PROSTHETIC VALVE THROMBOSIS
A DREADED COMPLICATION

by

Dr.V.Chitralekha

DEPARTMENT OF CARDIOThorACIC SURGERY

DEPARTMENT OF CARDIOLOGY

DEPARTMENT OF PAEDIATRICS
CASE REPORT

• 13 years old girl

• c/o nausea & vomiting – 3 days

• c/o G II ->G III Exertional dyspnea – 3 hrs

• Underwent MVR - 3 Months ago

• for Rheumatic mitral valve Disease with repeated attacks of infective Endocarditis.
Clinical Findings

- Conscious, Oriented, Afebrile, Tachypneic
- Sinus tachycardia - 137 / min
- JVP ↑, B.P 102 / 74 mm Hg
- Resp. rate 44 / min. Abd- hepatomegaly +
- CVS – Valve clicks not well heard
Investigations

• Prothrombin time & INR - 16 /13 – 1.1

• Emergency Echo – both leaflets partially closed & not moving

• Gradient across PV – peak 29 mm Hg
  mean 19.6 mm Hg
Treatment – Thrombolysis

• Streptokinase 1 lakh – I.V bolus ->
  1000 units / kg / DAY - 2 days

• Heparin 200 u / hr along with warfarin
  3 mg

• Serial estimation of APTT / PT & INR
Treatment – contd,

- Heparin for 1 week
- T.Warfarin 5 mg
- INR - 2.5
Investigations

- Flouroscopy on 2\textsuperscript{nd} day – one leaflet regained complete mobility > 80 \%
- Second leaflet was completely stuck

- Echo on 2\textsuperscript{nd} day –
- Gradient – peak- 12 mm Hg - mean 5 mm Hg
Clinical Course -

- Symptomatic improvement
- Clinically valve clicks well heard, No Liver
- After 1 week – ambulant, active
- INR stabilised
- Fit for Discharge
Clinical course – contd,

- Day prior to Discharge (10 days) c/o Palpitation & exertional dyspnea
- Repeat Fluro – Only 40% mobility of the single leaflet
- Echo – minimal movement of single leaflet
  Gradient – Peak – 25 mm Hg
  mean 15 mm Hg
Clinical Course – contd

• Nausea & vomiting started again
• Exertional dyspnea –progressive GIII -> IV
• INR – Stable - 2.4
• Echo – No evidence of Thrombus probably pannus formation
• Surgery – Thrombectomy / Reimplantation
• Repeat Thrombolysis – Doing well
Prosthetic Heart Valves

- Purpose – maintain unimpeded forward flow
- 1952 - DR. Hufngel implanted the first valve
Dr. Hufnagel Artificial Heart Valve in the collection of the National Museum of Health and Medicine.
1960 – First Starr- Edward valve
Starr Valve turns ’50”
Prosthetic Heart Valves

**Mechanical Valves**
- Ball & Cage
- Tilting Disk
- Bi-Leaflet
- Tri-Leaflet

**Biological Valves**
- Allograft / Iso graft
- Xenograft
Design Challenges

• Less thrombogenic

• No valve tissue interaction

• Blockage

• Minimal / no transvalvular gradient

• Minimal / no leakage

• Failure safety
STARR-EDWARDS MITRAL VALVE
PROSTHETIC BALL VALVES
BJORK – SHILEY DISC VALVE
MEDRONIC HALL BILEAFLET VALVE
CARPENTIER-EDWARDS DURALEX MITRAL VALVE (PORCINE)
BIOLOGICAL VALVES
Hancock- -M.O II Aortic bioprosthesis (porcine)
Prosthetic valve flow Pattern
Biological Valve Flow pattern
COMPLICATIONS - 0.3 - 5 %/year

- Valve Dysfunction
- STUCK VALVE
- PV Endocarditis
- Thromboembolic events
- Prosthetic Valve thrombosis
- Peri valvular leak
- Chronic Hemolysis
- Anticoagulant related haemorrhage
STUCK VALVE

• DEFINITION: Any thrombus in the absence of Infection attached near or to the operated Valve occluding part of blood flow or interfering with valve function
STUCK VALvE

- Fresh Thrombus
- Pannus ingrowth
- Combination of BOTH

Figure 1. A combination of valve thrombosis and pannus formation of prosthetic mitral valve.
Mechanism of clot formation

- Tissue Factor Activation
- Platlet Activation
- Contact Activation

- Initiation -> Amplification -> propagation
Causative & Risk Factors

- Inadequate Anticoagulants
- Poor patient Compliance
- Mitral valve prosthesis
- Atrial Fibrillation
- Drugs (eg. Contraceptives)
- Tumours
- Systemic Inflammation like SLE
- Low EF
Stuck Valve – contd,

**Symptoms**
- Asymptomatic
- Dyspnea
- Orthopnea
- PND
- Chest pain
- Palpitation
- Nausea
- LOC

**Signs**
- JVP
- Tachypnea
- Tachycardia
- Lessening / Absence of Valve clicks
- TIA
- Stroke
Investigations

- Prothrombin time & INR (International Normalised Ratio)
- Echocardiography
- Cinefluoroscopy
- MDCT - Multidetector row computed tomography
- CMR – Cardiac Magnetic Resonance
Investigations - ECHO

Transthoracic - TTE
- Widely available
- Good patient tolerance
- Portable
- Valve mobility
- LV Function

Transesophageal - TEE
- Widely available
- Good patient tolerance
- Portable
- Good Hemodynamic Assessment
- Mitral prosthesis
- LA clot
Investigations – contd,

• 3 D ECHO Doppler

• Fluroscopy
Investigations

**MDCT**
- 3D data set
- Aortic Pathology
- Sensitive for Detection of Calcification
- High Radiation
- Nephrotoxic contrast

**CMR**
- 3D data set
- No Ionising Radiation
Thrombosis VS Pannus

- Duration of symptoms
- Anticoagulant status
- Echo Intensity of the Mass
Treatment

- Heparin – Nonobstructed PV Thrombus

- Indication – Small fresh clots & Mild symptoms G I - II
Treatment – Thrombolysis

- Streptokinase
- Urokinase
- R tPA – Recombinant Tissue Type Plasminogen Activator
Thrombolysis – contd,

**Indications**
- PV Thrombosis
- NYHA class III – IV
- Low Cardiac output

**Contraindications**
- Active Internal Bleeding
- Pannus growth
- Haemorrhagic Shock
- Recent Cranial trauma
- B.P > 200 / 120 mm Hg
Thrombolysis- Advantages

• Alternative Therapy to tide over the crisis prior to surgery

• Unsuitable patients for surgery
Thrombolysis - DISADVANTAGES

- Continuous Monitoring
- Serial Investigations
- Allergic reactions, Embolism, Bleeding
- Incidence of Recurrence
- Ineffective in cases of pannus Formation
Surgery

• Thrombectomy

• Explant & Replacement of new valve
Explanted valve
Follow up therapy

• Adequate Anticoagulants
• Stabilised INR - 2.5 – 3.5
• Ecosprin / persantin/ clopidogrel
• Endocarditis Prophylaxis
Conclusion

- Principal risk factor – Inadequate anticoagulants
- Prompt Diagnosis
- Emergency Management
- Proper patient – physician Interaction