ANAESTHETIC CONSIDERATION IN A PATIENT WITH POST DOUBLE VALVE REPLACEMENT(DVR) WITH ATRIAL FIBRILLATION POSTED FOR NEPHRECTOMY

Dr. Kshitija Bora

JR-2

Dept. of Anaesthesiology

71yr old/male patient came to our hospital with chief complaints of:

- **Incomplete voiding of urine- 1 year**
- **Burning micturition- 1 month**

History of Presenting Illness:

- Patient was apparently alright 6 months ago when he developed **incomplete voiding of urine** associated with dribbling, urgency and increased frequency of urination.
- **Burning micturition since 1 month**, on-off, occasionally associated with fever
- **Shortness of Breath (NYHA class II)** since 3-4 years.
- **METS 2-3**
- No c/o chest pain/palpitations.
- No complaints of cough/cold/fever
- No previous h/o drug/food allergy.

Past History:

- Known case of **Hypertension** since 2018 (i.e. since 6 years) on medication

Tab Telmisartan 40mg OD

- **Surgical History: Bioprosthetic Double valve replacement** in 2018 (6yrs ago) under general anaesthesia, uneventful. Since then, patient was on

  - **Tab. Ecosprin AV 75mg/20mg OD**
  - **Tab. Digoxin 0.25mg OD**
  - **Tab. Lasix 20mg OD**
  - Tab. Warfarin-took for 4 years and then stopped

Personal History:

Not significant.

Family History:

Not significant.

General Examination

Weight: 80 kg
Height: 165 cm
BMI: 29.4 kg/m2

- Afebrile, conscious, well oriented to time, place and person.
- No pallor at present/icterus/clubbing/cyanosis/lymphadenopathy/oedema
- JVP not raised.

- Pulse: 56/min, **irregularly irregular** in right radial artery, good volume, no radio-radial or radio-femoral delay. Pulse deficit of 8 was noted. All peripheral pulses palpable.
- BP: 130/80 mmHg in left arm, supine position.
- RR – 16/min, regular, abdomino-thoracic
- SpO2 - 99% on room air
- Spine – IVS narrow, no deformity or scar

<u>Airway examination</u>

3 Finger mouth opening

Mallampati Score- 2

No loose teeth

Thyromental distance > 6.5cms

Neck movement: Not restricted

Systemic Examination:

❖ Cardiovascular System:

Inspection: Surgical scar of median sternotomy noted.
Apex impulse seen on left side of the chest 5th ICS 1cm medial to MCL.
No other visible pulsations.

Palpation: Apex beat palpated in the left 5th ICS 1cm medial to the MCL.
No parasternal heave or thrills.

Percussion: Left border of heart corresponds to the apex beat.

*Auscultation:*S1 & S2 heard.
No murmur.

- **Respiratory System:** Air entry bilaterally equal

  No added sounds

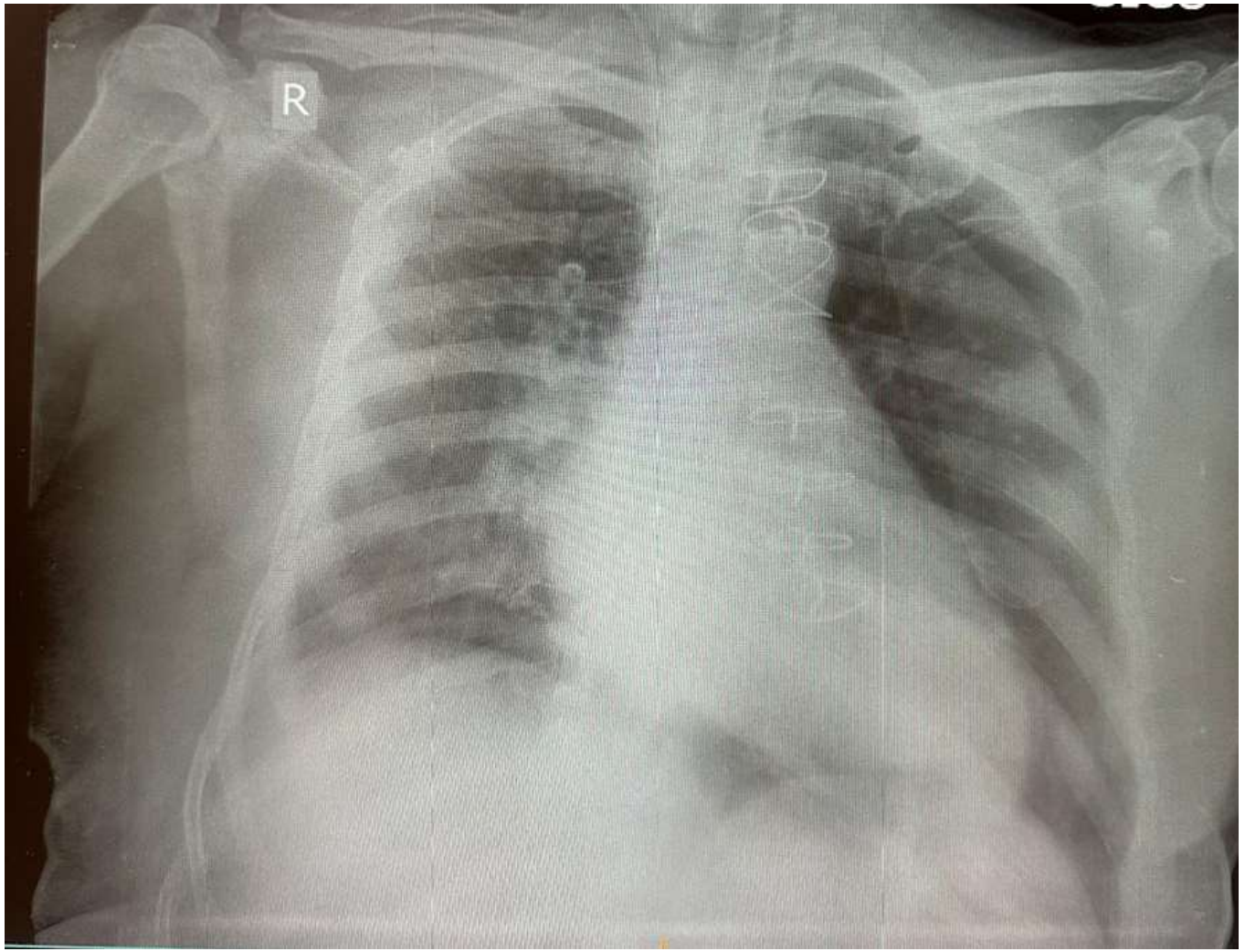
- **Central Nervous System:** Conscious, well oriented to time, place and person,

  no focal neurological deficit. GCS: 15/15

- **Per Abdomen:** Soft, non-tender

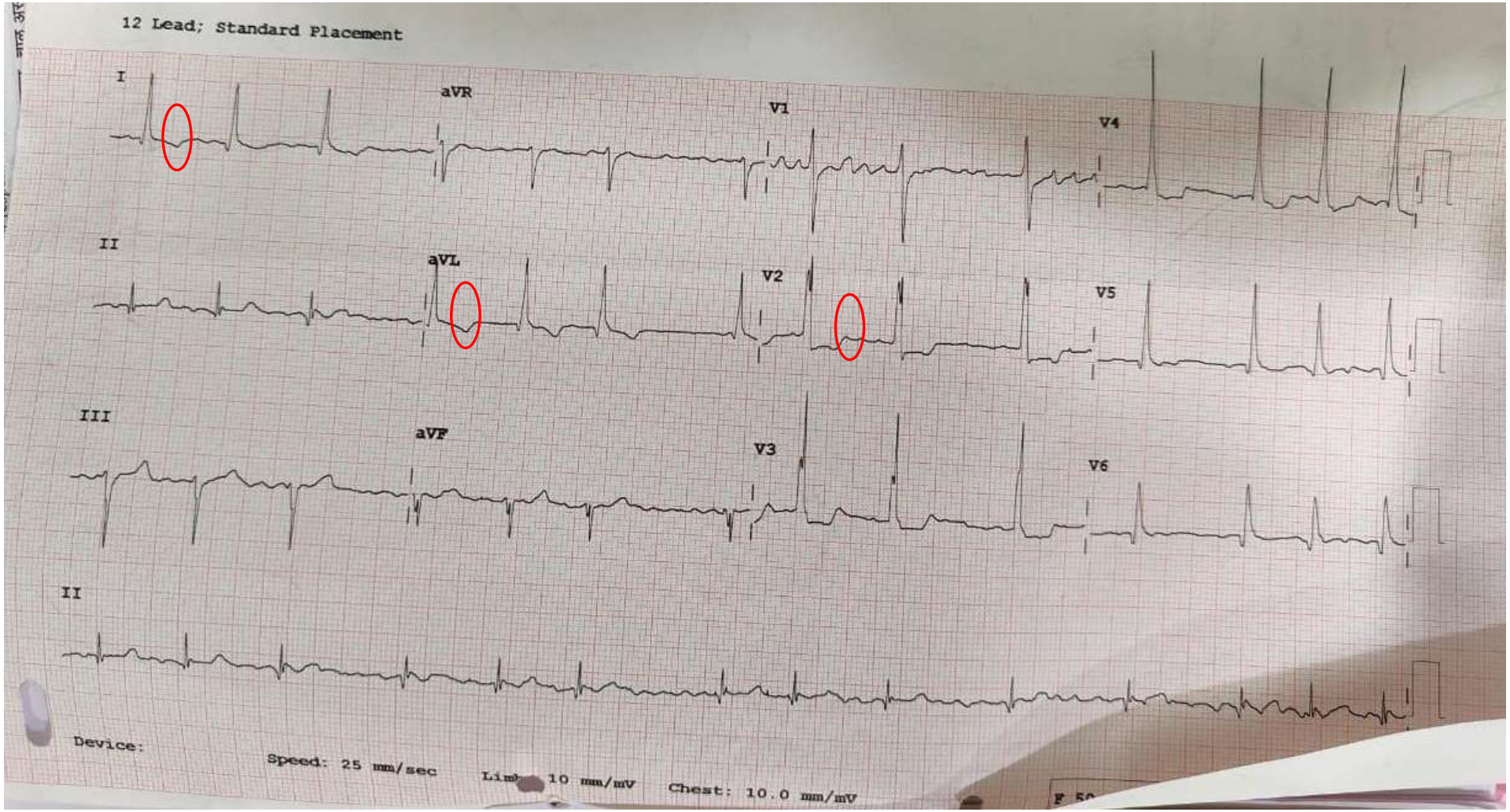
  Bowel sounds heard

Lab Investigation	Value
Hemoglobin	11.1 gm/dl
TLC	$9{,}900/mm^3$
Platelet Count	$2{,}70{,}000/mm^3$
Urea	27 mg/dl
Creatnine	1.28 mg/dl
Serum Electrolytes (Na/K/Cl)	135/4.2/105 mEq/L
PT/INR	12.7sec /1.09
Trop-I	33.7ng/L
CKMB	34 IU/L
NT Pro-BNP	**999 pg/ml**
RBS	110 mg/dl
Serology	Non-reactive
Blood Group	O Positive



- CXR: Cardiomegaly, increased Broncho-vascular markings, Bi-hilar opacities present, suture wiring noted.

❖ ECG: **Atrial fibrillation, Left axis deviation, T inversions noted in leads 1,V2, aVL**



2D-ECHO:

- 35% Ejection Fraction
- Dilated Left ventricle
- Severely depressed LV function
- Inferior, infero-septal, infero-lateral hypokinesia
- Moderate concentric Left Ventricular Hypertrophy
- No left atrial appendage clot
- Mitral and Aortic Valve prostheses in-situ; no paravalvular leak

❖ Cardiac Reference:

- Moderate cardiac risk;
- Start Inj Clexane 0.4cc s/c BD;
- Stop Inj Clexane 12hrs prior to surgery

❖ USG KUB-

- Left renal parenchymal disease;
- Prostatomegaly (35cc);
- Multiple right simple renal cysts(largest 21x26mm in upper pole);
- Left small kidney (55x28mm);
- Left obstructive calculus(18mm in renal pelvis and 10mm in interpolar region)

❖ EC (Ethylene dicysteine) Renal Scan:

- Poorly functioning kidney
- %function LK-2.63% RK-97.4%
- ERPF 127.4ml/min

DIAGNOSIS

71 Yr old male, a known case of hypertension with post bio-prostheses double valve replacement with atrial fibrillation, with non functioning left kidney posted for Left nephrectomy.

ANAESTHETIC MANAGEMENT

PRE-OPERATIVELY

- Tab.Ecosprin AV was stopped 5 days prior to surgery
- Inj.Clexane 0.4cc s/c BD was stopped 12hrs prior to surgery
- Tab.Telmisartan was withheld on the day of surgery
- Tab.Lasix 20mg OD continued
- Tab.Digoxin 0.25mg OD continued
- Patient given fitness under ASA-lll with High risk

- Patient and relatives were counselled about anaesthesia and associated risks.
- Written and informed consents taken.
- Patient Nil-By-Mouth for 8hrs
- One 20 G and one 18 G IV canula was secured.
- Adequate blood and blood products reserved.

Pre-op Vitals:

- PR: 56-58/min, irregularly irregular, good volume
- BP: 130/80mmHg
- SpO2: 99% on Room air
- Inj.Ceftriaxone 1gm iv was given 30 mins prior to the surgery.

Pre-Induction:

- All emergency drugs (including Amiodarone, Adrenaline, Digoxin and Noradrenaline) and Defibrillator kept ready.
- All standard ASA monitors were attached -Pulse oximeter, ECG, Invasive Blood pressure,

  End-tidal carbon dioxide, Nasal temperature probe
- Elasto-crepe bandage was applied on both lower limbs.
- Epidural catheter secured in sitting position at L2L3 intervertebral space; space achieved at

  4cm and fixed at 10cm
- Right IJV was secured with 7 French Tripple lumen central line using USG guidance under local anaesthesia.
- Arterial line secured in Left radial artery under local anaesthesia.

- Patient was **premedicated** with

  Inj Midazolam 0.02mg/kg iv

  Inj Fentanyl 2mcg/kg iv

  Inj Ondansetron 0.1mg/kg iv

- **Preoxygenated** for 3 min with 100% Oxygen

- **Induction** with,

Inj.Etomidate 0.3mg/kg iv given slowly and Inj.Vecuronium 0.1mg/kg iv

- Airway secured with **8.5** oral, cuffed, pvc endotracheal tube.

- After induction, Inj Bupivacaine 0.125% 10cc with 3mg morphine given via the **epidural** catheter.

- **Maintenance** with,
  - O2: N2O (50:50),
  - Sevoflurane (MAC between 1-1.2) and
  - Intermittent Inj.Vecuronium

- After induction, patient's position was changed from supine to lateral recumbent and kidney bridge raised.

- Soon after, there was a sudden **drop in the BP** (upto 60/30mmHg); which was managed by,

-**Inj.Noradrenaline** 4mg in 50cc NS infusion, (started at 0.05mcg/kg/minute)

-**Inj.Adrenaline** 2mg in 50cc NS, (0.1 mcg/kg/min)

Following which the hypotension resolved.

- The infusion rates were tapered and managed throughout intra-op according to the beat to beat IBP monitoring.
- ABGs drawn intermittently were within normal limits.
- Adequate intra-op analgesia was maintained with epidural and iv analgesics.

Total duration of surgery
4 Hours

- Patient was on Volume control ventilation throughout surgery

Volume Control	
Tidal Volume	450ml
RR	14/min
FiO2	50%
PEEP	1

- Input-output charting was done meticulously:

<u>Input/Output charting over 4 hours:</u>
Total Input: 2000ml
(1500 crystalloid +500ml colloid)
Blood loss:100ml
Urine output: 450ml

Input output balanced throughout surgery to maintain **euvolemia.**

- After completion of surgery, patient position was changed back to supine from right lateral position.

- At this time, it was noted that

  - The ECG monitor showed Tachyarrhythmia with rate between 180-200/min,

    Narrow QRS complexes
  - There was profound hypotension

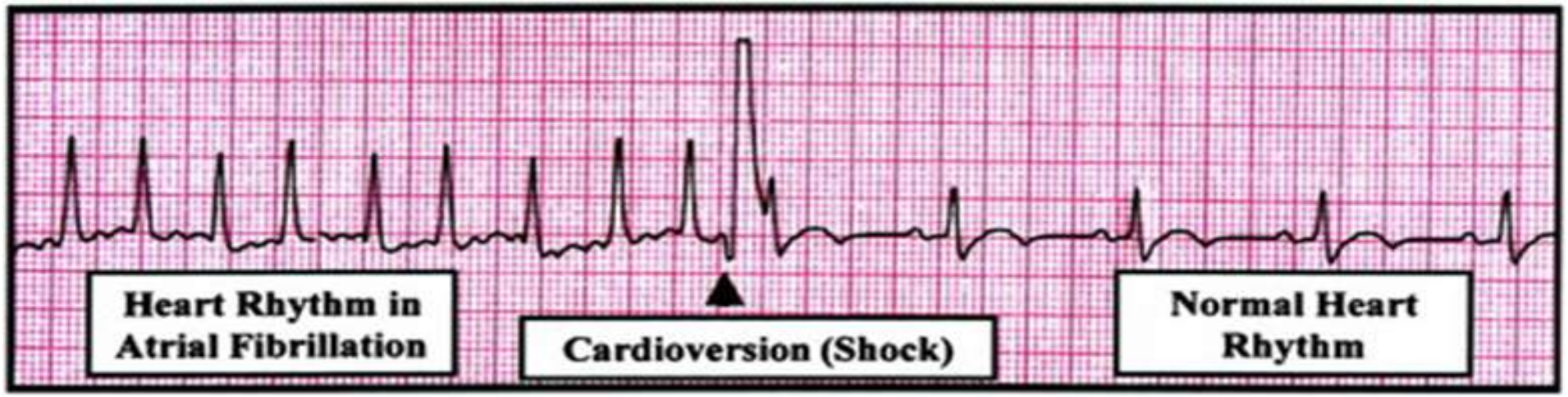
- Diagnosis of **Unstable Atrial Fibrillation** was made.

- In view of above findings,

We decided to CARDIOVERT.

- Defibrillator pads were placed antero-laterally.
- Set to **synchronized cardioversion**.
- After synchronization shock of **150J** was delivered.
- Following which,

Rhythm reverted to normal sinus rhythm.



Time (pm)	PR (bpm)	Rhythm	BP (mmHg)	Events	Intervention
1:35	56	Stable AF	100/70	Induction.	
2:05	62	Stable AF	**60/30**	**Position changed from supine to lateral recumbent.**	**Inj.Adrenaline and Inj.Noradrenaline infusions started.**
2:35	60	Stable AF	96/64	Fluctuating BP throughout surgery.	Inotrope and vasopressor support tapered according to beat to beat IBP to avoid hypotension
3:05	58	Stable AF	100/70		
3:35	64	Stable AF	104/68		
4:05	62	Stable AF	96/72		
4:35	60	Stable AF	98/64		
5:05	66	Stable AF	100/68		
5:20	180-200	**Tachyarrhythmia with narrow QRS Complexes; p waves absent**	**Non-recordable**	After surgery, **patient position changed from lateral recumbent to supine.**	**Unstable Atrial Fibrillation** diagnosed and **synchronised cardioversion** done.
5:40	90	NSR	100/90	Shifted to SICU	**Inj. Noradrenaline continued post-op.**

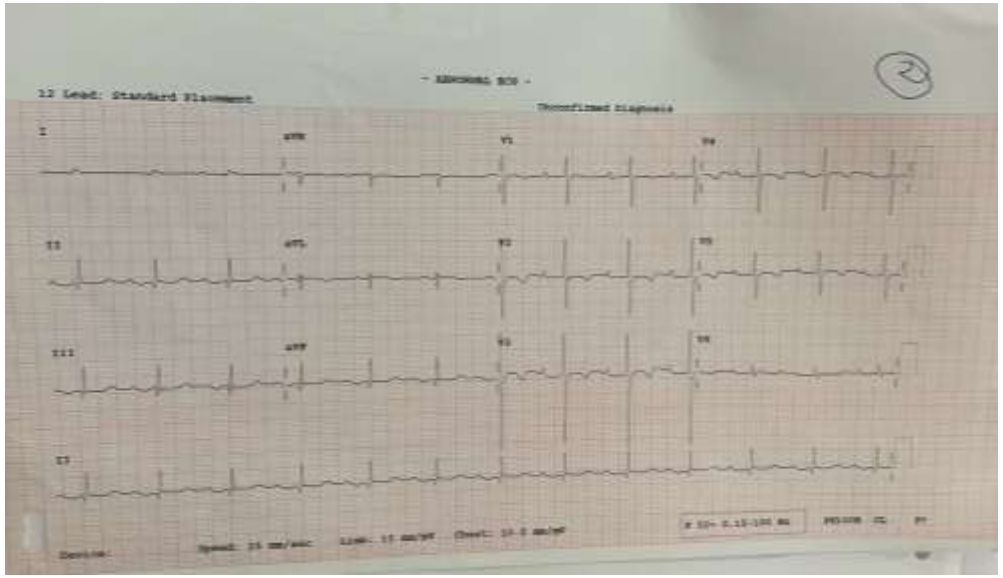
- In view of hemodynamic instability we decided to electively ventilate the patient and shifted him **intubated.**

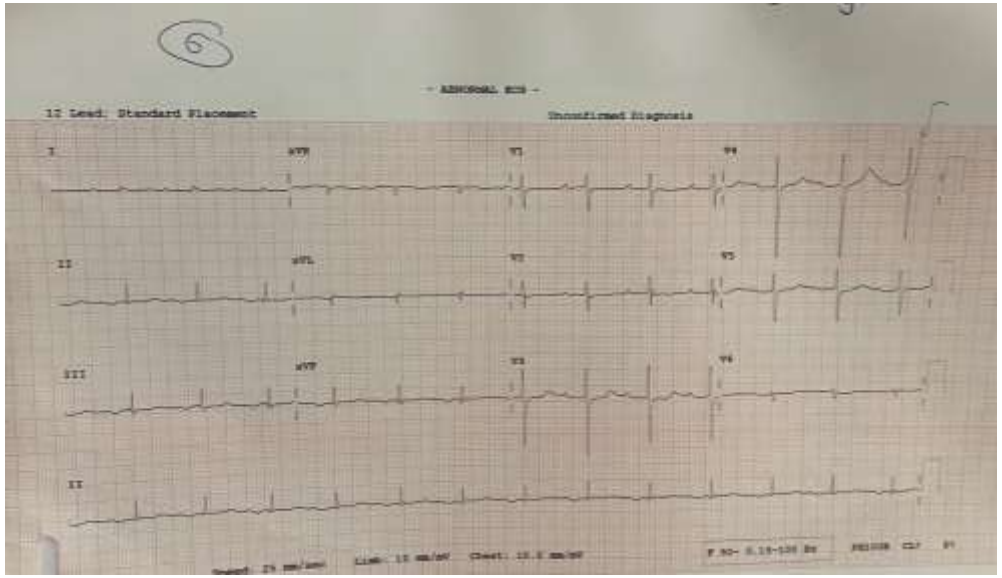
- Post operative vitals –
  - Pulse: 90/min, regular
  - BP: 100/90 mmHg (on inotropic support),
  - SpO2: 100 % (intubated, on VC)
  - ECG: Normal sinus rhythm

- Patient was shifted to **SICU** for observation.

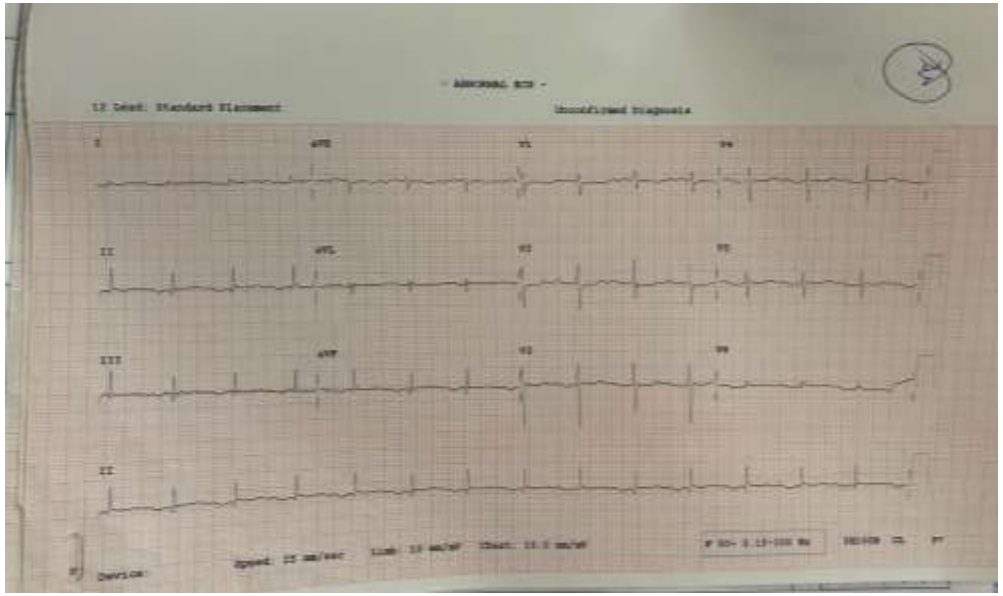
Post-operative:

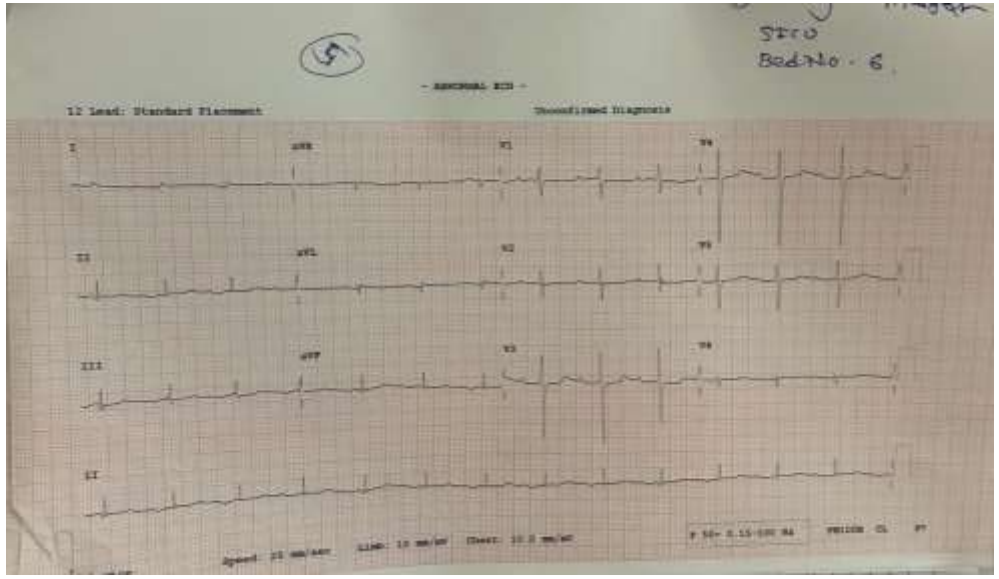
- Inj.Noradrenaline infusion was tapered to stop within 24hrs post surgery.
- Patient was extubated uneventfully on POD-1.
- Epidural catheter removed on POD-1, uneventful.
- Inj.Clexane 0.6ml s/c BD was started and then shifted to Tab.Acitrom 3mg OD.





SERIAL ECGS TAKEN POSTOP SHOWED NORMAL SINUS RHYTHM.





- **2D-Echo done post-op** showed

  - 35%EF
  - Dilated Left atrium and Left ventricle
  - Moderate concentric LVH
  - Inferior, infero-septal, infero-lateral wall hypokinesia at basal level
  - MV and AV prostheses in-situ, no leak across valves
  - Mild TR, Mild PAH

- Patient was shifted to Ward from ICU on POD-5,vitally stable.

- Later discharged from hospital on POD-9, after consulting cardiology for the continued medical management and follow up.

Anaesthetic Challenges were mainly due to:

1. **Atrial Fibrillation** → increased chances of thromboembolism.

↓

Increased chances of Myocardial Infarction, Stroke, Heart failure and of developing unstable arrythmias.

2. Bio-prosthetic **Double valve Replacement**

↓

Increased risk of thrombus formation, infection(endocarditis), arrhythmias.

3. Cardiovascular compromise owing to

Low ejection fraction,

Severely depressed LV function,

Geriatric age group and Hypertension.

-Diminished cardiac reserve may be manifested as exaggerated decreases in BP.

4. **Poor METS score and poor cardio-pulmonary reserve**.

5. Long-standing tachycardia is a well-recognized cause of heart failure and left ventricular dysfunction, called as, **Tachycardia-induced cardiomyopathy (TIC).**

DISCUSSION

In our case,

- **2D Echo** to rule out presence of any clot was done.
- Appropriate anticoagulation done prior to the surgery based on the Chads-65 score; (considering HTN, DM, Age, H/o Stroke and Heart Failure.)
- **Bridging therapy** was done. (As routinely recommended in patients having undergone DVR as per the 2017 ESC guidelines).
- **Prophylactic antibiotics** given prior to surgery to avoid infective endocarditis.
- Defibrillator and all emergency drugs were kept ready intra-op anticipating the complications.

- Epidural catheter secured to ensure **adequate analgesia**.
- **Cardio-stable anaesthetic drugs** (Inj.Etomidate and Inj.Vecuronium) were chosen over routine induction agents.
- Fluid restriction was planned.
- Hypotension was managed with **Inj.Noradrenaline and Inj.Adrenaline infusions** according to the invasive BP monitoring. It was ensured that no fluid boluses were given.
- Prompt diagnosis of Unstable Atrial Fibrillation and decision to cardiovert according to the **ACLS protocol** for unstable atrial fibrillation done.

- Presence of left ventricular hypertrophy in hypertensive patients is an important predictor of **cardiac mortality.**
- **Tachycardia-induced cardiomyopathy (TIC)** can be reversed with control of the tachycardia.

TAKE HOME MESSAGE

- ✓ Patient of apparently stable cardiac arrhythmia can become hemodynamically unstable peri-operatively at any point of time.
- ✓ Early detection and apt management is the key to successful outcome.

REFERENCES:

- Miller's Anaesthesia (9th edition)
- Kaplan's Cardiac Anaesthesia (8th edition)
- 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/ American Heart Association Joint Committee on Clinical Practice Guidelines
- Ethan R Ellis, Mark E Josephson, What About Tachycardia-induced Cardiomyopathy?, *Arrhythmia & Electrophysiology Review 2013;2(2):82–90*

THANK YOU!!