

Prosthetic Valve Endocarditis

Gregory M Scalia

Associate Professor of Medicine
Director of Echocardiography,
The Prince Charles Hospital
M.B.B.S.(Hons), M.Med.Sc., F.R.A.C.P., F.A.C.C., F.C.S.A.N.Z., F.A.S.E., J.P.

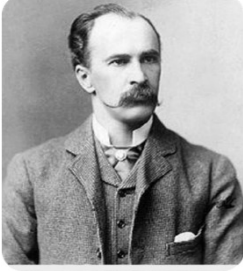


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Chapter of Echocardiography
Singapore Cardiac Society

27-28 October
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Infective Endocarditis



Fewer diseases present greater difficulties in the way of diagnosis than (prosthetic) endocarditis.... The protean character of the malady, the latency of the cardiac symptoms, and the close simulation of other disorders combine to render the detection peculiarly difficult"

William Osler, 1885 Royal Gulstonian Lecture

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Prosthetic valve Endocarditis



Explanted Mosaic TVR

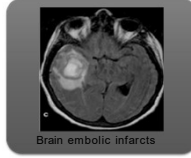
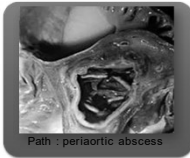
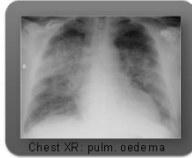
- PVE accounts for 10-30% of IE [1]
- Incidence ~1% per patient-year [1]
- Risk :
 - Mechanical = Bioprosthetic valves;
 - Lower risk with mitral valve repair 1.5% at 15yrs [2]
- *S Aureus* and coagulase-negative staphylococci – 40% cases[3]
- Health-care associated infections 40%
 - Infected cannula, surgical wounds
- Bowel related infections (Enterococcus etc)
 - Cancer, polyps and diverticulitis

1. Habib et al. Eur Heart J 2009
2. Foster et al. N Engl J Med. 2010;363: 156-160
3. Billewicz et al. JAMA. 1964;191:1002-1007-1010.

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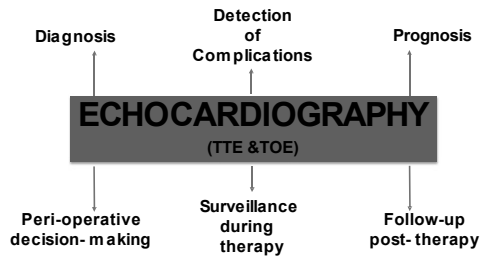
- Mortality predictors^[3]
 - Older age
 - S. Aureus
- **Complications**
 - Heart failure (1/3 pts)
 - Intra-cardiac abscess (1/3 pts)
 - Stroke (~1/5 pts)
 - Persistent bacteraemia (~1/5 pts)
- Surgery in 50% during index hospitalization
- In-hospital mortality 25%



1. Habib et al. Eur Heart J 2009
 2. Foster III et al. N Engl J Med 2010;363: 156-165
 3. Wang et al. JAMA March 28, 2007; Vol 297, No 12



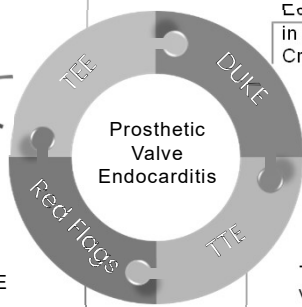
Prosthetic valve Endocarditis



Advantages and limitations of TOE



Red flags on TTE suggesting possible PVE



Echocardiography in Duke Diagnostic Criteria



Dr. Nabil Paktin, MD, FACC



New Criteria for Diagnosis of Infective Endocarditis: Utilization of Specific Echocardiographic Findings

DAVID T. DURACK, M.B., D.Phil., ANDREA S. LUKES, B.A., DAVID K. BRIGHT, M.D., Pharm.D., and the DUKÉ ENDOCARDITIS SERVICE*, Durham, North Carolina

Echocardiography in Duke Diagnostic Criteria
Prosthetic Valve Endocarditis

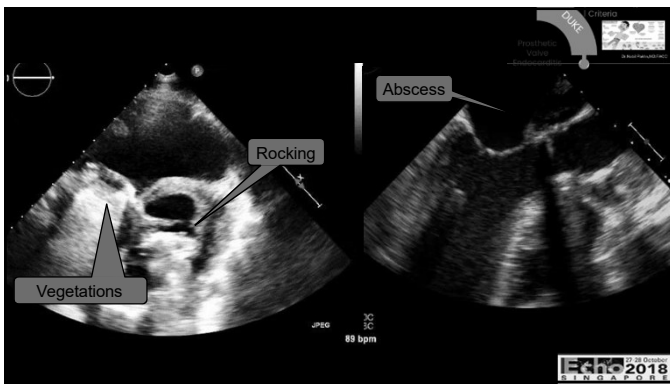
"DUKE" Criteria

- 2 MAJOR**
 - typical Blood cultures
 - evidence of endocardial involvement
 - +ve Echo
 - new valvular regurgitation
- 6 MINOR**
 - predisposition
 - fever
 - vascular phenomena
 - immunological phenomena
 - suggestive Echo
 - suggestive microbiology

Diagnostic categories

- Definite**
 - Clinical criteria
 - 2 major
 - 1 major, 3 minor
 - 5 minor
- Possible**
- Rejected**

The American Journal of Medicine Volume 96 **Echo 2018** SINGAPORE



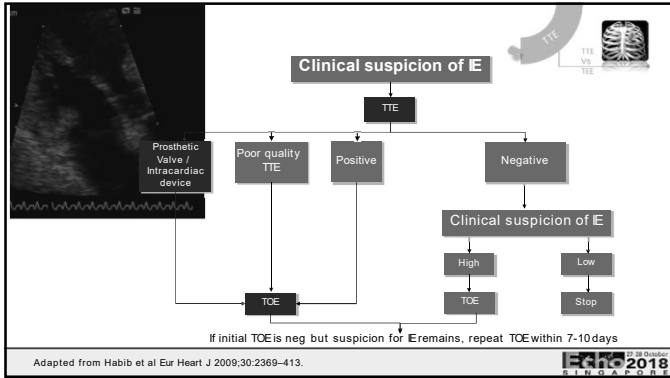
Accuracy for Detection of Vegetation or Abscess (Duke Major) in suspected PVE

| | Sens | | Spec | |
|------------|-------|--------|------|--------|
| | TTE | TEE | TTE | TEE |
| Veg | 27-69 | 77-100 | 64 | 85-100 |
| Ab | 17-40 | 58-88 | >90 | >90 |

Annotations for Vegetation (Veg):
 - TTE Sens: Weak Rule Out / Excellent Rule Out
 - TEE Sens: Excellent Rule Out
 - TTE Spec: Excellent Rule In / Reasonable Rule In
 - TEE Spec: Excellent Rule In


Annotations for Abscess (Ab):
 - TTE Sens: Weak Rule Out / Reasonable Rule Out
 - TEE Sens: Reasonable Rule Out
 - TTE Spec: Excellent Rule In
 - TEE Spec: Excellent Rule In

Sedgwick JF, Burstow DJ. Curr Infect Dis Rep. 2012 Aug;14(4):373-80 **Echo 2018** SINGAPORE



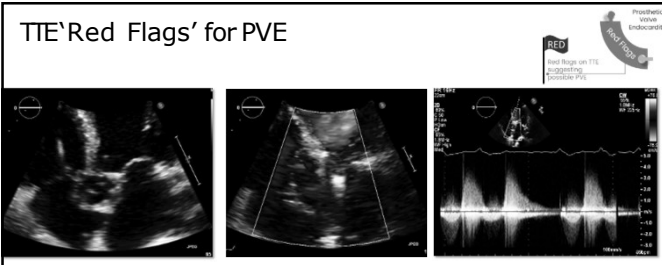
Summary of role of TTE in PVE

- Suboptimal sensitivity for **diagnosis** of PVE
- Provides usual comprehensive assessment
 - LV/RV systolic and diastolic function
 - PV haemodynamics
 - PV dysfunction (common cause of developing CHF)
 - Native valve structure and function
 - Right heart pressures
- PVE ('red flags')



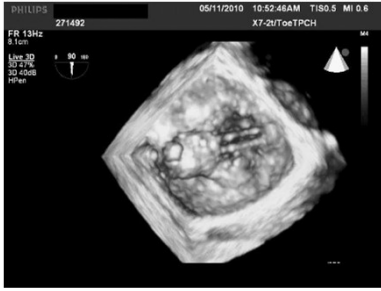
Adapted from Habib et al Eur Heart J 2009;30:2369-413. Echo 2018 SINGAPORE

TTE 'Red Flags' for PVE



Adapted from Habib et al Eur Heart J 2009;30:2369-413. Echo 2018 SINGAPORE

Advantages of TOE in PVE – MVR VRE



MVR with large vegetation and annular involvement

Advantages and limitations of TOE

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TOE in PVE – FreeStyle AVR



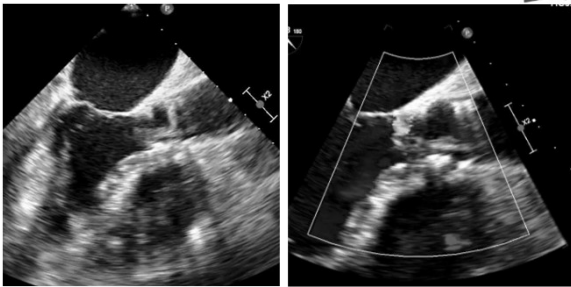
AVR with small vegetation

Advantages and limitations of TOE

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TOE in PVE – Portico TAVR

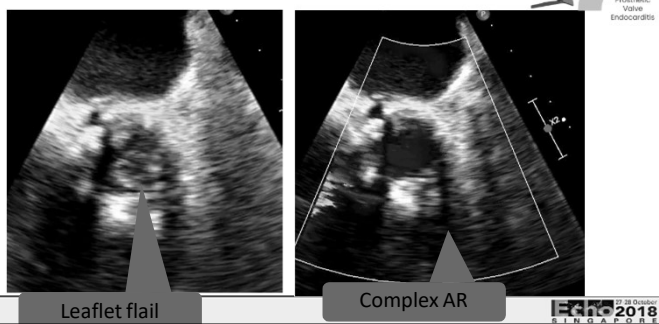


Advantages and limitations of TOE

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Advantages of TOE in PVE – Portico TAVR



Advantages of 3D TOE in AVR PVE – Rocking



Advantages of TOE in PVE

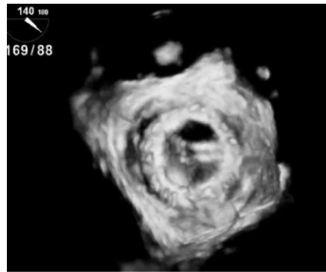
- MVR assessment
- MR detection
- Anatomy
- Incremental value of 3D



Confirms lateral annular dehiscence with significant MR

Advantages of TOE in PVE

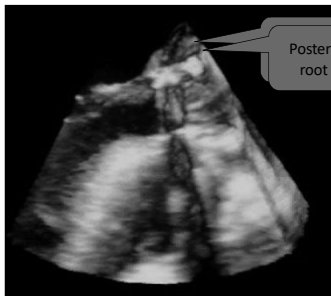
- MVR assessment
 - MR detection
 - Anatomy
 - Incremental value of 3D for annular pathology



MVR with large lateral annular dehiscence

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Advantages of TOE in PVE – 3D Abscess



Posterior aortic root abscess

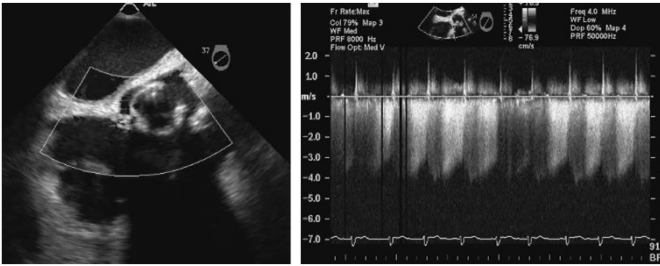
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TOE assessment of Allograft AVR



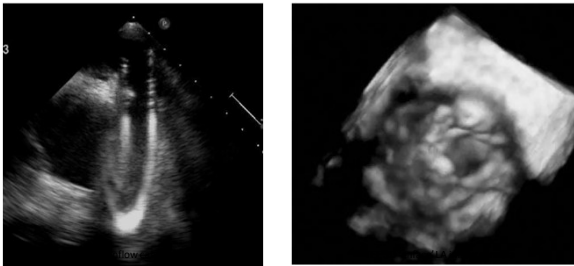
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Advantages of TOE in PVE – Fistula



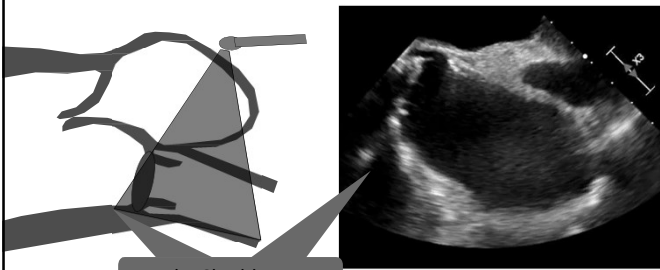
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Other Prosthetic-related Infections: Ventricular Assist Device – LA Inflow Cannula



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TOE in aortic prostheses :beware of pitfalls



Limited anatomic assessment below Valve

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TOE in aortic prostheses :beware of pitfalls

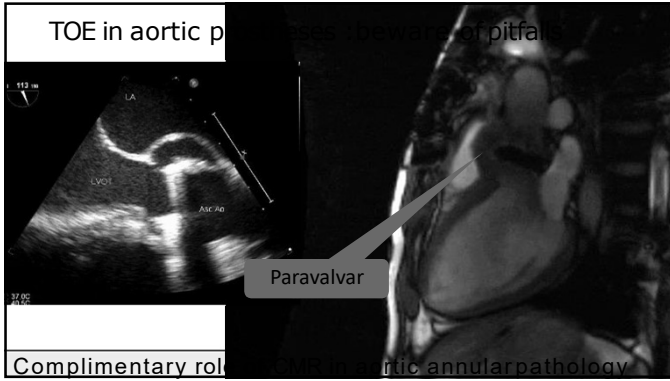
The diagram on the left shows a 3D reconstruction of an aortic valve prosthesis with a small, dark, irregular mass attached to one of the leaflets, labeled as a vegetation. To the right is a TOE image showing a similar mass on the aortic valve. A label 'Vege' with a pointer indicates this mass. Technical details in the TOE image include '118' at the top and '1.37.5C' at the bottom. The bottom right corner features the 'ECHO 2018 SINGAPORE' logo.

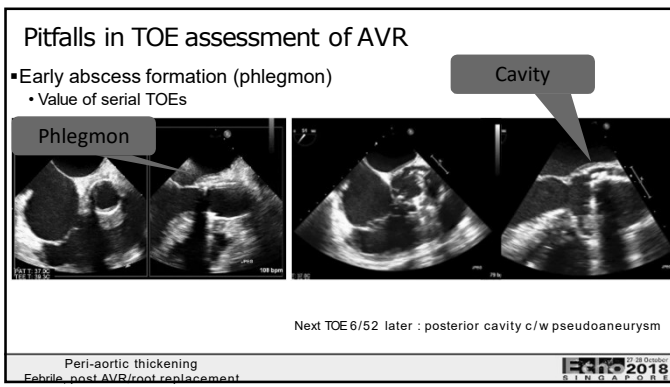
TOE in aortic prostheses :beware of pitfalls

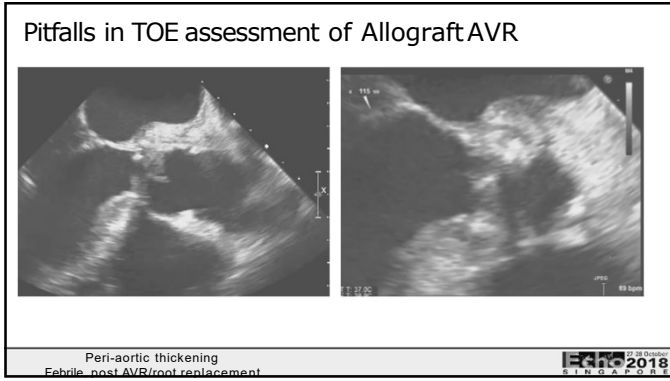
The diagram on the left shows a 3D reconstruction of an aortic valve prosthesis with a large, dark, triangular shadow cast behind it, labeled 'acoustic shadow' and 'Limited anatomic assessment'. To the right is a TOE image showing a similar shadow. Technical details in the TOE image include '128 m' at the top and '1.37.5C' at the bottom. The bottom right corner features the 'ECHO 2018 SINGAPORE' logo.

TOE in aortic prostheses :beware of pitfalls

Two TOE images are shown side-by-side. The left image shows a TOE view of the aortic valve with a label '118 bpm' at the bottom. The right image shows a TOE view of the aortic valve with a label '133 bpm' at the bottom. Technical details in the TOE images include 'F 4.0MHz 11cm' and 'F 4.0MHz 11cm' at the top, and '118 bpm' and '133 bpm' at the bottom. The bottom right corner features the 'ECHO 2018 SINGAPORE' logo.







Prosthetic Valve Endocarditis -Summary

- Profound clinical syndrome–
 - septicaemia with prosthetic valve
- Transthoracic Echo
 - entry level, anatomic, pathologic, hemodynamic
- Transoesophageal Echo
 - high resolution, access, angulation and 3D
- MRI and CT for major structural distortions
- Repeated tests if suspicion remains high
- Clinical judgement for these very sick patients



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