Utility of Modern-era Transthoracic Echocardiography in Diagnostic Decision-Making for Complex Left-Sided Infective Endocarditis

Dr John F Sedgwick\textsuperscript{1,2}, Dr Peter Pohliner\textsuperscript{1,2}, Dr Akhlaq Khan\textsuperscript{1,2}, Dr Han Sen Gan\textsuperscript{1,2}, Dr Robert Horvath\textsuperscript{1,2,3}, Dr Karen Hay\textsuperscript{2,4}, A/Prof. Darryl J Burstow\textsuperscript{1,2}

1. The Prince Charles Hospital, Brisbane, Australia.
2. The University of Queensland
3. Pathology Queensland
4. QIMR Berghofer Medical Research Institute

Introduction: Current infective endocarditis (IE) imaging pathways focus heavily on TOE, based on evidence from research ≥20 years ago. Despite a substantial improvement in TTE image resolution and transducer technology, there’s a void of information to guide physician decision-making based on TTE. In Australian context this is particularly important in regional centres, reliant on TTE to triage urgency of transfer.

Aim: To evaluate modern era TTE diagnostic accuracy of Left Sided Endocarditis (LSE) pathology, utilising a novel disease classification

Methods: Retrospective analysis of 242 patients undergoing TTE, TOE ≤14 days from surgery, for native(Nv) or prosthetic(Pv) endocarditis pathology from May 2005-Dec 2017. Valve-level LSE pathology was classified i) on an 8-point pathology orientated ordinal scale and ii) into 3 categories: 0=none IE, 1=mimickers (nil or mimicker), 2=vegetation, 3=leaflet disruption (perforation, destruction, flail) +/- vegetation, (leaflet pathology) 4=periannular (abscess/pseudoaneurysm/dehiscence), 5=periannular + vegetation, 6=periannular+leaflet disruption, 7=fistula +/- other (periannular or fistula). Imaging data was collected from pre-reported studies by an echocardiologist. The method was validated in a smaller substudy where images were blindly reviewed by 2 of the study investigators. Agreement between TTE/TOE and pathology observed at surgery was assessed using Bland-Altman 95% limits of agreement (LOA) and weighted kappa statistics. Effects of covariates on within-patient severity assessment were assessed using linear mixed effects modelling.

Results: Agreement (TOE vs TTE,≤5days) at lesion level ranged from good to severe, and v) IE mimickers present.

Conclusion: Integrating findings of TTE accuracy with disease severity, an imaging algorithm is proposed. For an inconclusive TTE study, TOE is recommended if: i)poor (<fair) image quality, ii)Pv, iii)EITHER 2moderately-severe AR, AS, iv)periannular involvement OR suspected, OR poorly visualised, and v)IE mimickers present. Favourable features for a true negative TTE study without a clear indication for TOE, include: i)fair image quality, ii)Nv, iii)no mimickers and iv)moderate valve dysfunction.

Figure 1. Transthoracic echo imaging pathway for a negative infective endocarditis imaging study

- Values clinical communication
- *Harmonised guidelines on how to conduct a full clinical examination
- *European Society of Cardiology (ESC) and American College of Cardiology (AHA/ACC) guidelines

Figure 2. Transthoracic echo imaging pathway for a positive infective endocarditis imaging study

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IE denotes infective endocarditis, LSE left side infective endocarditis, LV left ventricular ejection fraction, AR aortic regurgitation, and AS aortic stenosis.