John O'Shea Memorial Lecture

Echocardiography : the big moments in the revolution – a personal reflection

Darryl J Burstow
Eminent Cardiologist, TPCH
Assoc Professor, UQ
Adjunct Professor, QUT

ECHO AUSTRALIA

17-19 March 2025

Disclosures

- No disclosures relevant to this presentation

Shared Era, Shared Research interests

The Cardiac Society of Australia and New Zealand

Position Statement on Sedation in Conjunction with Transoesophageal Echocardiography

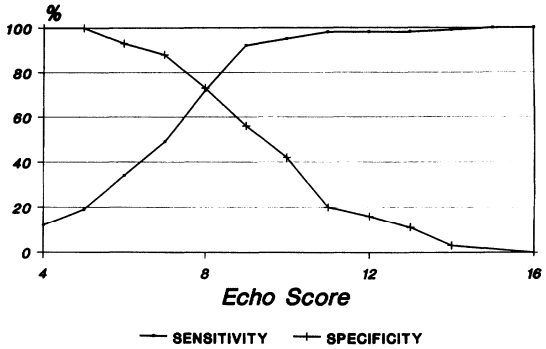
This position statement was developed by Dr John O'Shea and members of the Cardiac Imaging Council.

The statement was reviewed by the Continuing Education and Recertification Committee and ratified at the CSANZ Board meeting held on Wednesday, 10th August 2011.

(*Circulation* 1990;82:448–456)

Prediction of Successful Outcome in 130 Patients Undergoing Percutaneous Balloon Mitral Valvotomy

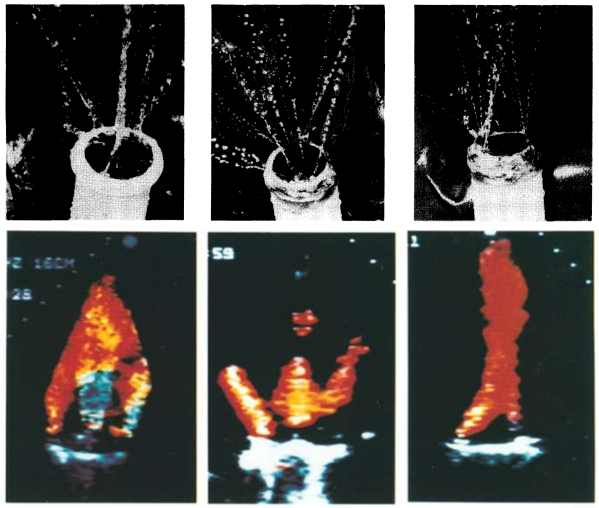
Vivian M. Abascal, MD, Gerard T. Wilkins, MBChB, John P. O'Shea, MBBS, Christopher Y. Choong, MBBChir, PhD, Igor F. Palacios, MD, James D. Thomas, MD, Emma Rosas, MD, John B. Newell, BS, Peter C. Block, MD, and Arthur E. Weyman, MD



JACC Vol. 18, No. 6
November 15, 1991:1493–8

Patterns of Normal Transvalvular Regurgitation in Mechanical Valve Prostheses

RANK A. FLACHSKAMPF, MD, JOHN P. O'SHEA, MBBS, BRIAN P. GRIFFIN, MBBS, UIS GUERRERO, BS, ARTHUR E. WEYMAN, MD, FACC, JAMES D. THOMAS, MD, FACC
ɔston, Massachusetts



JACC Vol. 17, No. 6
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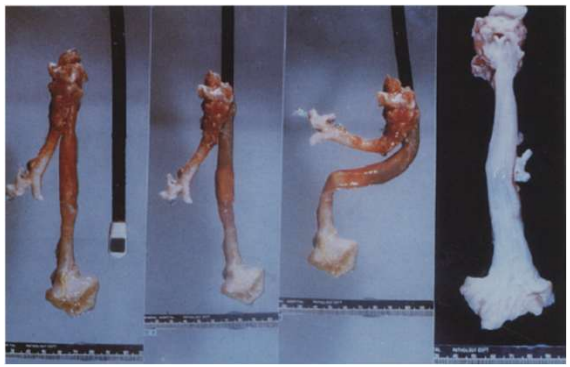
Effects of Prolonged Transesophageal Echocardiographic Imaging and Probe Manipulation on the Esophagus—an Echocardiographic-Pathologic Study

JOHN P. O'SHEA, MBBS, FRACP, JAMES F. SOUTHERN, MD, PhD, FACP, MICHAEL N. D'AMBRA, MD, CYNTHIA MAGRO, MD, J. LUIS GUERRERO, BS, JANE E. MARSHALL, BS, GUS V. VLAHAKES, MD, ROBERT A. LEVINE, MD, FACC, ARTHUR E. WEYMAN, MD, FACC
Boston, Massachusetts



ECHO AUSTRALIA

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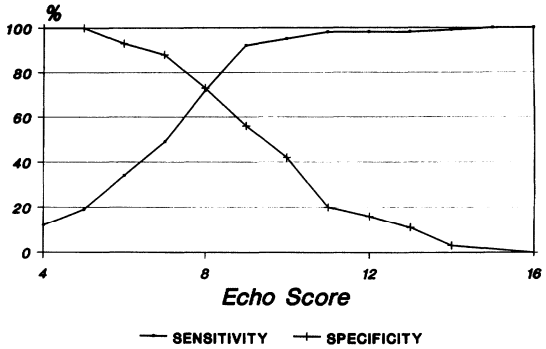

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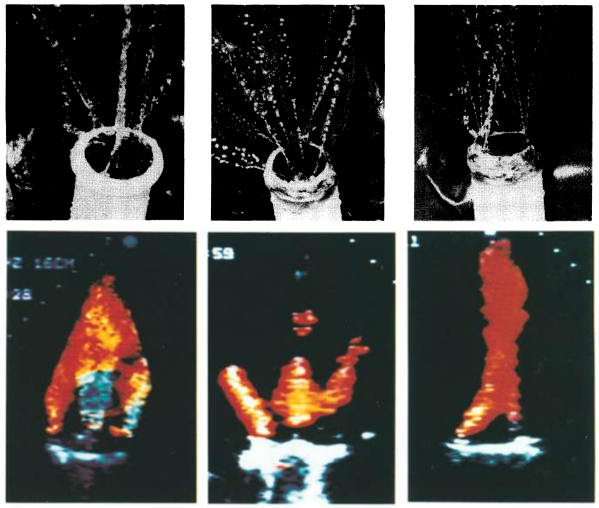

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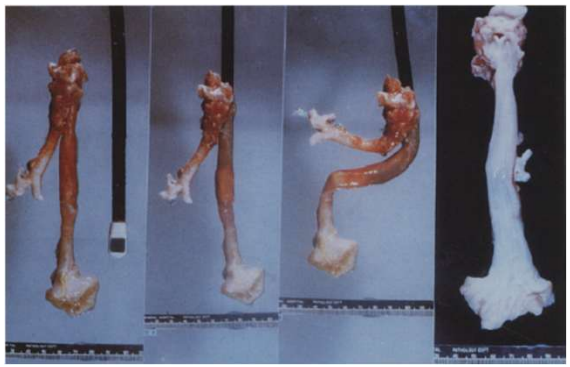

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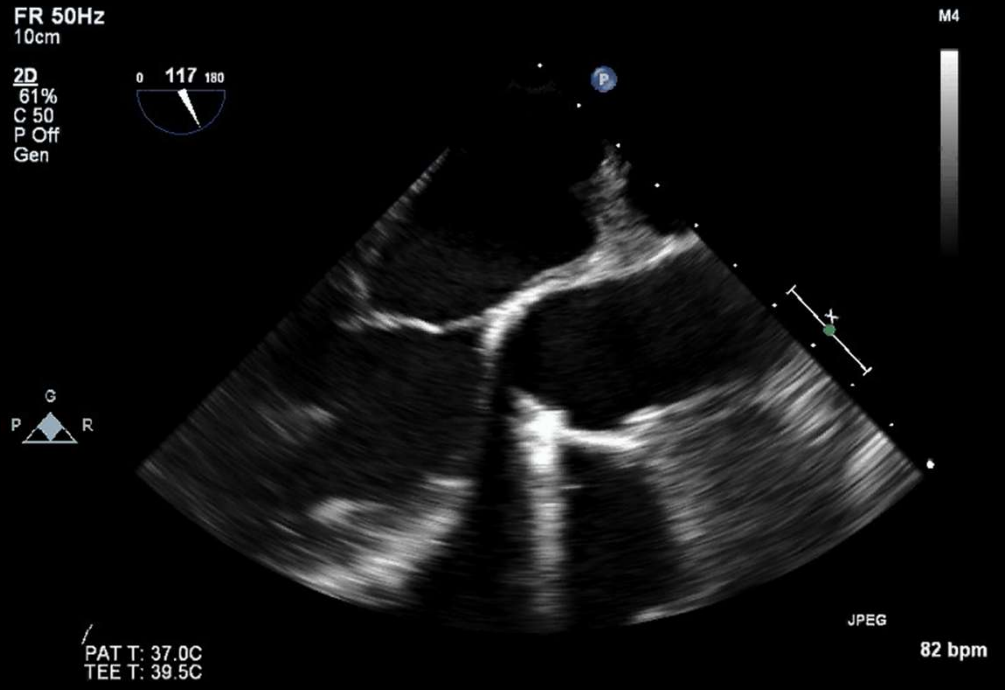
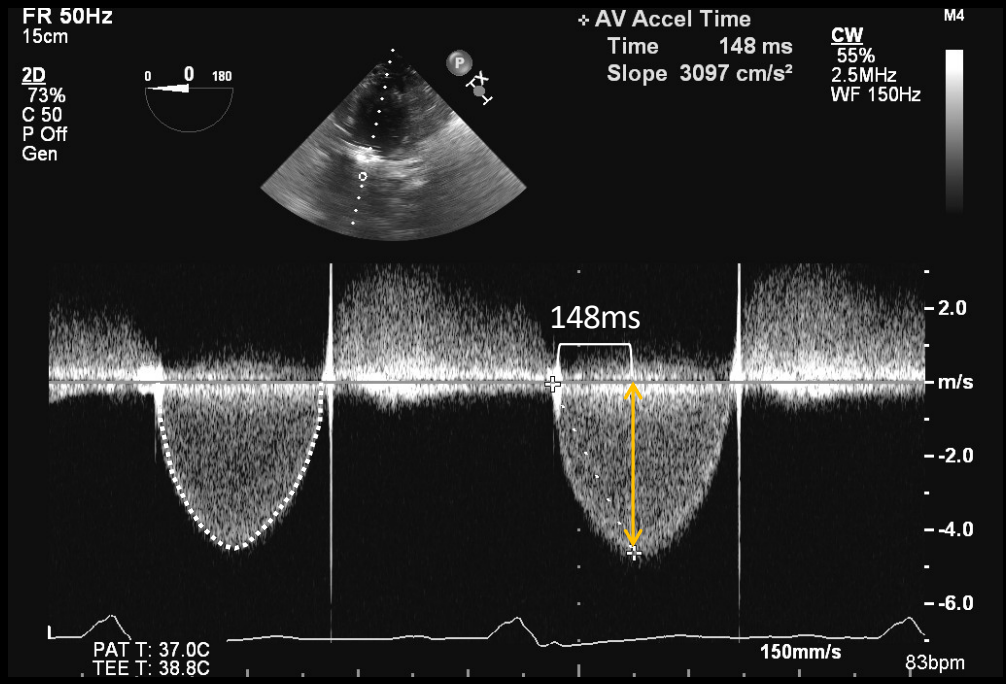
My Big moments in Echocardiography

1. Doppler ultrasound

Case of PV obstruction



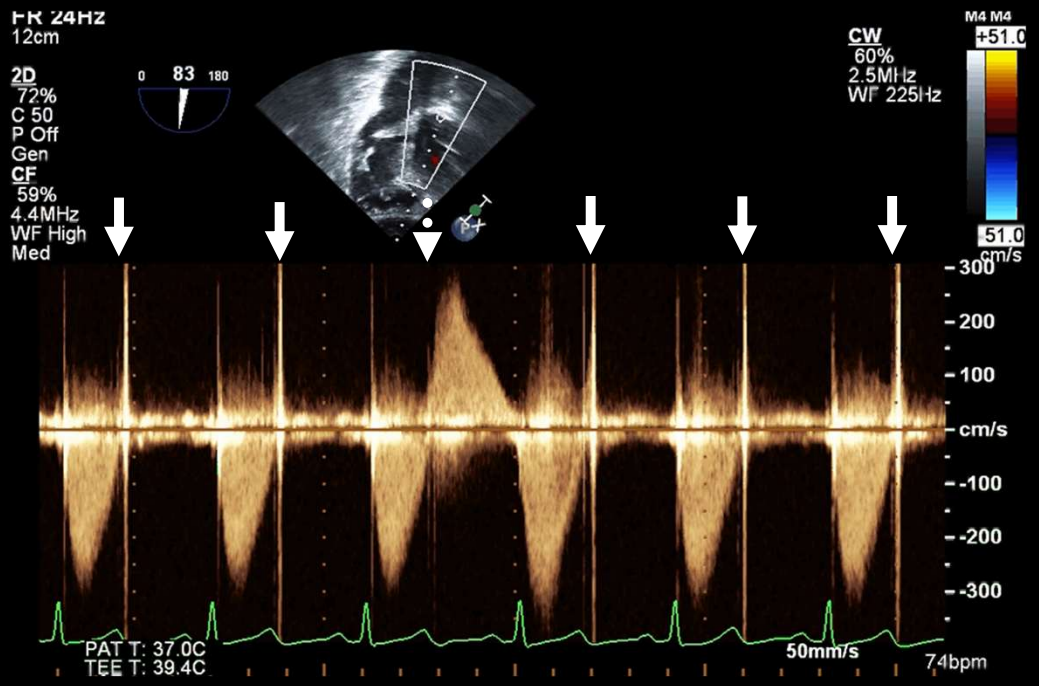
? PV leaflet motion abnormal

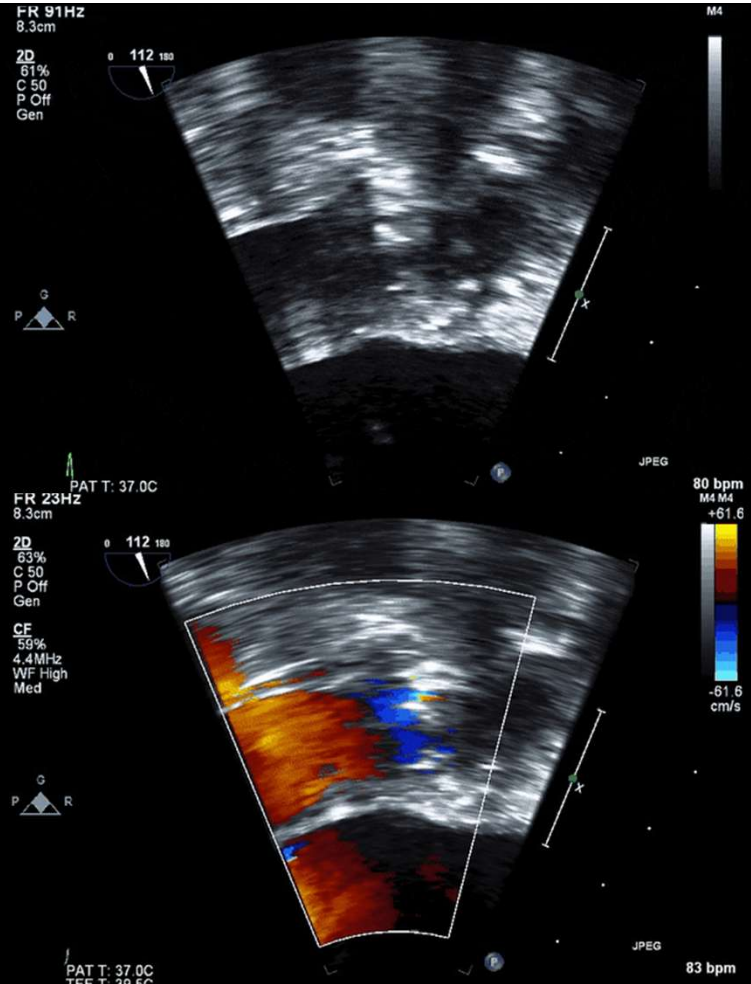


V_1 = 4.5m/s, mean gradient = 50mmHg, **AT** = 148msecs
(mean grad 25mmHg 2009)

CW Doppler confirms both the presence and severity of PV dysfunction (non-invasively)
: measurement of valve gradients and time intervals (AT)

Case of PV regurgitation





CW Doppler trace demonstrated the presence of a PV leaflet abnormality and intermittent, severe AR (non-invasively)

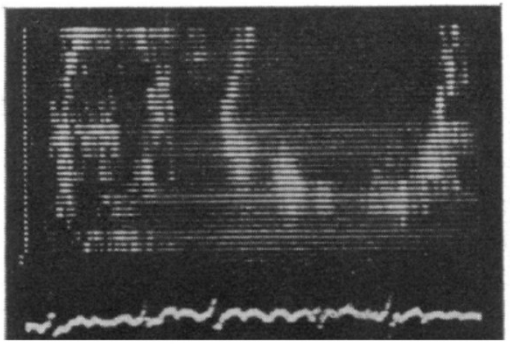
: observation of event timing and time intervals (short AR PHT)

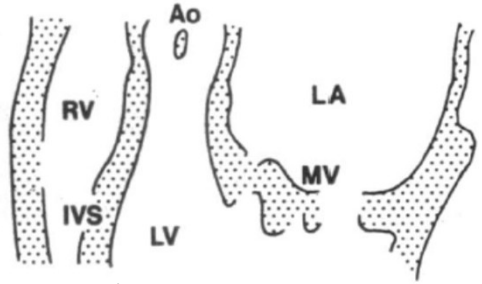
Big moments in Echocardiography: 1970's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

2D Echocardiography

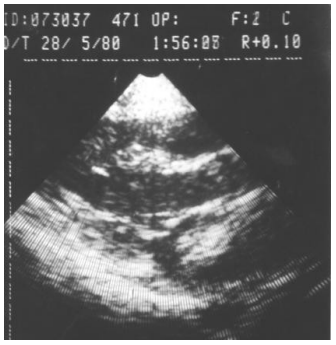
1971
First description





Bom N, Lancée CT, Honkoop J, Hugenholtz PG. Ultrasonic viewer for cross-sectional analyses of moving cardiac structures. Biomed Eng. 1971;6:500-3

1979 at TPCH



Dr D Radford

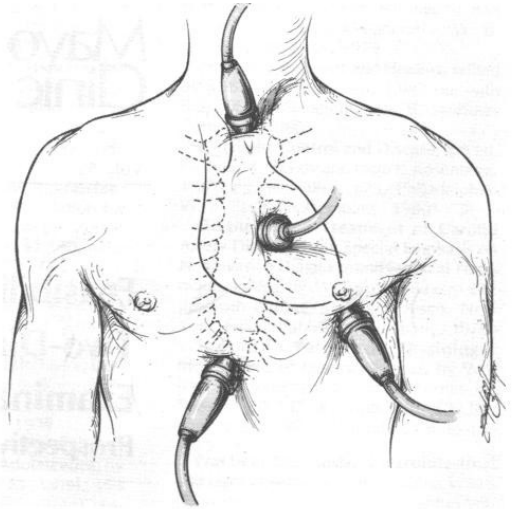
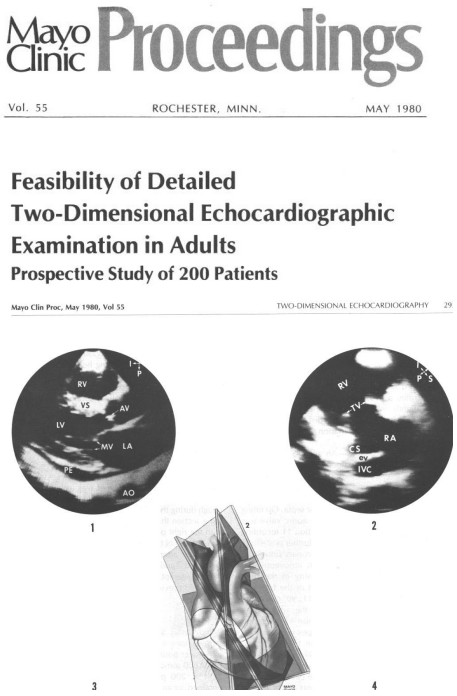


Fig. 1. Four standard transducer positions—parasternal, apical, subcostal, and suprasternal—utilized to visualize heart and great vessels.

1980
Exam protocols


Mayo Clinic Proceedings

Vol. 55 ROCHESTER, MINN. MAY 1980

Feasibility of Detailed Two-Dimensional Echocardiographic Examination in Adults
Prospective Study of 200 Patients

Mayo Clin Proc, May 1980, Vol 55 TWO-DIMENSIONAL ECHOCARDIOGRAPHY 29

cross-sectional cardiac anatomy and function in 'real-time'

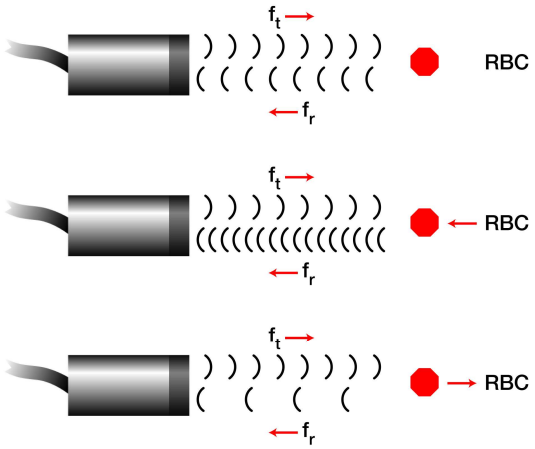
ECHO AUSTRALIA

Big moments in Echocardiography: 1980's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

1842 **Doppler principle** **1977**

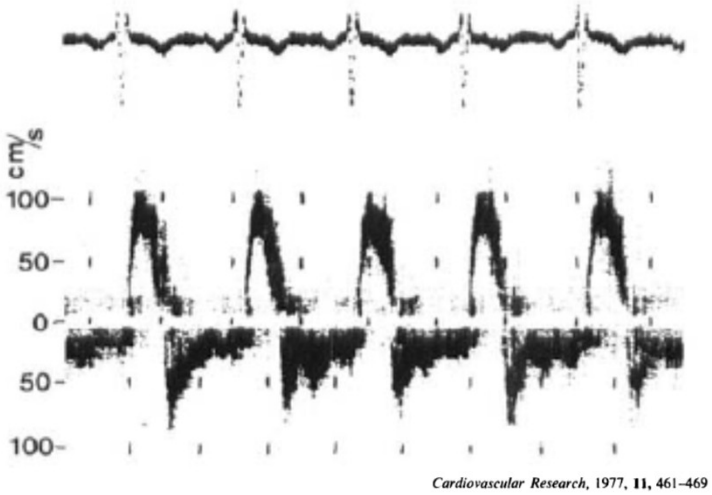
Christian Doppler



$$\pm\Delta f = \frac{2 \times f_t \times V \cos\theta}{C}$$

Allowed the calculation of *flow velocity* and the display of *flow direction* from the Doppler shift

Asc Ao flow velocity in pt with AR (SSN)



Cardiovascular Research, 1977, **11**, 461–469

Diagnosis of valvular heart disease using transcutaneous Doppler ultrasound[1]

A. O. BRUBAKK[2], B. A. J. ANGELSEN, AND L. HATLE

From the Division of Engineering Cybernetics, Norwegian Institute of Technology, University of Trondheim and the Section of Cardiology, Medical Department, Regional Hospital, Trondheim, Norway

Big moments in Echocardiography: 1980's

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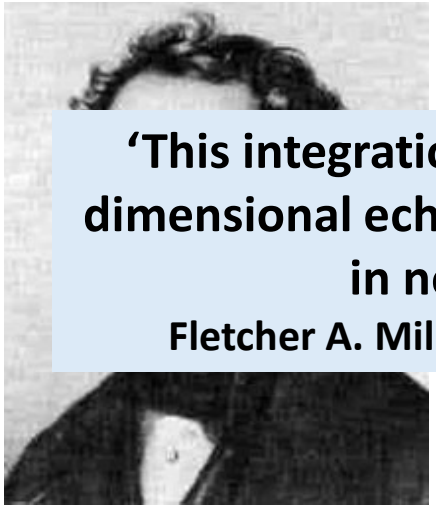
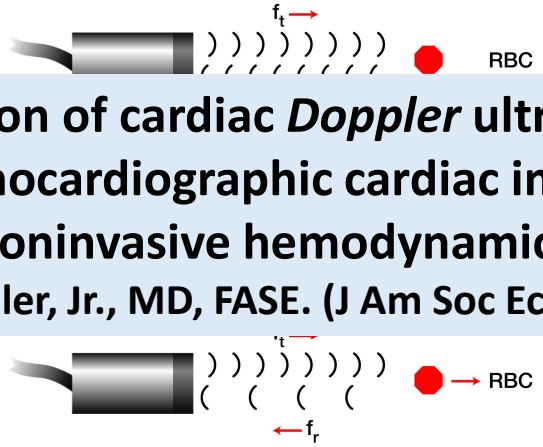
1842 **Doppler principle**



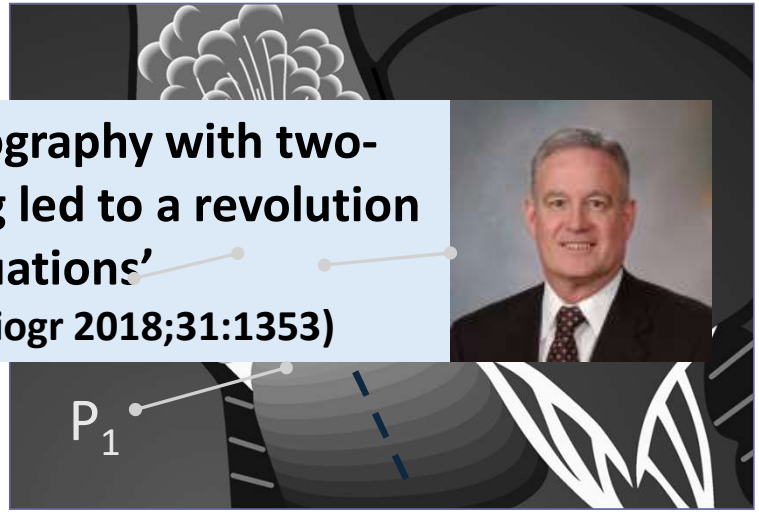
Christian Doppler



$$\pm\Delta f = \frac{2 \times f_t \times V \cos\theta}{C}$$

Allowed the calculation of *flow velocity* and the display of *flow direction* from the Doppler shift **(Δf)**

1738 (simplified) **Bernoulli Equation**



$$P_1\text{-}P_2(\Delta P) = 4V^2$$

for measurement of <u>*intracardiac pressure gradients*</u>

'This integration of cardiac *Doppler* ultrasonography with two-dimensional echocardiographic cardiac imaging led to a revolution in noninvasive hemodynamic evaluations'

Fletcher A. Miller, Jr., MD, FASE. (J Am Soc Echocardiogr 2018;31:1353)

Big moments in Echocardiography: 1980's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

Doppler Haemodynamics

1978 -1980

Growing clinical applications

Noninvasive assessment of pressure drop in mitral stenosis by Doppler ultrasound

L. HATLE, A. BRUBAKK, A. TROMSDAL, AND B. ANGELSEN

From Section of Cardiology, Medical Department, University Hospital, 7000 Trondheim; and Division of Engineering Cybernetics, The Norwegian Institute of Technology and Division of Automatic Control at the Foundation of Scientific and Industrial Control at the University of Trondheim, 7000 Trondheim, Norway

Br Heart J 40:131-140, 1978

Non-invasive assessment of aortic stenosis by Doppler ultrasound

L HATLE, B A ANGELSEN, A TROMSDAL

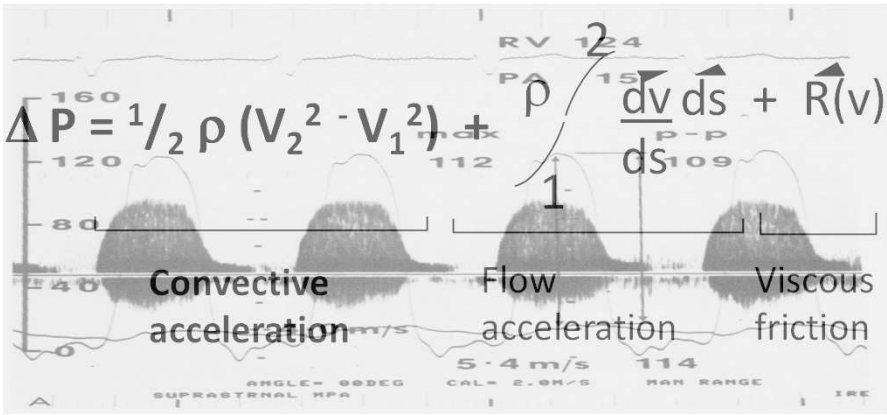
From the Section of Cardiology, Medical Department, University Hospital, Trondheim; and Division of Engineering Cybernetics, The Norwegian Institute of Technology and Division of Automatic Control at the Foundation of Scientific and Industrial Control at the University of Trondheim, Trondheim, Norway

Br Heart J 43:284-292, 1980

1985-1989

Validation of (simplified) Bernoulli equation
for measurement of ***Valve Gradients*** and
Intracardiac pressures

$$\Delta P = {}^1/_2\,\rho\,(V_2^2 - V_1^2) + \rho \int_1^2 \frac{dv}{ds}\,ds + R(v)$$



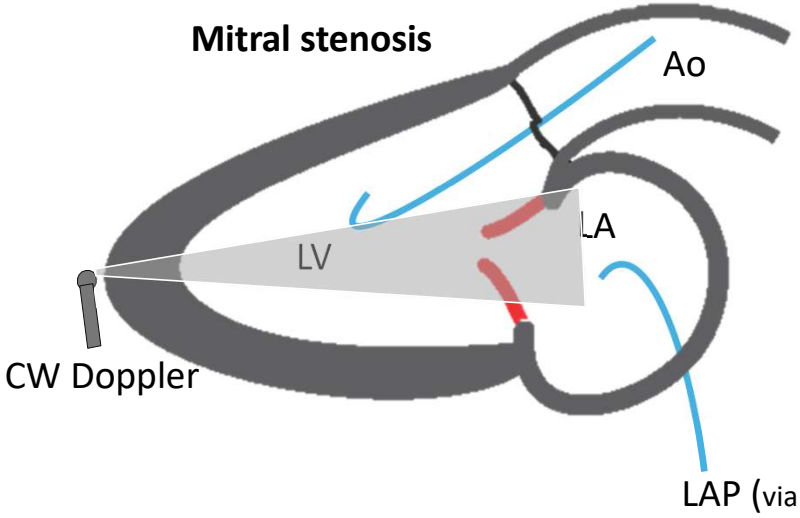
ECHO AUSTRALIA

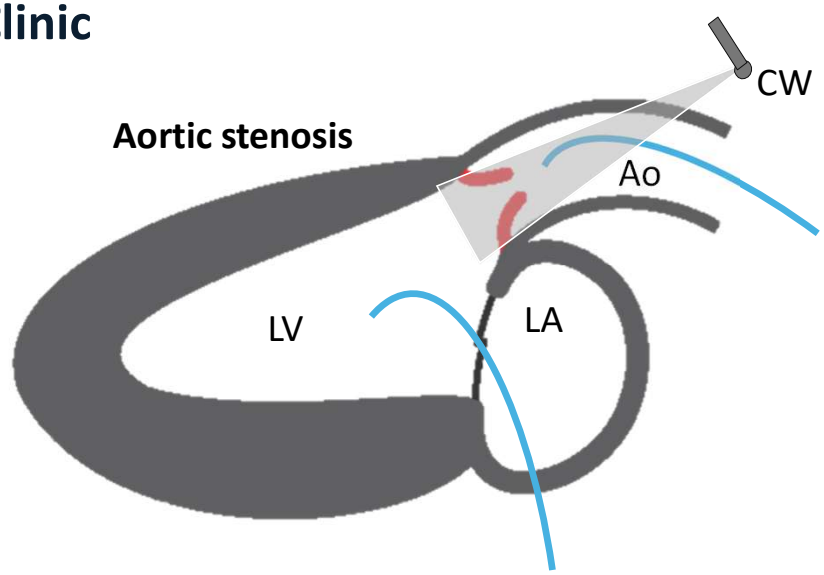

R A Nishimura

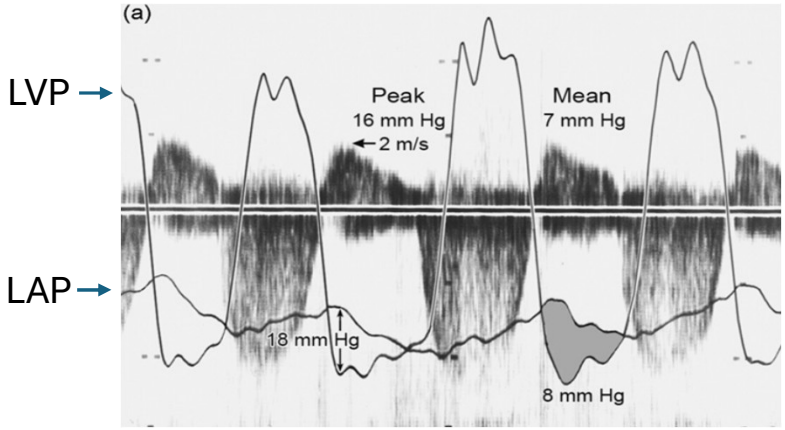
Simultaneous Doppler – Dual Catheter correlative studies

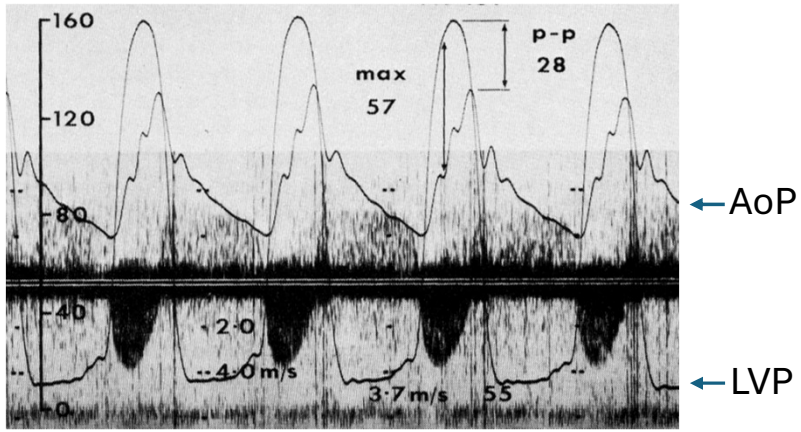
Mayo Clinic


A Jamil Tajik










"STRIKE 3, YOURE OUT!"
DB


Phil Currie

Simultaneous Doppler–Dual Catheter correlative studies


Jim Seward

Mayo Clinic

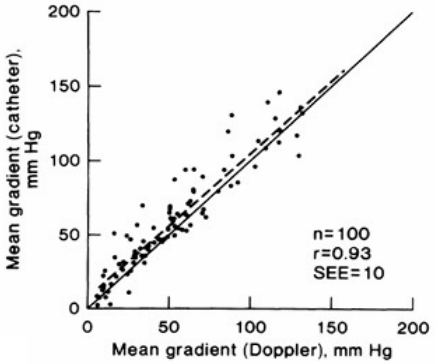
Validation of Bernoulli Equation ($\Delta P = 4V^2$) 1985-89

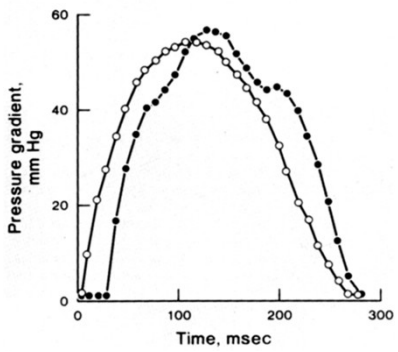
Aortic stenosis

Continuous-wave Doppler echocardiographic assessment of severity of calcific aortic stenosis: a simultaneous Doppler-catheter correlative study in 100 adult patients

Circulation 71, No. 6, 1162-1169, 1985.

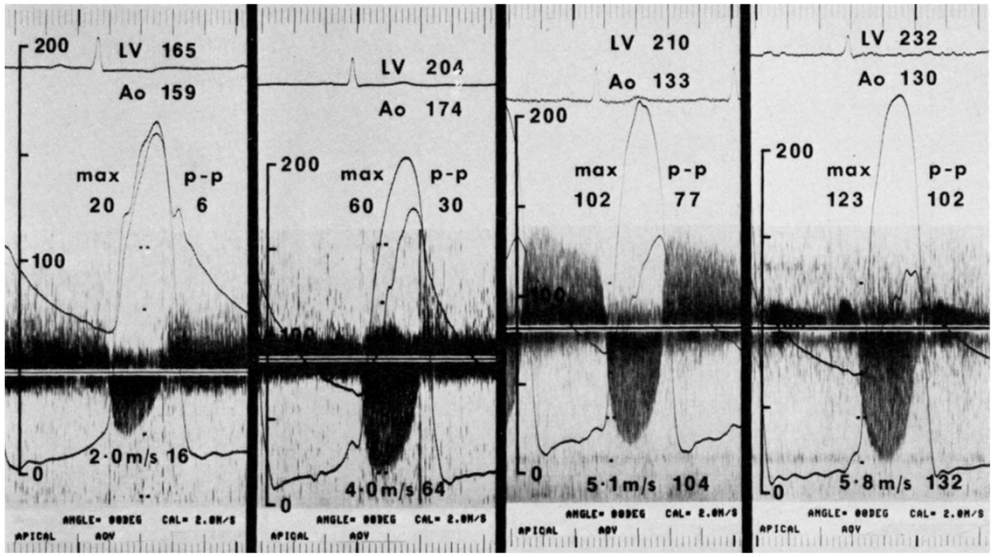
PHILIP J. CURRIE, M.B.B.S., F.R.A.C.P., JAMES B. SEWARD, M.D., GUY S. REEDER, M.D., RONALD E. VLIETSTRA, MB.CH.B, DENNIS R. BRESNAHAN, M.D., JOHN F. BRESNAHAN, M.D., HUGH C. SMITH, M.D., DONALD J. HAGLER, M.D., AND A. JAMIL TAJIK, M.D.





Digitized Ao-LV instantaneous pressure gradient (systole) vs AV CW Doppler instantaneous gradient (systole)

Arithmetic mean of the IPGs = mean pressure gradient (MPG)



Aortic stenosis : mild / moderate / severe

Excellent correlation : cath Max IPG vs Doppler IPG

Excellent correlation : cath MPG and Doppler MPG

ECHO AUSTRALIA


Phil Currie

Simultaneous Doppler – Dual Catheter correlative studies

Mayo Clinic


Jim Seward

Validation of Bernoulli Equation ($\Delta P = 4V^2$) 1985-89

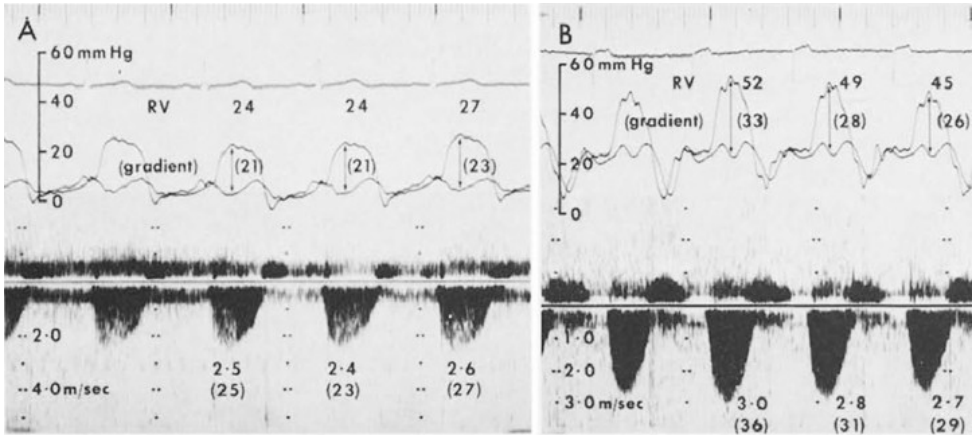
RVSP (using TR velocity)

Continuous Wave Doppler Determination of Right Ventricular Pressure: A Simultaneous Doppler-Catheterization Study in 127 Patients

PHILIP J. CURRIE, MBBS, FRACP, JAMES B. SEWARD, MD, FACC, KWAN-LEUNG CHAN, MD, FRCPC, DEREK A. FYFE, MD, PHD, DONALD J. HAGLER, MD, FACC, DOUGLAS D. MAIR, MD, FACC, GUY S. REEDER, MD, FACC, RICK A. NISHIMURA, MD, A. JAMIL TAJIK, MD, FACC

Rochester, Minnesota

(J Am Coll CardioI 1985;6:750-6)



Mixed LVOTO and RVOTO lesions

Instantaneous Pressure Gradient: A Simultaneous Doppler and Dual Catheter Correlative Study

PHILIP J. CURRIE, MBBS, FRACP, DONALD J. HAGLER, MD, FACC, JAMES B. SEWARD, MD, FACC, GUY S. REEDER, MD, FACC, DEREK A. FYFE, MD, PHD, ALFRED A. BOVE, MD, PHD, FACC, A. JAMIL TAJIK, MD, FACC

Rochester, Minnesota

(J Am Coll CardioI 1986;7:800-6)

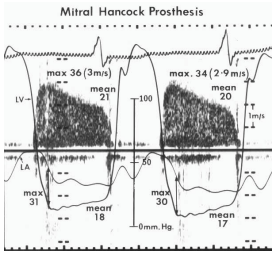
Prosthetic valves

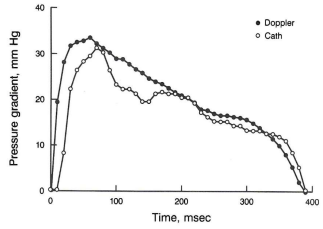
Continuous Wave Doppler Echocardiographic Measurement of Prosthetic Valve Gradients

A Simultaneous Doppler-Catheter Correlative Study

Darryl J. Burstow, MB, BS, FRACP, Rick A. Nishimura, MD, Kent R. Bailey, PhD, Guy S. Reeder, MD, David R. Holmes Jr., MD, James B. Seward, MD, and A. Jamil Tajik, MD

(Circulation 1989;80:504-514)



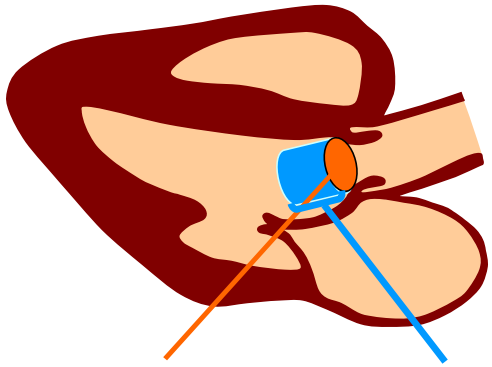


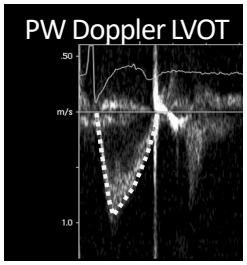
ECHO AUSTRALIA

Big moments in Echocardiography: 1980's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

Doppler Haemodynamics : foundation of quantitation





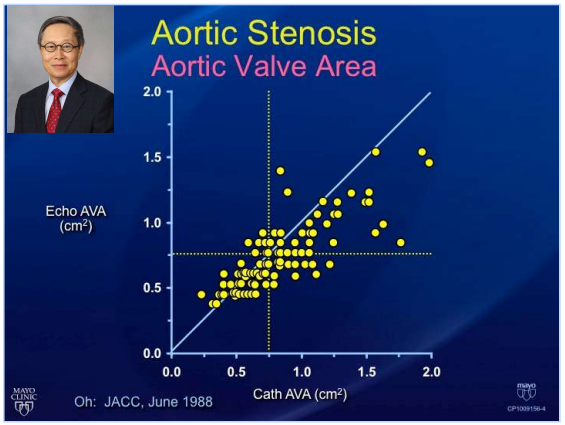
VTI

$SV[mls] = CSA_{LVOT}\,[cm^2] \times VTI_{LVOT}\,[cm]$

LV Stroke Volume

(based on hydraulic orifice equation **Q = A x v**)

$$\text{Valve Area} = \frac{\text{LVOT SV}}{\text{AV VTI} \quad \text{or} \quad \text{MV VTI}}$$



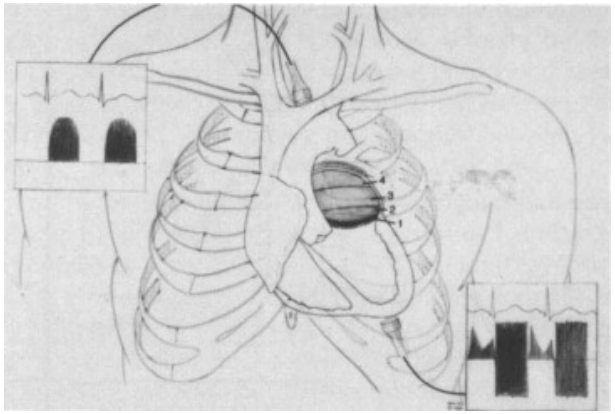
Courtesy FA Miller Jr. MD

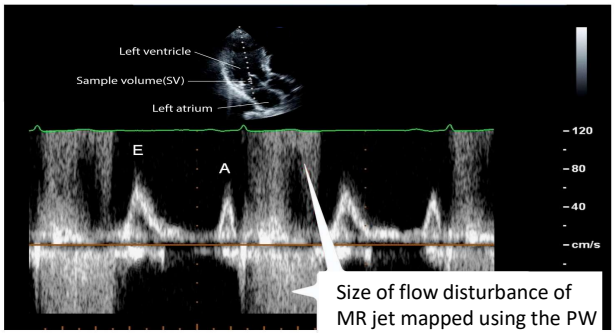
Valve areas (stenotic and prosthetic)

(based on continuity equation)

Big moments in Echocardiography: 1980's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020



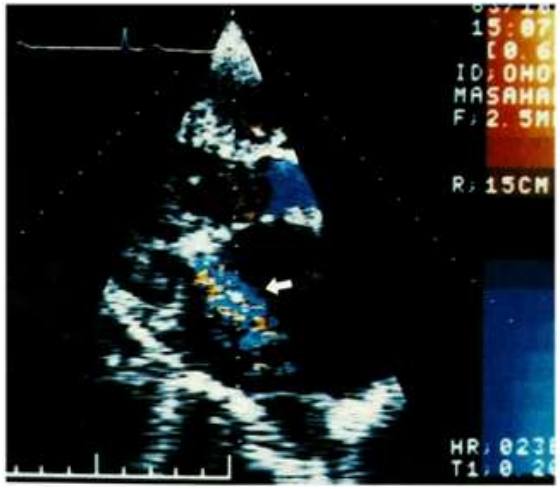


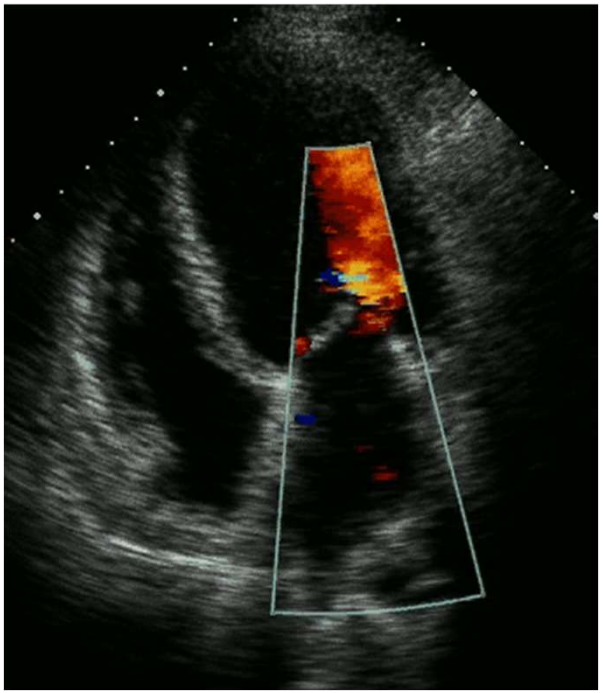
Size of flow disturbance of MR jet mapped using the PW sample volume

Colour Doppler

Clinical Applications of a New Type of Real-Time Two-Dimensional Doppler Flow Imaging System

KUNIO MIYATAKE, MD, MITSUNORI OKAMOTO, MD, NAOKAZU KINOSHITA, MD, SHIRO IZUMI, MD, MAFUMI OWA, MD, SEIICHI TAKAO, MD, HIROSHI SAKAKIBARA, MD, and YASUHARU NIMURA, MD, MSc

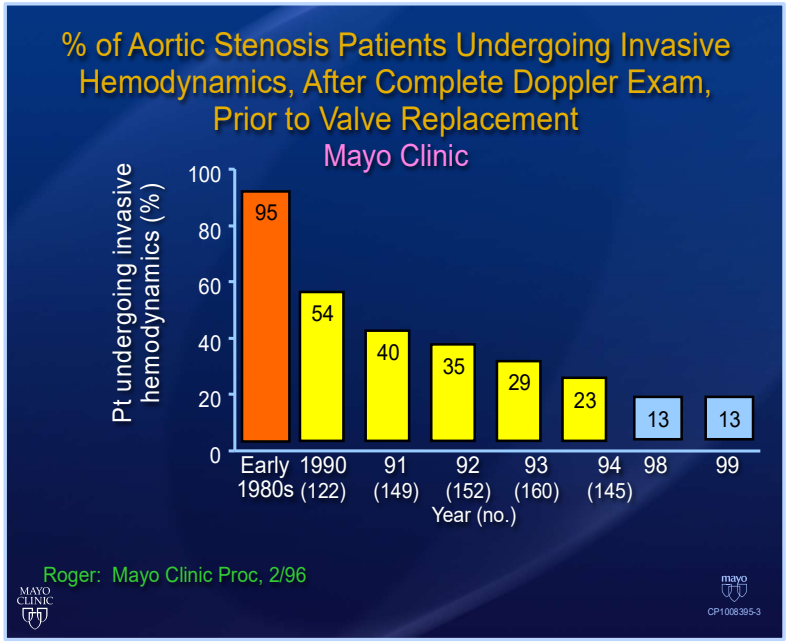




Big moments in Echocardiography: 1980's

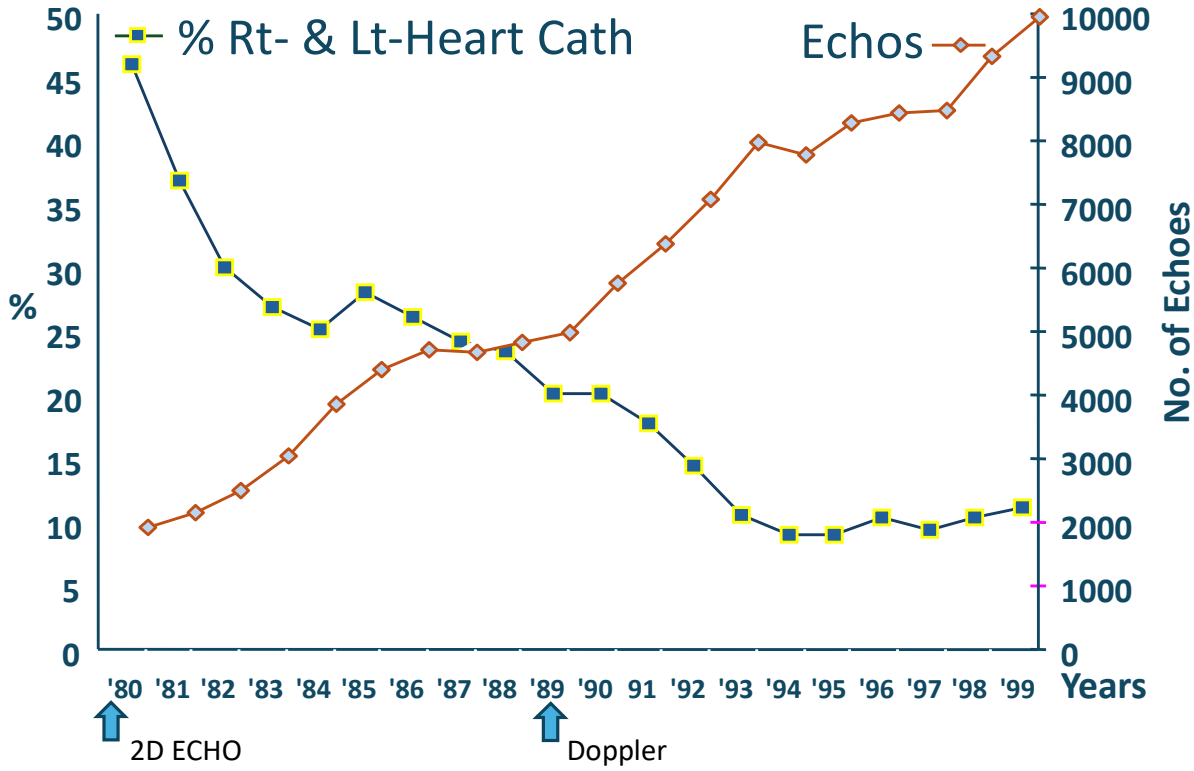
Clinical impact of non-invasive Doppler haemodynamics

Mayo Clinic



Courtesy FA Miller Jr. MD

TPCH



Big moments in Echocardiography: 1980's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

Doppler Haemodynamics

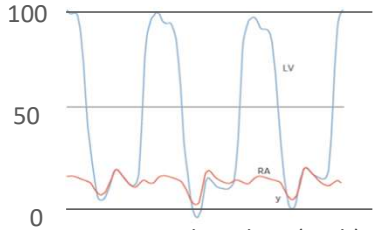
1985-87 : Dr Liv Hatle's Study Leave (Stanford and Mayo)

Restrictive Myocardial Disease

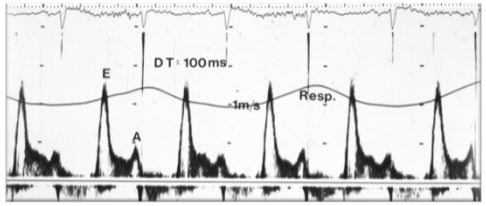
Demonstration of Restrictive Ventricular Physiology by Doppler Echocardiography

CHRISTOPHER P. APPLETON, MD, LIV K. HATLE, MD, RICHARD L. POPP, MD, FACC
Stanford, California

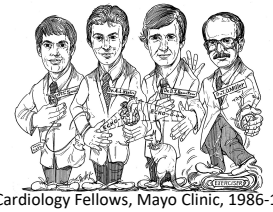
(J Am Coll Cardiol 1988;11:757-68)



Restrictive physiology (Cath)



Restrictive physiology (Mitral flow velocity)



Cardiology Fellows, Mayo Clinic, 1986-1988

Doppler Characterization of Left Ventricular Diastolic Function in Cardiac Amyloidosis

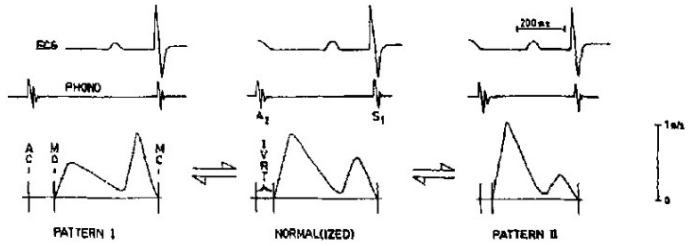
ALLAN L. KLEIN, MD,* LIV K. HATLE, MD,† DARRYL J. BURSTOW, MB, BS,* JAMES B. SEWARD, MD, FACC,* ROBERT A. KYLE, MD,‡ KENT R. BAILEY, PhD§, THOMAS F. LUSCHER, MD,‖ MORIE A. GERTZ, MD,‡ A. JAMIL TAJIK, MD, FACC*
Rochester, Minnesota

(J Am Coll Cardiol 1989;13:1017-26)

Relation of Transmitral Flow Velocity Patterns to Left Ventricular Diastolic Function: New Insights From a Combined Hemodynamic and Doppler Echocardiographic Study

CHRISTOPHER P. APPLETON, MD, LIV K. HATLE, MD, RICHARD L. POPP, FACC
Stanford, California and Tucson, Arizona

(J Am Coll Cardiol 1988;12:426-40)



ECHO AUSTRALIA

Big moments in Echocardiography: 1980's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

Doppler Haemodynamics

1985-87 : Dr Liv Hatle's Study Leave (Stanford and Mayo)

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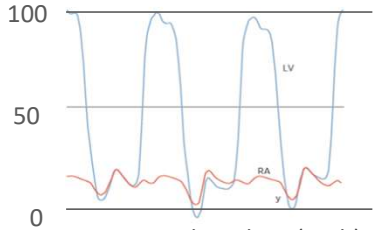
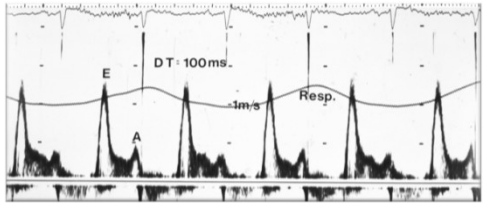
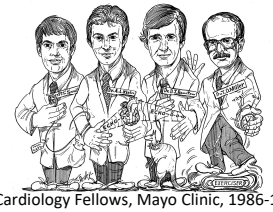


Restrictive physiology (Cath)



Restrictive physiology (Mitral flow velocity)



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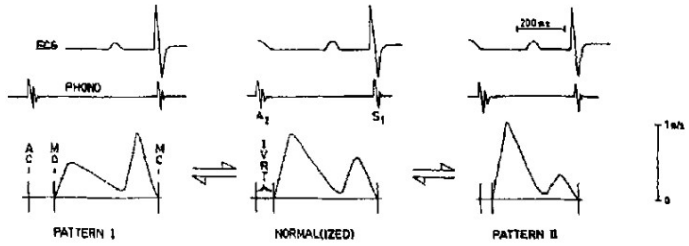


ECHO AUSTRALIA

Big moments in Echocardiography: 1980's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

Doppler Haemodynamics

1985-87 : Dr Liv Hatle's Study Leave (Stanford and Mayo)

Pericardial disease

Differentiation of Constrictive Pericarditis and Restrictive Cardiomyopathy by Doppler Echocardiography

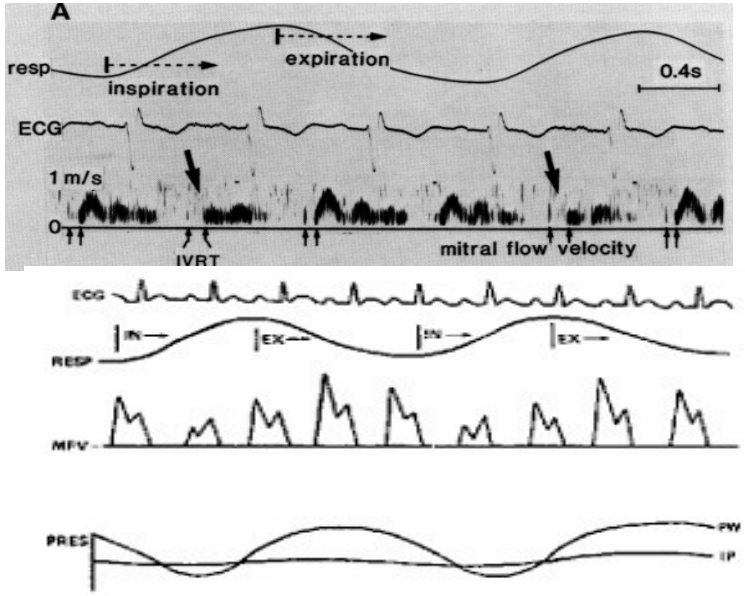
Liv K. Hatle, MD, Christopher P. Appleton, MD, and Richard L. Popp, MD

(Circulation 1989;79:357-370)

Cardiac Tamponade and Pericardial Effusion: Respiratory Variation in Transvalvular Flow Velocities Studied by Doppler Echocardiography

CHRISTOPHER P. APPLETON, MD,* LIV K. HATLE, MD, RICHARD L. POPP, MD, FACC

Stanford, California



Compressive pericardial diseases: Abnormal respiro-phasic variation in LV and RV filling

Vale Dr Hatle 1936-2023

European Heart Journal - Cardiovascular Imaging (2023) **24**, 1425–1429
https://doi.org/10.1093/ehjci/jead206

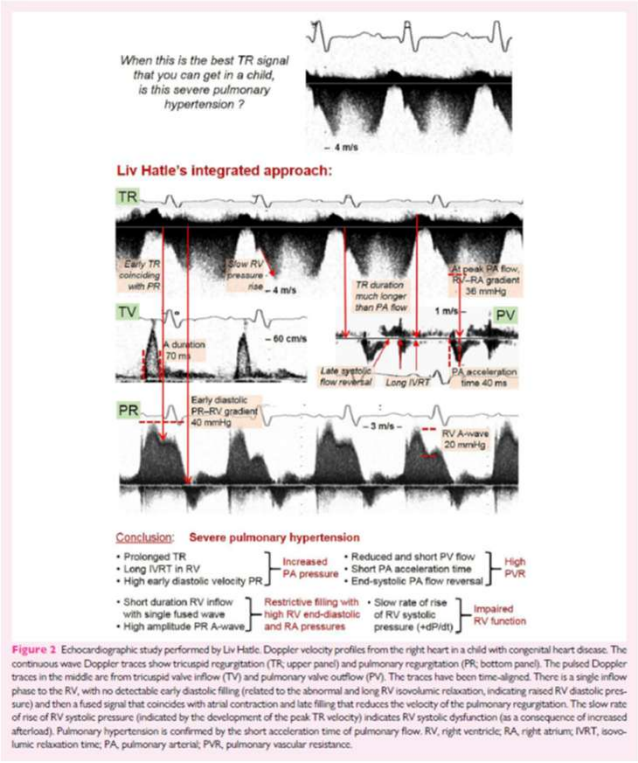


Figure 2 Echocardiographic study performed by Liv Hatle. Doppler velocity profiles from the right heart in a child with congenital heart disease. The continuous wave Doppler traces show tricuspid regurgitation (TR; upper panel) and pulmonary regurgitation (PR; bottom panel). The pulsed Doppler traces in the middle are from tricuspid valve inflow (TV) and pulmonary valve outflow (PV). The traces have been time-aligned. There is a single inflow phase to the RV, with no detectable early diastolic filling (related to the abnormal and long RV isovolumic relaxation, indicating raised RV diastolic pressure) and then a fused signal that coincides with atrial contraction and late filling that reduces the velocity of the pulmonary regurgitation. The slow rate of rise of RV systolic pressure (indicated by the development of the peak TR velocity) indicates RV systolic dysfunction (as a consequence of increased afterload). Pulmonary hypertension is confirmed by the short acceleration time of pulmonary flow. RV, right ventricle; RA, right atrium; IVRT, isovolumic relaxation time; PA, pulmonary arterial; PVR, pulmonary vascular resistance.

My Big moments in Echocardiography

2. Transoesophageal Echocardiography

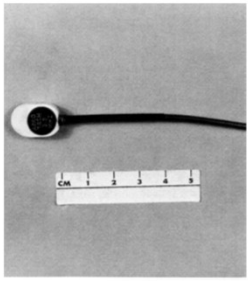
Big moments in Echocardiography: 1990's

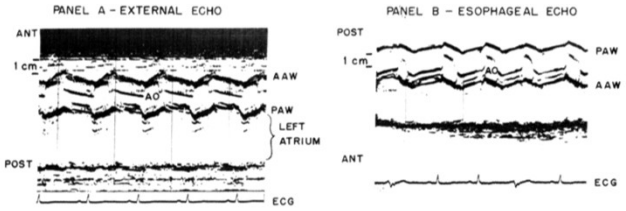
1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

Transoesophageal Echo mid 1980s

Esophageal Echocardiography

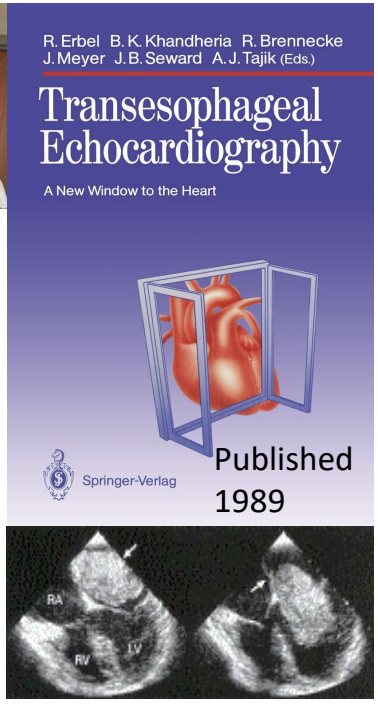
LEON FRAZIN, M.D., JAMES V. TALANO, M.D., LEO STEPHANIDES, M.S., HENRY S. LOEB, M.D., LEROY KOPEL, M.S., AND ROLF M. GUNNAR, M.D.





1st description Franzin et al 1976

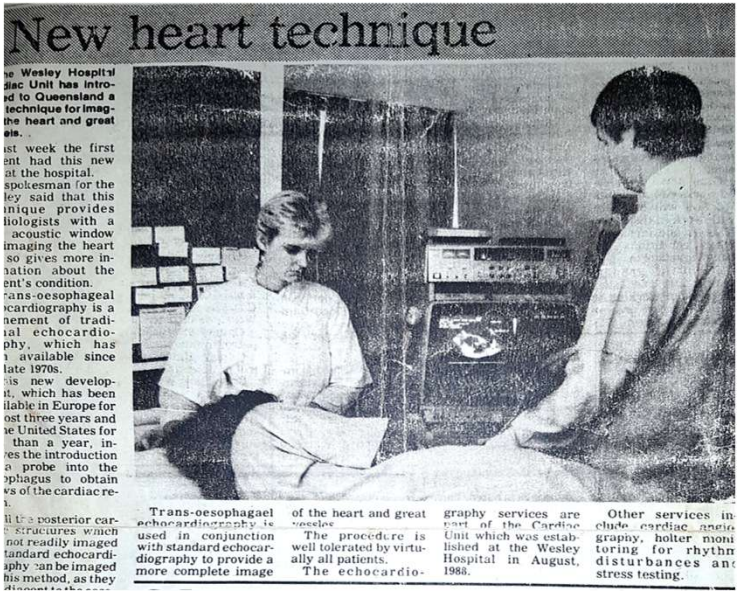
Bijoy



Published 1989

'A new window to the heart'

TOE introduced in Qld 1989



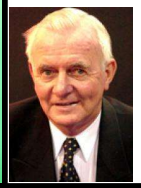
New heart technique

Trans-oesophagael echocardiography is used in conjunction with standard echocardiography to provide a more complete image of the heart and great vessles. The procedure is well tolerated by virtually all patients. The echocardiography services are part of the Cardiac Unit which was established at the Wesley Hospital in August, 1988. Other services include cardiac angiography, holter monitoring for rhythm disturbances and stress testing.

Wesley Hospital, Brisbane

ECHO AUSTRALIA

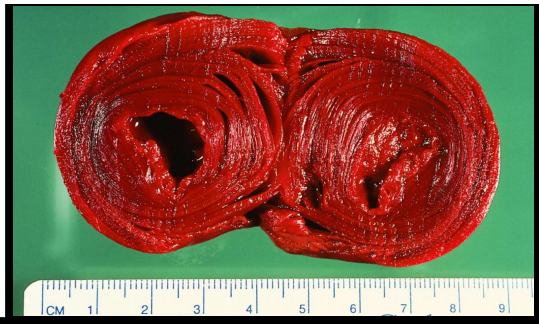
Images in Cardiovascular Medicine

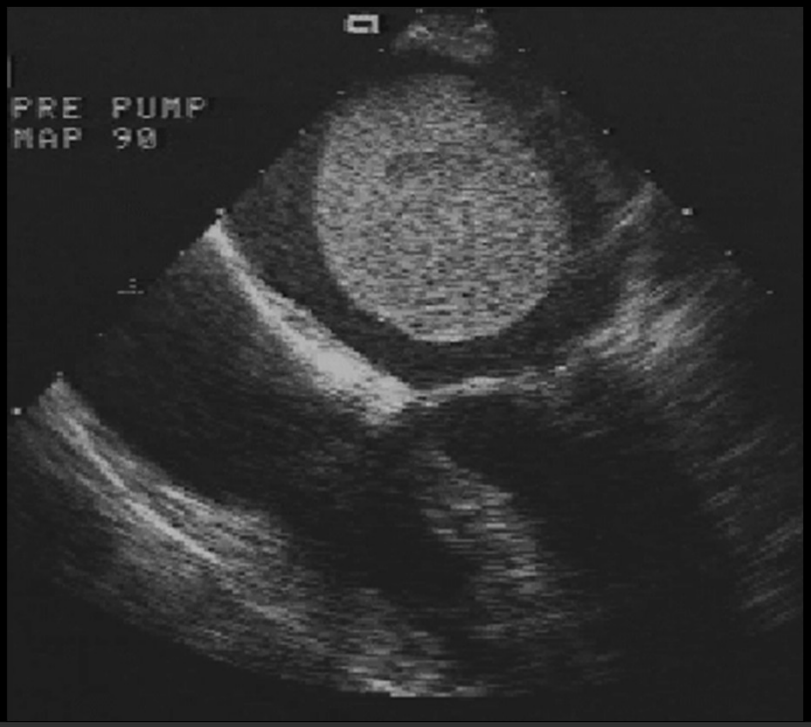


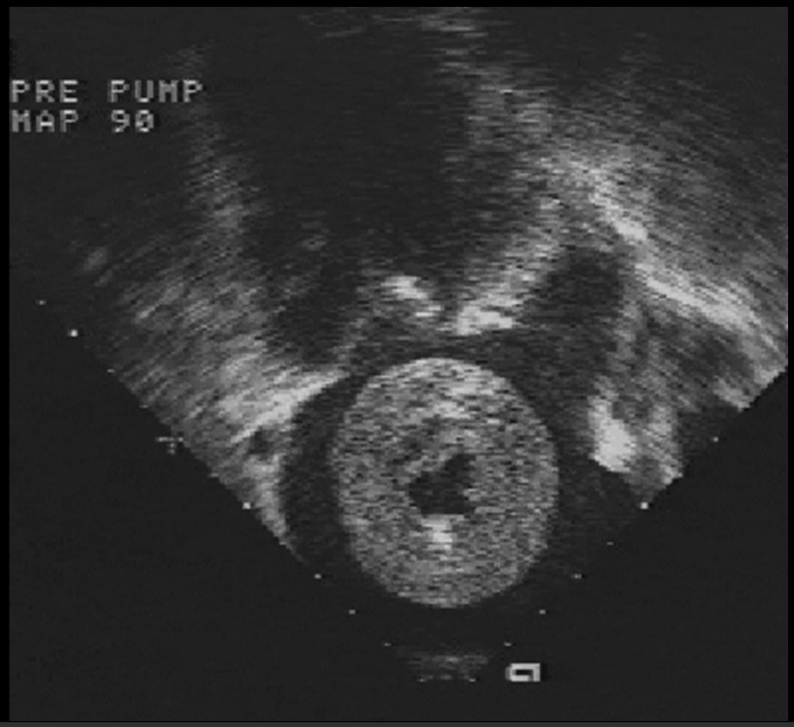
Mobile Left Atrial Thrombus Associated With Mitral Stenosis

(Circulation. 1998;98:931-932)

G.R. Wright-Smith, MBBS; D.J. Burstow, FRACP; R. Seymour, FRACP;
C. Smith, FRACS; M.F. O'Brien, FRACS, FRCS







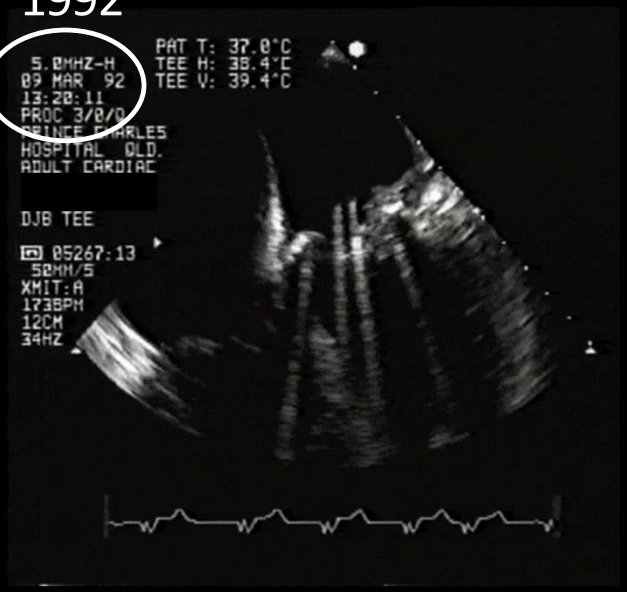
Big moments in Echocardiography: 1990's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

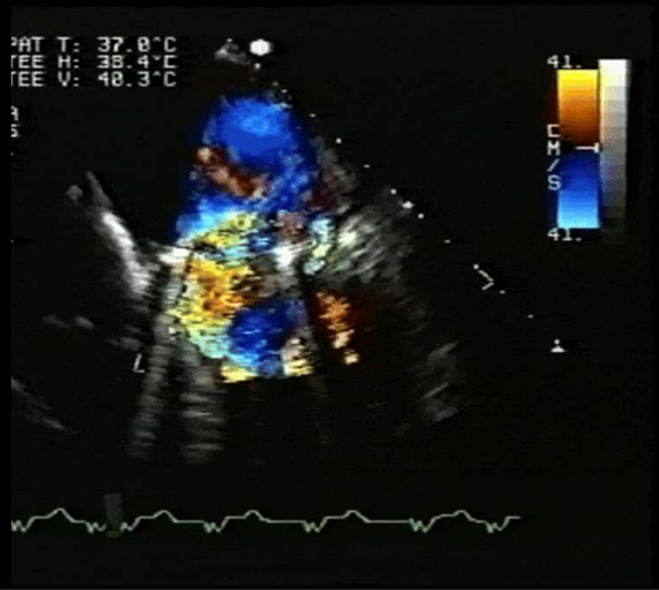
Transoesophageal Echocardiography

Improved image resolution (esp. posterior cardiac structures) promised higher diagnostic yield

1992



TTE for comparison



MVR (rocking) with vegetation and severe perivalvar MR

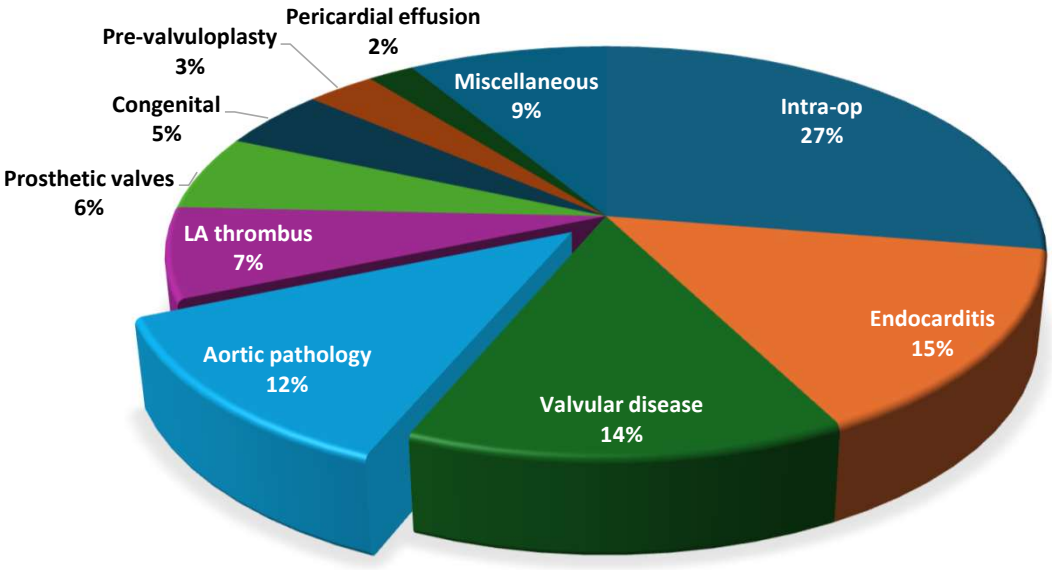
ECHO AUSTRALIA

Big moments in Echocardiography: 1990's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

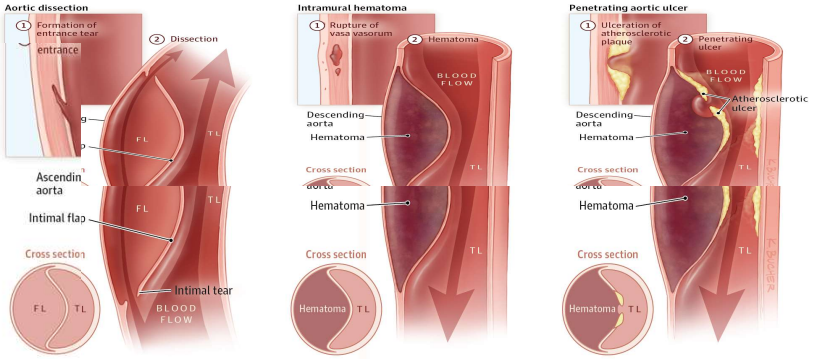
Transoesophageal Echocardiography

Indications no. = 4282



TPCH TOE 1990-1995

Acute Aortic Syndromes



Diagnosis and Therapeutic Consequences of Intramural Aortic Hematoma

T. Schappert, M.D., V. Sadony, M.D., F. Schoen, M.D.,* C. v. Birgelen, M.D.,* H.-R. Zerkowski, M.D., and R. Erbel, M.D.*

*Departments of Thoracic and Cardiovascular Surgery and *Cardiology, Essen University Medical School, Essen, Germany*

(J Card Surg 1994;9:508-515)

Big moments in Echocardiography: 1990's

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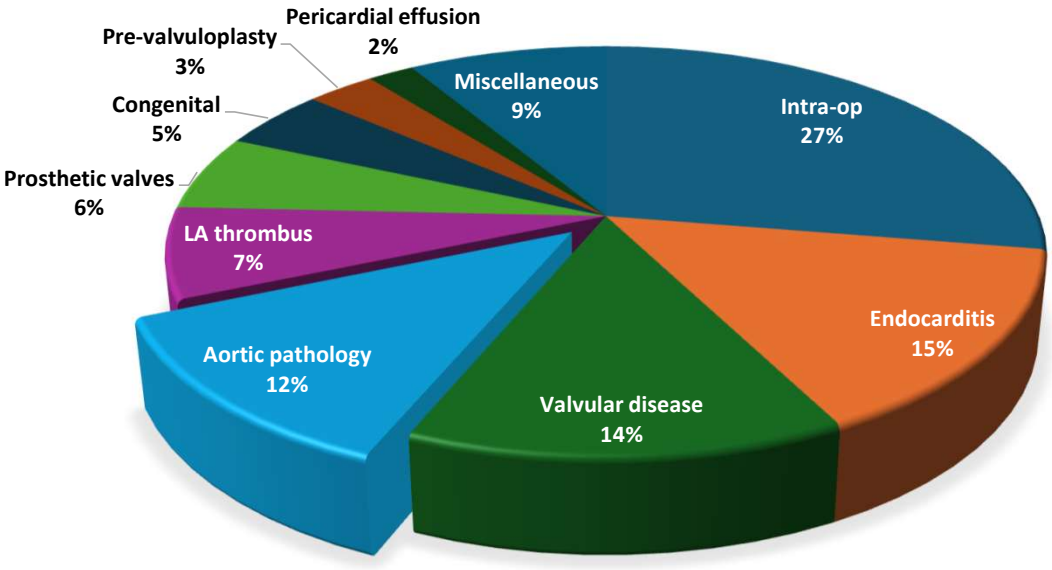
Transoesophageal Echocardiography

Indications no. = 4282



TPCH TOE 1990-1995

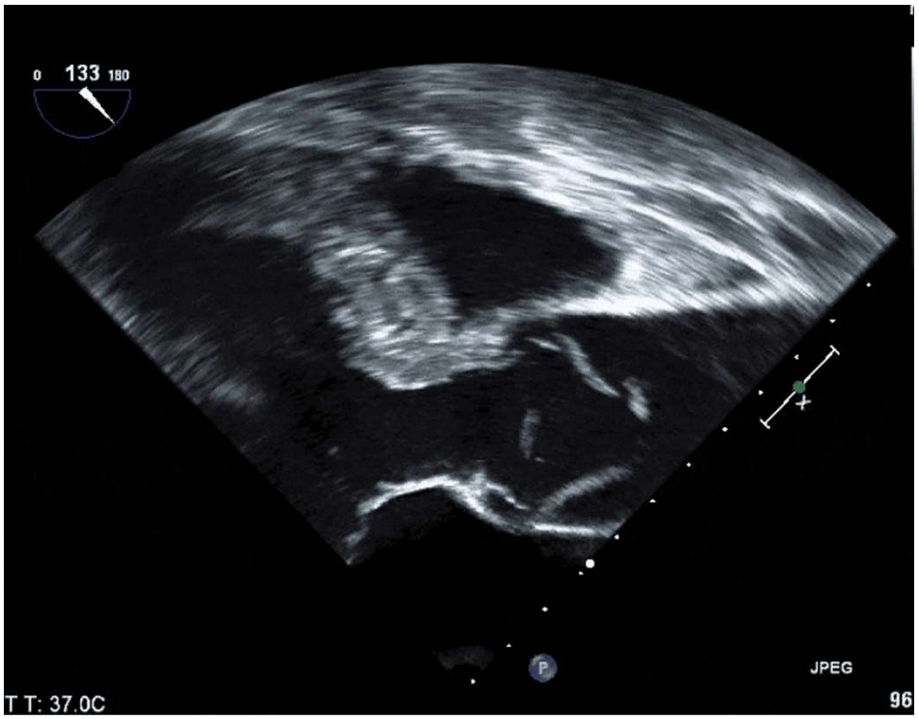
Data derived from Shiga et al: Diagnostic Accuracy of Transesophageal Echocardiography, Helical Computed Tomography, and Magnetic Resonance Imaging for Suspected Thoracic Aortic Dissection. Systematic Review and Meta-analysis *Arch Intern Med. 2006;166:1350-135.*

Imaging Technique	No of pooled Studies	Year of publication	Sensitivity (%)	Specificity (%)
TOE	10	1991-2000	98 (95-99)	95 (92-97)
Helical CT	3	1995-2003	100 (96-100)	98 (87-99)
MRI	7	1988-2000	98 (95-100)	98 (95-100)

Big moments in Echocardiography: 1990's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

TOE: primary diagnostic imaging modality for AAS (at TPCH)



Note……

- Time : 1am
- Number of call-in staff required

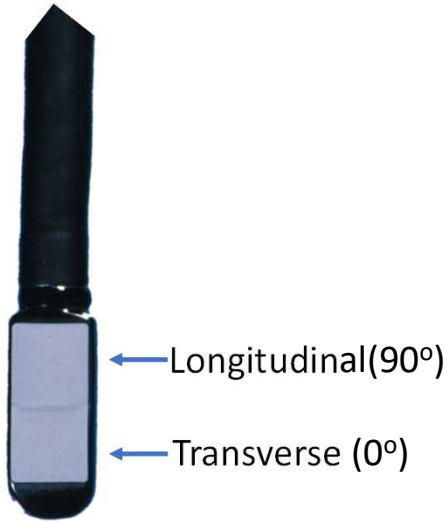
to perform procedure : 1

- Performed at bedside
- Rapid diagnosis : confirmed by clip #3
- Important ancillary data obtained
  - Normal LV function / No PE
  - Mechanical AV lesion
  - Site of entry tear
- No contrast requirement

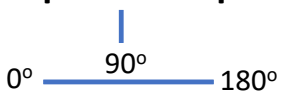
TOE remains an excellent imaging modality in the assessment of acute aortic syndromes

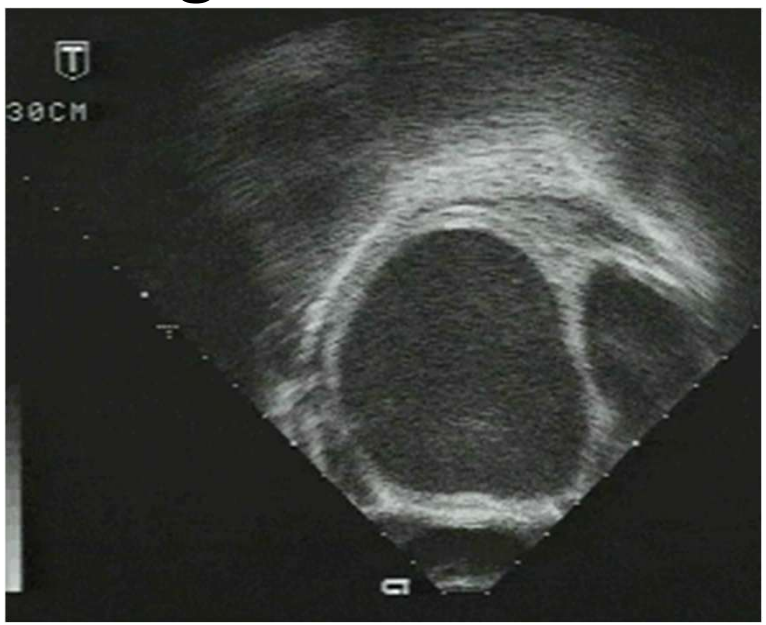
Big moments in Echocardiography: 1990's

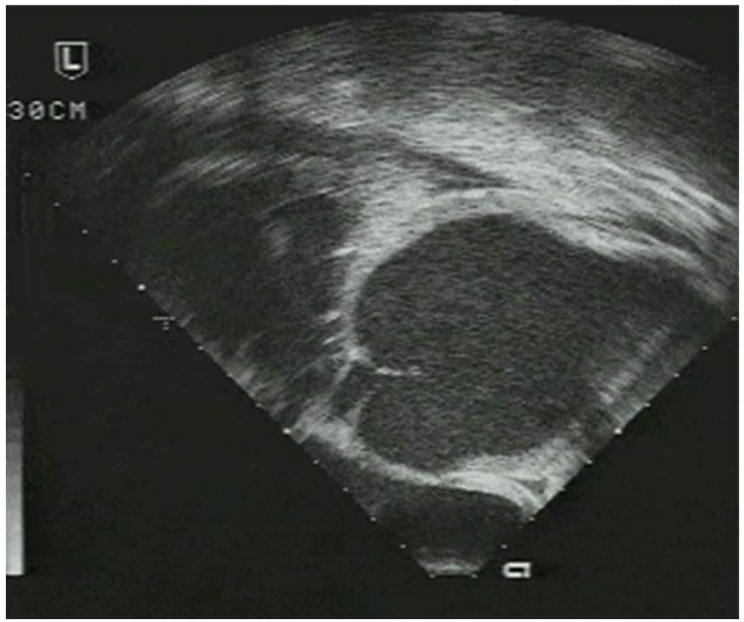
TOE: increased recognition of Intramural Haematoma (IMH)



Bi-plane TOE probe







1995: My first recognized case of IMH in a 35yr old male with Annulo-aortic ectasia
(Note associated small pericardial effusion)

Big moments in Echocardiography: 1990's

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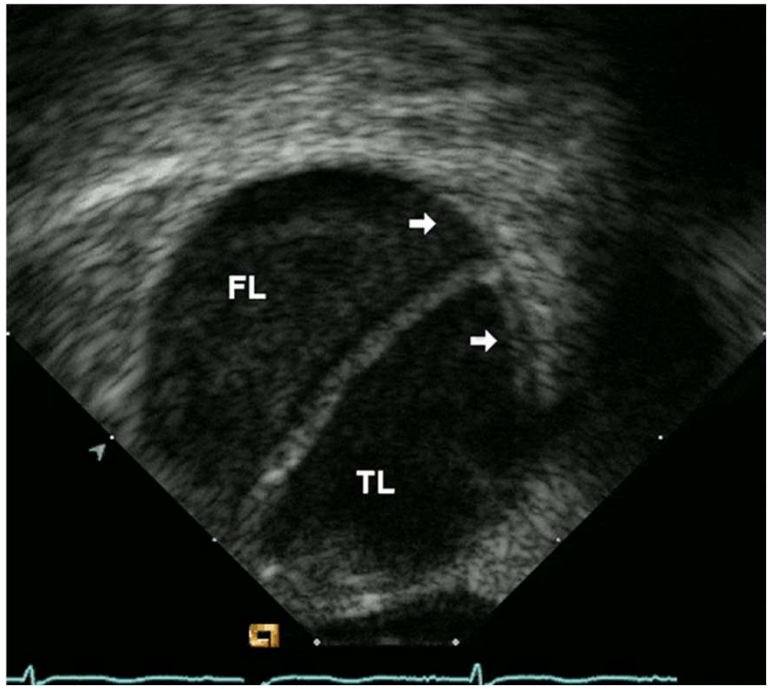
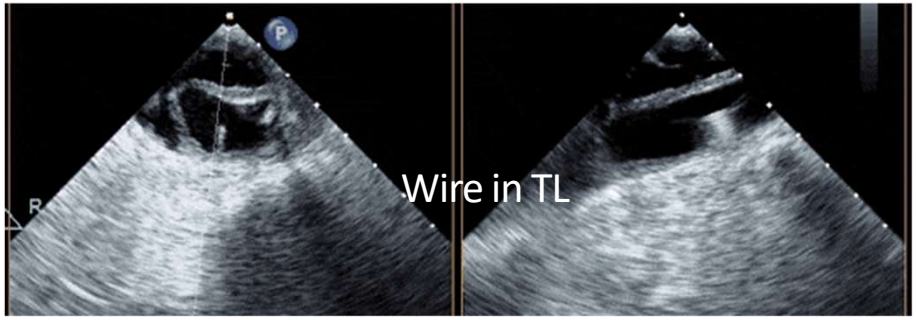
TOE in AAS: secondary imaging goals



Intact wall of the TL (highest sens & spec)

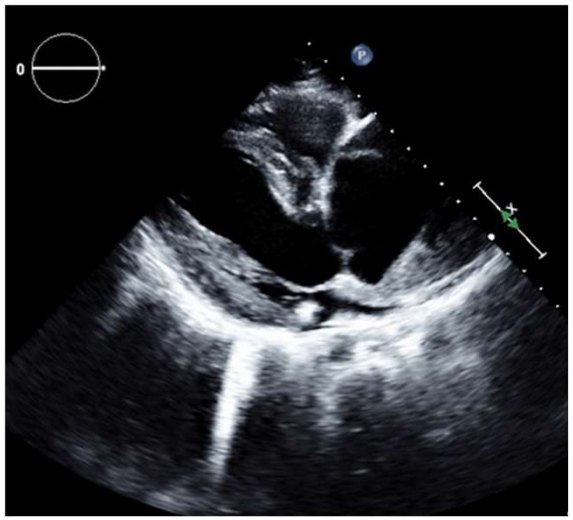
Cobwebs in FL



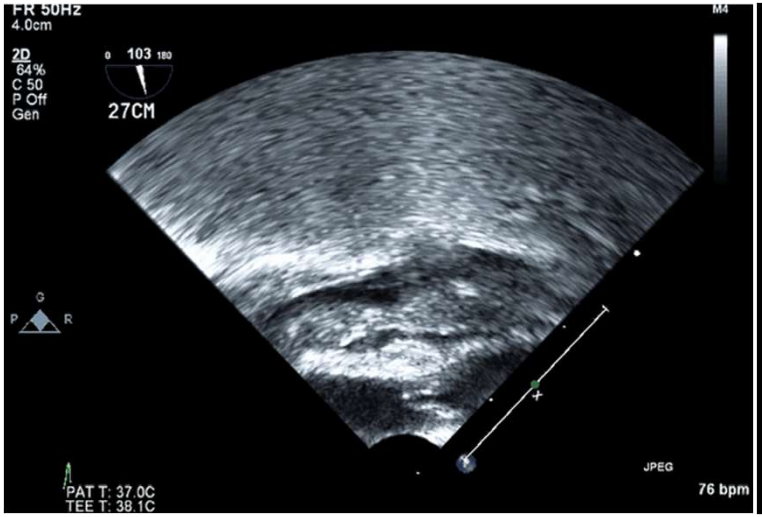
Big moments in Echocardiography: 1990's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

TOE in AAS: rarer pathologies



TTE: BAV / Type A dissection



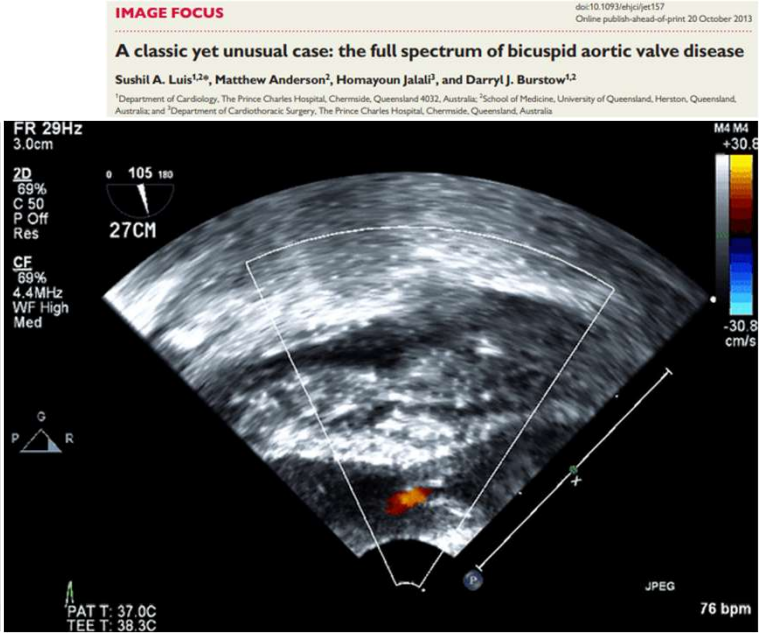


IMAGE FOCUS

doi:10.1093/ehjci/jet157
Online publish-ahead-of-print 20 October 2013

A classic yet unusual case: the full spectrum of bicuspid aortic valve disease

Sushil A. Luis[1,2]*, Matthew Anderson[2], Homayoun Jalali[3], and Darryl J. Burstow[1,2]

[1]Department of Cardiology, The Prince Charles Hospital, Chermside, Queensland 4032, Australia; [2]School of Medicine, University of Queensland, Herston, Queensland, Australia; and [3]Department of Cardiothoracic Surgery, The Prince Charles Hospital, Chermside, Queensland, Australia

Pre-pump TOE : severe coarctation

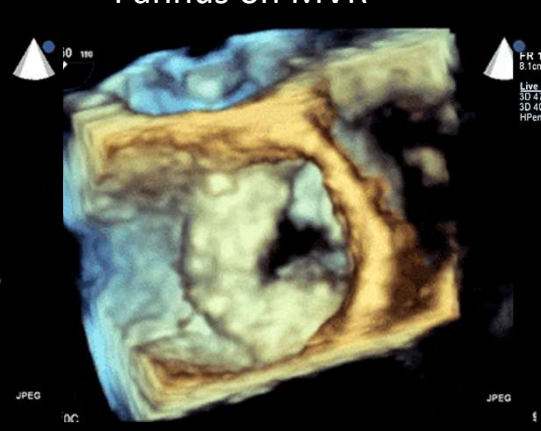
Big moments in Echocardiography

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

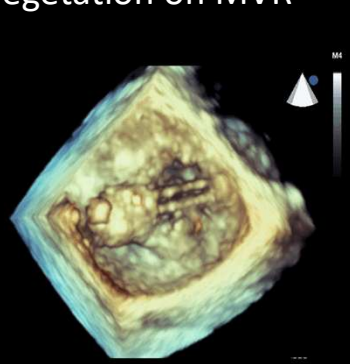
Continued evolution of TOE
3D TOE

Mitral stenosis

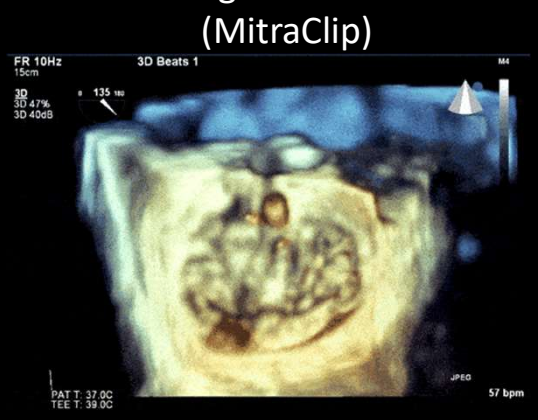
Pannus on MVR



Vegetation on MVR



Guiding interventions (MitraClip)

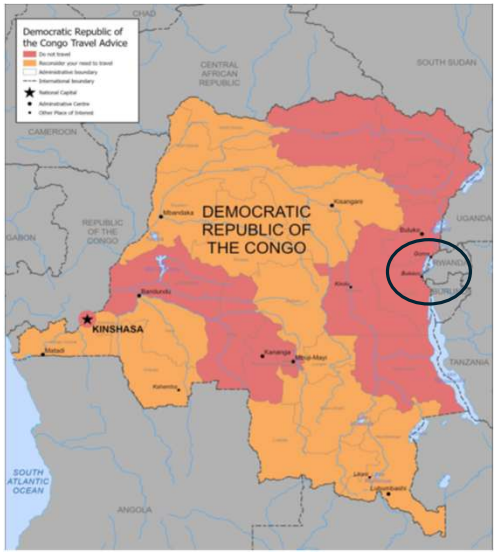


ECHO AUSTRALIA

My Big moments in Echocardiography

3. Miniaturization

Heal Africa Hospital in Goma, D.R.Congo

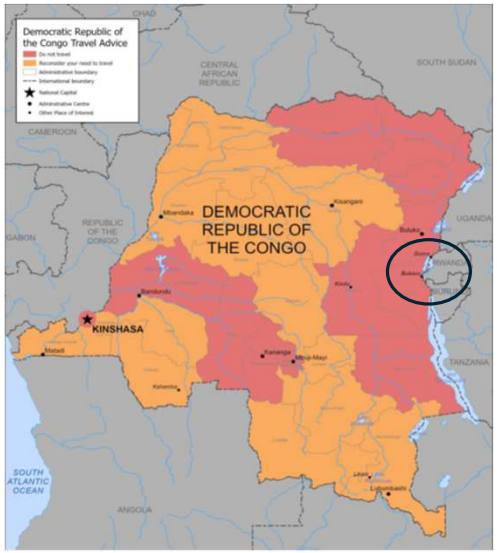


- Goma is the capital of North Kivu province
- Life expectancy 64yrs
- Mean age 14yrs
- Mean years of schooling: 3.5 years (up to 9 years)
- Living with war > 40 yrs
- Unemployment 90%

AusHEAL

https://ausheal.org.au/

Heal Africa Hospital in Goma, D.R.Congo



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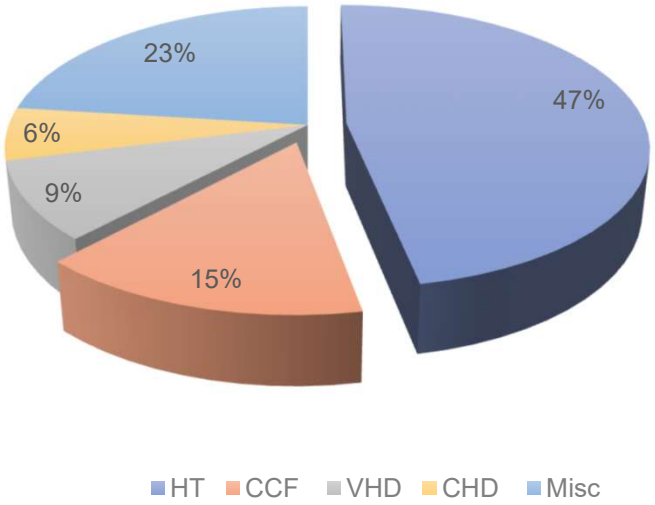
AusHEAL

https://ausheal.org.au/

High CVS Disease burden in DRC

- **Hypertension** and **Heart Failure** are common diagnoses at Heal Africa Hospital

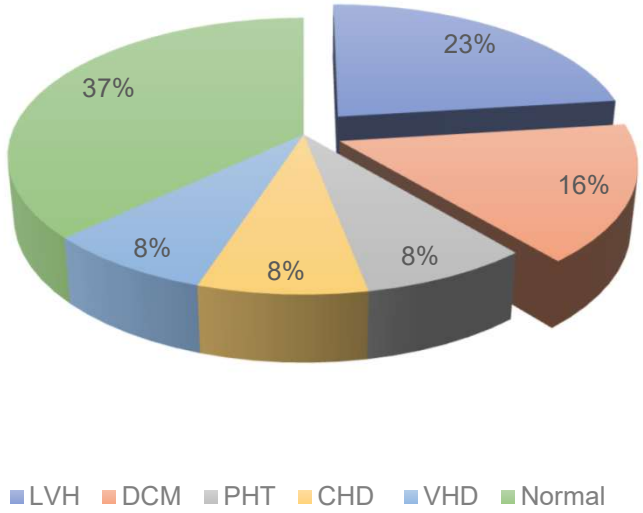
Clinical presentations to Cardiology OPD at HA



High burden of Hypertension / CCF

n = 120pts
Mean Age: 48.5 yrs

Echo findings at Cardiology OPD at HA



LVH / DCM or VHD present in nearly 50%

Data from AusHeal team visits 2022-23

Big moments in Echocardiography: 2010's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

Miniaturization

Hand-held Ultrasound (HHU)

Mobile Echo system

Big moments in Echocardiography: 2010's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

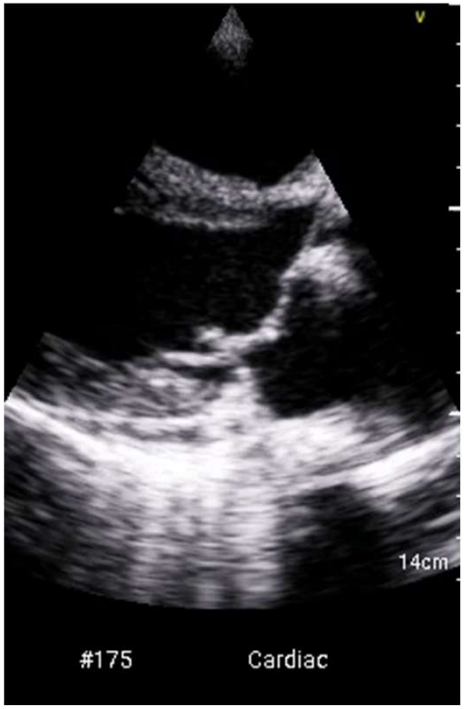
HHU

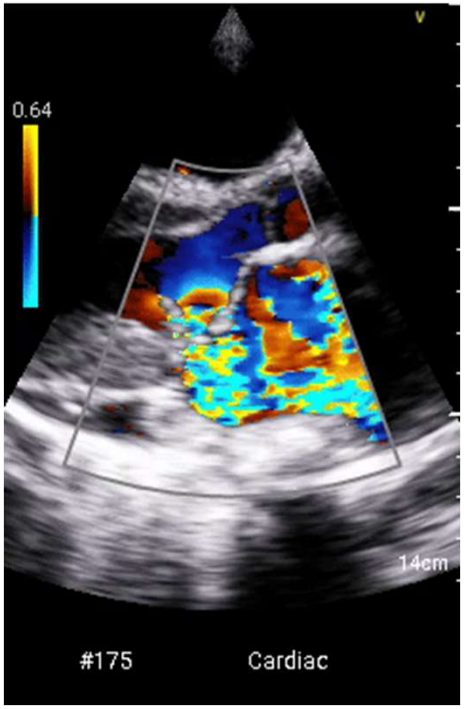
Miniaturization

Mobile
Echo systems

57 yrs female

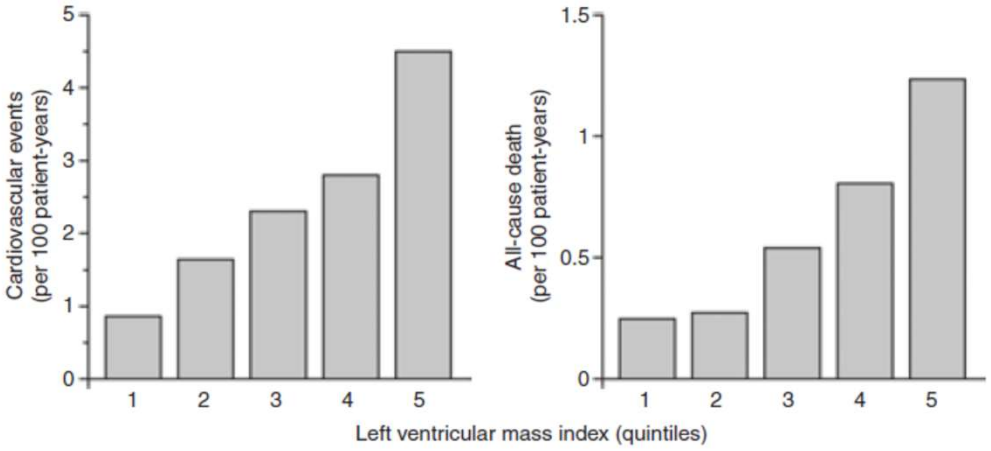
- One month history of dyspnoea
- PSM
- Hypertension
- Vscan Echo:
  - Ant MVP with ruptured chordae
  - Severe MR
  - Likely underlying Rheumatic valve



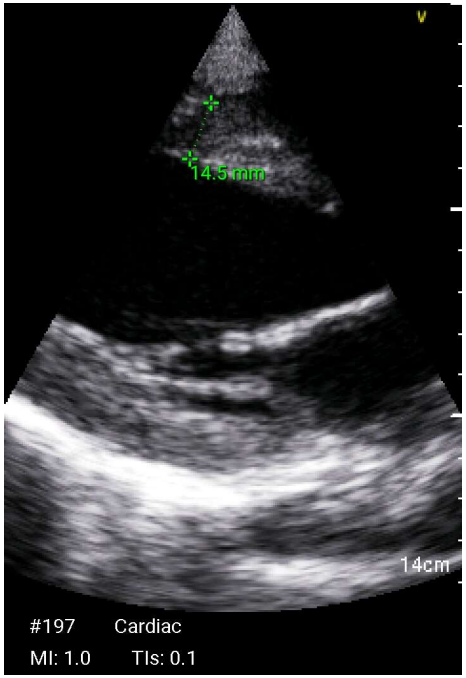


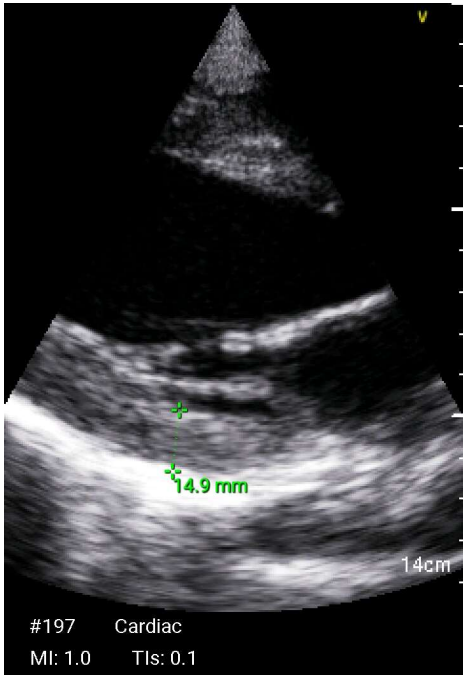
Patient with Hypertension : Value in detecting LVH

- Increasing LVH correlates with a poorer prognosis



Am J Hypertens 2008;21:500-508

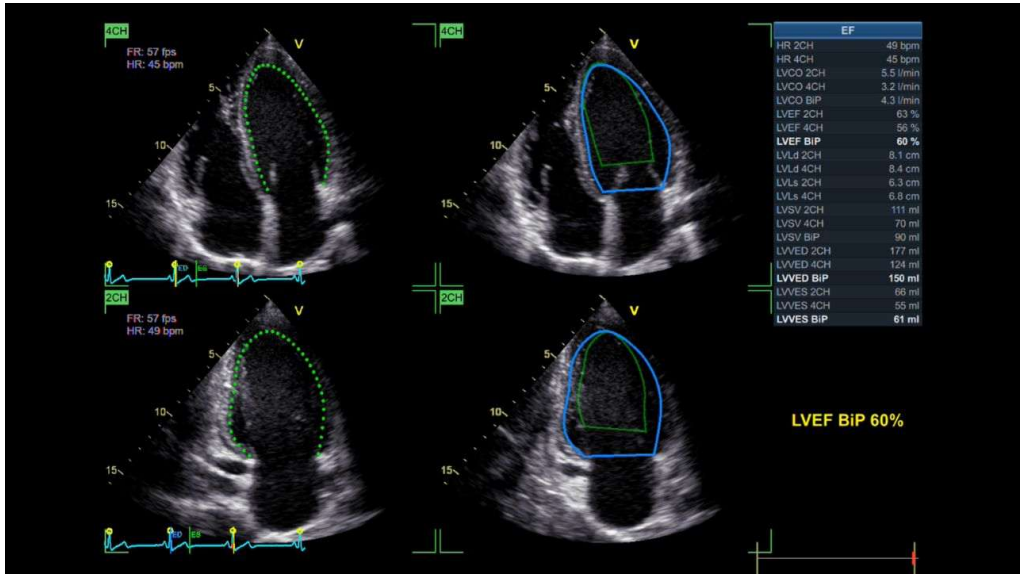




Patient with Heart failure : Value in detecting phenotype

- HFrEF vs HFpEF

Future greater automation with AI



Big moments in Echocardiography: 2010's

1800 1850 1900 1950 1970 1980 1990 2000 2010 2020

HHU

Miniaturization

Mobile Echo systems

Meets many of the Challenges of these regions

- **High burden of disease**
  - Can provide UAPE to POCUS to basic comprehensive exam
  - Important core parameters regularly obtained. 'less' is often more in this environment
- **Poor patient population**
  - Minimal / low cost
- **No government support** (currently under military occupation by M23 rebels)
  - Minimal / low cost
- **Limited clinical skills training**
  - Real time teaching at the bedside
  - 'safety net'
  - Possible future role of AI
- **Unreliable Power**
  - Runs on battery
- **Limited infrastructure**
  - Can bring machine back to Australia for service and repair

My Big moments in Echocardiography

1. Doppler ultrasound

The cornerstone of quantitation

2. Transoesophageal Echocardiography

The ‘New Window’ that gave us new eyes

3. Miniaturization

Providing just access to a critical technology

My Big moments in Echocardiography

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