fibrillation. Patient compliance in our large unselected population is suboptimal, and telephone follow-up of patients who miss transmissions consumes almost an hour per day. Improvement in patient compliance, perhaps through the use of automatic systems and mobile transmitters, is important to fulfill the promise of RM being an efficient method of CIED follow-up.

AJMALINE TESTING AND RISK STRATIFICATION IN SUDDEN CARDIAC DEATH

ROBBIE RYAN, CHIEF II CARDIAC PHYSIOLOGIST, MATER UNIVERSITY HOSPITAL, DUBLIN

There is continuing interest among scientists and clinicians in identifying clinically useful risk markers of sudden cardiac death (SCD). Although seminal trials have shown the mortality benefit of prophylactic treatment by implantable cardioverter-defibrillators (ICDs) among patients with depressed left ventricular ejection fraction (LVEF), there are some concerns about the widespread use of this strategy. The reasons for this concern are as follows:

(1) LVEF is limited by low sensitivity, because the majority of subjects who die suddenly have preserved LVEF;

(2) ICD candidates today exhibit lower rates of malignant arrhythmias and have better outcomes without an ICD than the patients included in trials 10 years ago, most likely because of improvements in non-ICD therapy;

(3) fewer than one-third of patients with a prophylactically implanted ICD device ever receive an appropriate shock from the device, and the risk of death of nonarrhythmic causes may presently outweigh the risk of death attributable to arrhythmia in these patients; and

(4) ICDs themselves may increase mortality by mechanisms that are not yet completely understood.

Numerous noninvasive methods derived from electrocardiograms (ECGs) have been proposed to risk stratify patients for SCD. Among these, Holter analysis that includes heart rate variability/turbulence has been recommended by the American Heart Association, American College of Cardiology, and Heart Rhythm Society in their scientific statement on noninvasive risk stratification. Many other ECG-derived methods, such as T-wave alternans and measures obtained from standard 12-lead ECGs, are still being clinically tested or are under development. Still, none of these ECG variables are widely used in clinical practice, mainly because of the lack of large, adequately analyzed observational trials or randomized trials using these variables as inclusion criteria.

In this issue of Heart Rhythm, Au-yeun et al. have analyzed the predictive value of many Holter-based variables of R-R interval dynamics as predictors of appropriate shocks or cardiac arrest in a subset of patients included in the Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT). On the basis of the results, the authors conclude that variables from R-R intervals correlate with the occurrence of SCD and distinguish survival among SCD-HeFT ICD patients, and that SCD prediction models should incorporate Holter-based variables to refine ICD patient selection. The study also showed that indexes based on fractal analysis of R-R interval dynamics perform somewhat better than heart rate
variability/turbulence measures in risk prediction. This observation is in line with a previous study that included patients with depressed left ventricular function.

The conclusion concerning the clinical utility of Holter variables in the selection of candidates for ICD therapy is premature and not well justified by current studies, including the one by Au-yeunget al. The authors of the SCD-HeFT study did not include other easily obtainable clinical variables or 12-lead ECG variables in their statistical analysis. Rigorous statistical analyses have not been performed in many other previous noninvasive risk stratification studies for SCD. The MADIT-II (Multicenter Automatic Defibrillator Implantation Trial II) investigators showed that a simple clinical risk score, which included New York Heart Association functional class, age, renal function, QRS duration, and atrial fibrillation, was useful in risk stratification for primary implantation of ICDs in patients with ischemic left ventricular dysfunction. A U-shaped pattern for ICD efficacy was observed, with no or little benefit from ICD therapy among those with a high or low risk score, respectively. Any noninvasive risk variable, or combination of risk markers, should show some benefit in addition to easily obtainable clinical risk markers to prove some clinical utility.

The clinical utility of non invasive tests will be assessed in an ongoing randomized trial (REFINE-ICD[Risk Estimation Following Infarction Noninvasive Evaluation ICD Efficacy]) in which post-infarction patients with an LVEF between 0.36 and 0.50, abnormal heart rate turbulence, and T-wave alternans measured more than 4 weeks after the index event will be randomized to ICD therapy versus conventional therapy. This type of trial may provide a more definitive answer.

Adapted from Where to go in risk stratification for sudden cardiac death: Are P values enough?
V.Huiikuri, Heart Rhythm, Oct 2015
Infective endocarditis has an estimated annual incidence of 3 to 9 cases per 100,000 persons in industrialized countries. The male:female case ratio is more than 2:1. The highest rates are observed among patients with prosthetic valves, intracardiac devices, unrepaired cyanotic congenital heart diseases, or a history of infective endocarditis, although 50% of cases of infective endocarditis develop in patients with no known history of valve disease. Streptococci and staphylococci account for 80% of cases of infective endocarditis, with proportions varying according to valve (native vs. prosthetic), source of infection, patient age, and coexisting conditions. Staphylococci are now the most frequently identified microorganisms in several types of infective endocarditis which results from the increased proportion of health care–associated cases of infective endocarditis. In parallel, the incidence of cases attributable to oral streptococci has decreased in industrialized countries. Cases of infective endocarditis in which a blood culture is negative (10% of cases) may reflect one of two situations: infective endocarditis in patients exposed to antibiotic agents before the diagnosis of infective endocarditis or infective endocarditis caused by fastidious microorganisms.

In the conventional model of native-valve infectious endocarditis, infection results from the colonization of damaged valvular endothelium by circulating bacteria with specific adherence properties. Endothelial damage may result from so-called jet lesions due to turbulent blood flow or may be provoked by electrodes or catheters or by repeated intravenous injections of solid particles in intravenous-drug users. Chronic inflammation, as in chronic rheumatic heart disease and degenerative valvular lesions, may also promote infective endocarditis. In contemporary population-based studies of infective endocarditis in industrialized countries, in hospital mortality ranges from 15 to 22%, and 5-year mortality is approximately 40%. However, rates vary widely across subgroups of patients. For instance, in-hospital mortality is less than 10% among patients with right-sided lesions or oral streptococcal, left-sided, native-valve lesions, whereas it is 40% or more among patients with prosthetic-valve infective endocarditis due to Staphylococcus aureus.

The diagnosis of infective endocarditis is generally based on clinical, microbiologic, and echocardiographic findings. The Duke criteria (Table 1) have sensitivity and specificity of more than 80% and are the reference criteria for diagnosis. However, they should not replace clinical judgment for diagnosis in the individual patient, especially in the first stage of care. Transthoracic echocardiography is performed first and is better than transesophageal echocardiography for detecting abscesses in the anterior aortic valve in a patient with a prosthetic valve and for assessing the
hemodynamic consequences of valvular dysfunction. Transesophageal echocardiography has higher sensitivity and specificity overall and is recommended when the results of transthoracic echocardiography are negative and there is a high clinical suspicion, poor imaging quality, and the presence of prosthetic valves or an intracardiac device, as well as in cases in which the transthoracic echocardiographic findings are suggestive of infective endocarditis but not definitive. Combined transthoracic and transesophageal echocardiography shows vegetations in 90% of cases, valve regurgitation in 60%, paravalvular abscess in 20%, and infrequently, dehiscence of the prosthesis, pseudoaneurysms, and fistulas. In cases with initially negative findings on echocardiography, repeat examination should be performed if infective endocarditis continues to be suspected. Repeat transthoracic or transesophageal echocardiography is recommended if a new complication is suspected and when therapy has been completed.

Prophylaxis to prevent infective endocarditis have been restricted to patients who have a prosthetic valve, a history of infective endocarditis, or unrepaired cyanotic congenital heart disease and who are planning to undergo an invasive dental procedure; In the United Kingdom, antibiotic prophylaxis against infective endocarditis is no longer recommended in any circumstances. To date, reports indicate no appreciable increase in the incidence of infective endocarditis due to viridans group streptococci since the guidelines were revised to recommend a restricted use of antibiotic prophylaxis. Good oral, dental, and skin hygiene are recommended to reduce risks.

Constrictive Restrictive Cardiac Disease
Dr Angie Brown, Consultant Cardiologist, Medical Director of the Irish Heart Foundation

The differentiation of restrictive cardiomyopathy from constrictive pericarditis is often challenging. Although relatively uncommon, these diseases affect a significant segment of the population. Establishing the correct diagnosis is important since these conditions carry different prognostic and therapeutic implications. While most causes of restrictive cardiomyopathy rapidly lead to intractable heart failure and death, heart failure in constrictive pericarditis can dramatically improve with pericardiectomy. The restrictive cardiomyopathies are a group of disorders that affect myocardial function by either primary myocyte dysfunction and/or by extracellular infiltration or fibrosis.

Idiopathic restrictive cardiomyopathies are often familial and associated with skeletal muscle involvement. Infiltrative disorders include primary amyloidosis, sarcoidosis, Hurler’s and Gaucher’s disease. Occasionally, tumors such as non-Hodgkin’s lymphoma and sarcomas infiltrate the myocardium leading to restriction. Hemochromatosis, Fabry’s and glycogen storage disease also may cause a restrictive cardiomyopathy. Likewise, different diseases may lead to the development of constrictive pericarditis. Idiopathic cases are still very common but much less than previously reported. Cardiac surgery, pericarditis and mediastinal radiation are equally represented among the most common known causes in developed countries. Rheumatological disorders are responsible for 5–10% of the cases. Tuberculosis is still a prevalent cause of constrictive pericarditis in underdeveloped countries.

Although non-specific, electrocardiographic findings may offer a clue to recognize restrictive or constrictive disease. Low electrocardiogram (ECG) voltage is often present in cardiac amyloidosis. Intra-atrial, atrioventricular and intraventricular conduction defects are also common in all infiltrative restrictive cardiomyopathies. Low ECG voltage, however, may also be present in constrictive
pericarditis, often together with rightward QRS axis deviation. QRS electrical alternans can be seen in patients with effusive-constrictive disease.

Two-dimensional and Doppler echocardiography are useful not only in differentiating constriction from restrictive diseases but also in establishing prognosis. Atrial dilation, small left and right ventricular cavity size and normal or near normal left ventricular ejection fraction are features common to all restrictive diseases. Increased left ventricular wall thickness in the presence of normal or low ECG voltage is the hallmark of infiltrative disorders, but wall thickness is often normal in restrictive diseases caused by radiation, chemotherapy and idiopathic fibrosis. Increased valvular and interatrial tissue thickness, pericardial brightness and effusions and multi-valvular regurgitation are typical features of cardiac amyloidosis. Discrete granulomas may be seen predominantly in the interventricular septum of patients with cardiac sarcoidosis. Aortic valve calcification extending into the mitral valve anterior leaflet is suggestive of post-radiation injury. Apical thrombi in both ventricles are a classical finding in endocardial fibroelastosis.

In constrictive pericarditis, the pericardium may be particularly thickened; the right atrial and ventricular free walls are often tethered, giving the appearance of right ventricular systolic impairment. The most specific two-dimensional echocardiographic findings in constriction, however, are the presence of an interventricular early diastolic septal bounce and a respiratory septal shift, moving inferiorly and to the left during inspiration. Caval dilation with absence of inspiratory collapse is a non-specific marker of elevated central venous pressure and is common to both restrictive and constrictive disease.

Doppler findings in the restrictive cardiomyopathies may vary according to the stage of the disease. In early cases, the transmitral Doppler examination demonstrates a pattern of early relaxation with a ratio of early filling (E) to atrial contraction (A) velocities <1. Pulmonary venous Doppler flow indicates predominance of systolic (S) over diastolic flow (D). With advanced disease, the transmitral Doppler demonstrates a E/A ratio>1 with a shortened early filling deceleration time, and the pulmonary venous flow shows predominant diastolic flow (S/D <1), findings characteristics of reduced ventricular compliance and increased left atrial pressure. The latter findings are also typical of patients with constriction. However, in constriction, Doppler examination demonstrates a significant decrease in flow to the left heart chambers during inspiration and a decrease during expiration, with opposite changes in the right heart (Figure 1). Tissue Doppler imaging (TDI), can measure directly the velocity of myocardial motion. Since relaxation is impaired in restrictive cardiomyopathy but not in constriction, TDI myocardial velocities measured during early diastole can be used to differentiate both conditions (Figures 2 and 3).

Adapted from Constriction vs. Restriction: How To Evaluate? Garcia. ACC CURRENT
JOURNAL REVIEW Jul/Aug 2003
Setting Up a Physiologist-Led Loop Recorder Implantation Service

Cara Mercer, Senior Cardiac Physiologist, Grantham Hospital, UK
(supported by an unrestricted grant from Medtronic)

In the UK, the National Institute of Health and Clinical Excellence (NICE) state “in patients that have total loss of consciousness with a probable cardiac cause, but have symptoms infrequently (less than once every two weeks) then an implantable loop recorder is the first line of investigation”. ILR’s are more expensive than non-invasive monitoring and costs vary between £1,200 and £2,000 per device depending on the complexity of the device. Cost efficacy of ILR’s in syncope has been scrutinised in several publications. The Centre for Research and Dissemination at the University of York undertook at probabilistic health economic assessment of ILR’s (including implant, monitoring and explant costs) in the investigation of syncope compared to alternative methods of investigation and concluded that they were cost effective.

The Consultant Nurse in Cardiology (CN) was asked to undertake training in ILR implantation/explanation he had already possessed advanced clinical skills, training in consent, non-medical prescribing and surgical training. Hence, a very short ‘start up curve’ was expected in getting the new service up and running. A period of supervised implantation under the guidance of a pacing consultant cardiologist was undertaken and competence was assessed using Direct Observation of Procedural Skills (DOPS). In order to deliver the highest quality clinical service with high patient flow during implant sessions the CN was trained in ‘device mapping’ but routinely a clinical physiologist ‘mapped’ (identifying the optimum position for the device) and completed patient registration while CN implanted.

Within two months of the commencement of the new service waiting lists had been cleared and patients satisfaction audit scored high. As the team gained knowledge and skills the number of implants undertaken in a four hour clinical session was increased from three to five (occasionally six). An unforeseen consequence of the new service was demand increased as referring clinicians realised the patients journey had improved.

The success of the service meant that a second operator was required to ensure continuity during annual leave and unplanned absence. One of the cardiology nurse practitioners was identified and trained under the supervision of the nurse consultant. Two patients experienced anaphylaxis requiring treatment secondary to prophylactic pre-procedure antibiotics (teicoplanin used in penicillin allergic patients). Thus, a literature review was undertaken and no evidence was found that prophylactic antibiotic administration reduced pocket infection in ILR implantation and indeed there was little evidence for their use in pacemaker implantation. Following discussion with microbiology we stopped giving routine prophylactic antibiotics and a prospective audit of n=100 patients was
undertaken. No increase in pocket infection was noted. Routine cannulation was also discontinued.
We also reviewed if devices can be implanted on warfarin provided the INR <3 seconds to reduce
patients thromboembolic risk in AF or those with prosthetic heart valves. Contemporary evidence
suggested that pacemaker implantation could be undertaken on anti-coagulated patients but no
evidence was found for ILR’s (5). As pacemaker implantation is more traumatic than ILR
implantation the pathway was revised to implant during continued anti-coagulation. Diathermy is
always available when implanting on patients on warfarin/ novel anti-coagulation but has never been
required. No increase in bleeding/ haematoma has been observed.
Physiology led implantation: Historically, one of the Trusts smaller hospitals had sent their patients
to a neighbouring Trust for ILR implantation as no local service was available. This meant a loss of
revenue to the Trust but more importantly a long journey times for patients often undertaken on
‘patient transport’. Many of our older patients found the journey arduous. Hence, it was decided to
develop a local service. A senior clinical physiologist (CP) expressed interest in developing this
service and began training under the supervision of the NC. There were several challenges that
needed to be overcome namely that while a highly skilled physiologist they had little training in
surgical skills, consent or pharmacology. Legally, should a nurse or a clinical physiologist have a
serious adverse event then they would be judged against the profession who had historically
undertaken that role. Thus, to ensure consistent quality the clinical physiologist undertook the
training in:

- Mental Capacity Act/ Consent
- European Resuscitation Council Advanced Life Support (ALS)
- Cannulation
- IV Drug Administration
- Surgical Skills
- ILR implantation/ removal (30 supervised procedures)

It was necessary to amend the Trusts Medicines Management Policy to permit a clinical physiologist
to administer medication namely local anaesthetic. As clinical physiologist are a voluntary
registered healthcare professionals they are not permitted to administer medications under Patient
Group Directions (PGD’s) but are allowed to administer against a named patient prescription. Thus,
options to facilitate clinical physiology administration are that the request form can be adapted to
become a prescription or the physiologist can approach an independent prescriber prior to the
procedure and have a prescription order completed. Once trained we amended the clinical
physiologist job description to include ‘implantation/ removal of loop recorders’ to ensure
compliance with NHSLA (National Health Service Litigation Authority) requirements.
Transoesophageal Echocardiography
Dr David Moore, Consultant Cardiologist, AMNCH, Tallaght

Mitral valve (MV) prolapse is a relatively common disease in clinical practice, and the estimated prevalence rates vary from 0.6% to 2.4%. Conventional 2-dimensional (2D) echocardiography with Doppler capability is a widely accepted diagnostic tool for the assessment of MV disease. However, the complex anatomy of the MV apparatus exposes the limitations of this routine technique. A high level of expertise is also required for the accurate interpretation of 2D images. As surgical and catheter techniques improve over time, more detailed quantification of MV prolapse is being required. Recently introduced realtime 3-dimensional transesophageal echocardiography (TEE) can provide more accurate geometric information on the MV than 2D TEE. Conventional 2D echocardiography is one of the most useful methods for assessing MR; however, this technique has limitations in some cases with complicated MV structures. Earlier studies have already reported that 3D echocardiography can more accurately and easily identify the locations of MV prolapse than 2D echocardiography. Three-dimensional TEE is particularly useful for assessing the complex commissural and lateral and/or medial lesions of MV prolapse. In the modern era of rapidly increasing options for valve disease management, accurate and reliable morphologic assessment of the MV is of more importance than ever before. For instance, in the MitraClip trial, MV prolapse gap and width determined by 2D echocardiography are used as inclusion criteria for patients who should receive catheter treatment. In other words, interventional cardiologists use MV prolapse gap and width assessed by echocardiography to decide whether they will proceed with catheter treatment or not. Thus, ensuring the accuracy of these MV prolapse parameters will further enhance clinical decision making.

To our knowledge, this study is the first to report the following findings: (1) 3D TEE can quantify prolapse gap and width, (2) 2D TEE underestimates MV prolapse width and leaflet gap compared to 3D TEE, and (3) the differences in prolapse gap and width between 3D TEE and 2D TEE are associated with MV prolapse width itself. In the present study, 2D TEE underestimated mitral leaflet gap in group 1 and group 2 compared to 3D TEE. Two-dimensional TEE could not show complicated MV anatomy, because of its limited scan plane orientation. In contrast, 3D TEE can provide unlimited plane orientation and excellent image qualities of the whole MV. In 3D TEE, search of the maximum MV leaflet gap by manual trace in multiple parallel long-axis planes spanning the annulus can be performed. As for the severity of MR, Shanks et al reported that 3D TEE is more feasible and accurate in the quantitative assessment of functional and organic MR than 2D TEE because 3D echocardiography can evaluate a specific region of interest in any desired orientation. However, their study did not
quantify MV prolapse width or leaflet gap. In the present study, 2D TEE underestimated MV prolapse gap in group 2 compared to that in group 1. This is probably due to complicated prolapse often seen in group 2, and 2D TEE had difficulties in accurate measurements of the maximal gap. In this study, 2D TEE also underestimated prolapse width compared to 3D TEE. Three-dimensional TEE depicts the MV in the en face view, therefore, the localization and measurement of the maximal width of MV prolapse can be navigated by en face 3D transesophageal echocardiographic images. In contrast, 2D TEE depicts the MV only in the commissural view, and 2D TEE cannot convincingly identify the largest MV prolapse width, because of lack of access to full information regarding the whole 3D space. It is therefore natural that 2D TEE underestimates MV prolapse.

Two-dimensional TEE underestimated MV prolapse width and leaflet gap compared to 3D TEE. Two-dimensional TEE could not detect the largest prolapse gap and width, because of the complicated anatomy of the MV. Three-dimensional TEE provided more precise quantification of MV prolapse than 2D TEE.

Adapted from Comparison of Real-Time Three-Dimensional Transesophageal Echocardiography to Two-Dimensional Transesophageal Echocardiography for Quantification of Mitral Valve Prolapse in Patients With Severe Mitral Regurgitation. Izumo et al Am J Cardiol 2013;111:588-594

**Have you comments to make on the day.....please email us info@iicms.ie**

**Check out the Cardiology Faculty Page on www.iicms.ie**

**Make sure you join the IICMS for future CPD events**
Future CPD Events in November - supported by the HSE HSCP Professional Education and Development Office

Basic Echo Workshop - Dublin
This workshop will be aimed at final year students and new graduates with minimal exposure to echo and will concentrate on basic echo skills and techniques. It will include hands on workstations. Places will be limited to 30 people and priority will be given to IICMS members

Advanced Echo Day - Dublin
This day which will cover topics of interest to the experienced echocardiographer. Again priority will be given to IICMS members and a charge will apply to non-members

Keep an eye out for dates on www.iicms.ie
Micra®
TRANSCATHETER PACING SYSTEM

Yes,
out of sight
out of mind