ANTERIOR MEDIASTINAL MASS: ANAESTHETIC CHALLENGES

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CHIEF COMPLAINTS

A 19-year-old female presented with chief complaints of

- Chest pain since 8 months
- Breathlessness since 1 month
- Fever since 4 days

HISTORY OF PRESENTING ILLNESS

- Patient was apparently alright 8 months back when she presented with complaints of continuous chest pain which had increased since the last 10 days, it was retrosternal and non-radiating

- Associated with breathlessness while walking uphill (MMRC Grade I) since 1 month, not exacerbated in supine position

- Low grade fever with evening rise in temperature since 4 days

- No h/o cough, stridor, hoarseness, dysphagia or neck fullness

PAST HISTORY

- Not a known case of bronchial asthma / tuberculosis / thyroid disease
- No history of ICU stay / blood transfusion / previous surgery

FAMILY HISTORY

- No significant family history

PERSONAL HISTORY

- No significant personal history

GENERAL EXAMINATION

Weight - 40 kgs,

Height - 156 cms,

BMI – 16.46 kg/m^2

- Conscious, co-operative, afebrile and oriented to time, place and person
- Patient was comfortably lying in supine position
- No pallor, icterus, cyanosis, clubbing, edema, lymphadenopathy
- Pulse rate - 86bpm in right radial artery, regular in rate and rhythm, all peripheral pulses palpable
- Blood pressure - 110/70 mmHg over right brachial artery in supine position
- Respiratory rate – 20 breaths/min
- SPO_2 - 96% on room air in sitting and supine position
- JVP – not raised

AIRWAY EXAMINATION

- Mouth opening – 3 fingers
- Mallampati score – Class 2
- Thyromental distance > 6.5 cm
- Neck movements – normal
- TM Joint mobility – mobile
- No loose or missing teeth

SYSTEMIC EXAMINATION

RESPIRATORY SYSTEM

- Inspection :
  - Normal shape of chest
  - Decreased movement of chest during respiration on left side
  - Respiratory rate – 20 breaths/min thoraco-abdominal pattern
  - Skin over chest normal, no scars present

RESPIRATORY SYSTEM

- Palpation :
  - Inspectory findings confirmed
  - Decreased movement of chest during respiration on left side
  - Trachea shifted to right side
  - Tactile vocal fremitus- diminished in left lower region

- Percussion :
  - Dull note on left middle and lower region

- Auscultation :
  - Significantly decreased air entry in left lower zone
  - No added sounds (wheeze, rhonchi, crepitations)

- **Cardiovascular system**
  - S_1S_2 heard, No murmurs present

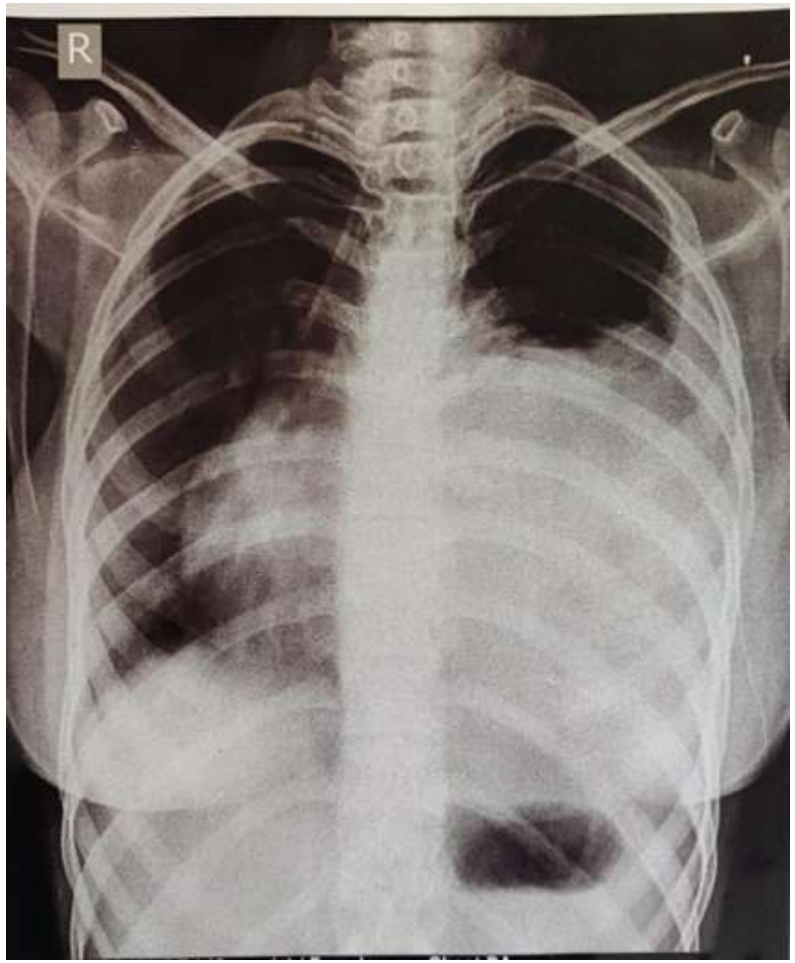
- **Central nervous system**
  - Power, tone and reflexes were normal
  - No focal neurological deficit

- **Per abdomen**
  - Soft, Non-tender
  - No organomegaly

INVESTIGATIONS

LAB PARAMETER	VALUE
Hemoglobin	11.2 gm/dl
TLC	7,930/ mm^3
Platelet	3,13,000 /mm^3
PT/INR	15.3/1.2
Urea	17 mg/dl
Creatinine	0.56 mg/dl
Na	138 mEq/L
K	4.6 mEq/L
Cl	103 mEq/L
Blood group	O positive
Serology	Non-reactive

INVESTIGATION	FINDINGS
Chest X-ray	• Large soft tissue lesion making an obtuse angle with mediastinal contour, • Mass in anterior mediastinum, extending up to left lateral chest wall, • Obscurring silhoutte of left diaphragm, • Obliteration of left CP angle with pleural effusion
ECG	Normal sinus rhythm
2D Echo	EF 60%, Grade 1 diastolic dysfunction, no RWMA, no PAH
Pulmonary function tests	Breath holding time 26 secs 6 mins walk test – Significant desaturation of 4% (96% to 92%) Spirometry – Restricition present



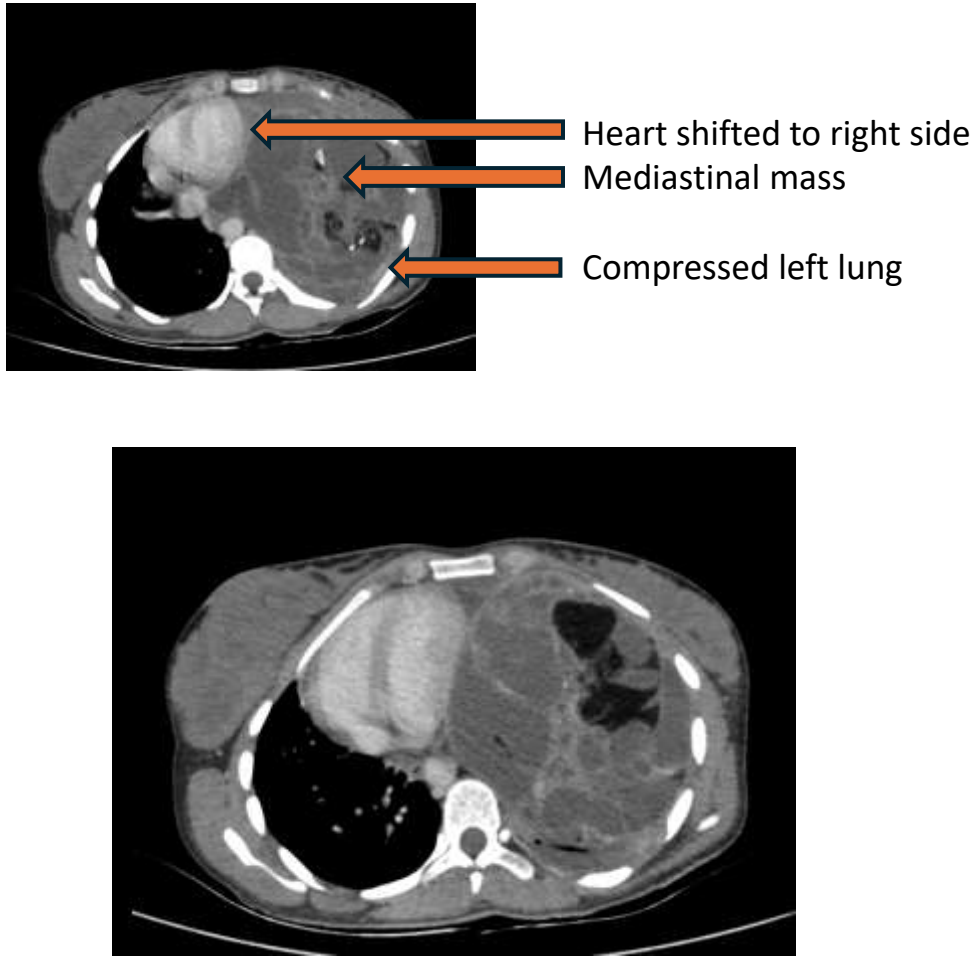
CHEST X-RAY

HRCT CHEST

- 14.7 x 14.4 x 11.3 cm mass lesion in mediastinum in left paracardiac region, displacing the mediastinum towards right with rotation of heart
- Superiorly abutting left brachiocephalic vein, arch of aorta and medially, main pulmonary artery, left superior pulmonary vein
- Posteromedially abutting left pulmonary artery, left inferior pulmonary vein and compressing left main bronchus
- Mild left pleural effusion

CT GUIDED BIOPSY

- HPE – Mature teratoma



HRCT CHEST

Tracheal deviation to right

Mediastinal mass

Heart shifted to right side

Compressed left lung

Mediastinal mass

CT CHEST AND ABDOMEN

DIAGNOSIS

A 19 year old female with large left side anterior mediastinal mass posted for surgical excision.

PLAN OF ANAESTHESIA

General Anaesthesia

Thoracic epidural

Double lumen endotracheal tube

PRE-OPERATIVELY

- A thorough pre anaesthetic evaluation, with due focus on pressure effects of the tumor on cardiovascular, major vessels and pulmonary system, was done
- Written informed consents for high risk, post operative intensive care and ventilator were obtained
- NBM more than 6 hours

- Adequate blood and blood products were kept ready

- Pre-operative optimization by nebulization with Duolin (Ipratropium bromide + Levosalbutamol) and Budesonide was advised night prior and morning of surgery

- Patient was taken up for surgery under ASA III with high risk

- PRE OP VITALS:

  PR: 90 beats/min

  BP: 110/90 mm Hg

  Spo_2: 97% on room air

ANAESTHETIC MANAGEMENT

- Standard ASA Monitors-ECG, NIBP, SPO_2 were attached
- Large bore IV cannulas were secured
- Difficult intubation trolley and emergency drugs were kept ready
- Arterial line was secured in right radial artery for invasive blood pressure monitoring under local anaesthesia
- Patient was preoxygenated with 100% O_2 for 3 minutes

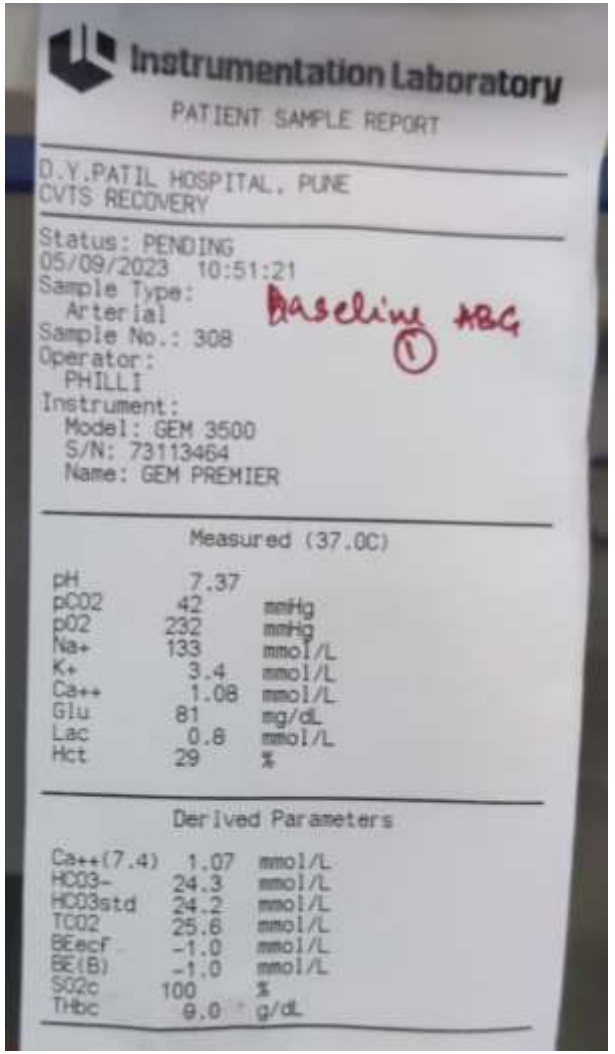
DIFFICULT AIRWAY CART

- Pre-medication was done with Inj Midazolam 0.02mg/kg, Inj Glycopyrrolate 4mcg/kg and Inj Fentanyl 2mcg/kg
- Induction was done with Inj Propofol 2mg/kg, given slowly
- Bag mask ventilation was possible, hence muscle relaxant Inj Vecuronium 0.1mg/kg was given
- Patient was intubated under C-MAC video laryngoscope guidance with Right sided 35Fr Double lumen tube, the tube placement was confirmed with bilateral equal air entry and tracing of end tidal CO_2
- Patient was maintained on O_2 + air mixture (50:50) + sevoflurane (MAC 1-1.2) and intermittent Inj Vecuronium

- Patient was then put on Volume control mode
- Post induction, thoracic epidural was secured in T_6-T_7 Intervertebral space in lateral position
- USG guided central venous catheterization was done in the right internal jugular vein
- Analgesia was ensured with Inj Morphine 3mg which was given via the epidural catheter followed by epidural infusion of 0.25% bupivacaine at 3-5 ml/hr

VENTILATOR SETTINGS

- Normothermia was maintained using body surface area warmer
- Median sternotomy incision was taken for removal of the mass
- Intra-operatively serial ABG monitoring was done to evaluate the oxygenation-ventilation status and haemoglobin monitoring
- Hypotension occurred during surgical resection and the blood loss was managed by administration of crystalloids, blood and noradrenaline infusion (0.02-0.05 mcg/kg/min)
- As majority of the left lung was collapsed, there was no requirement of one lung ventilation



Instrumentation Laboratory

PATIENT SAMPLE REPORT

D.Y.PATIL HOSPITAL, PUNE
CVTS RECOVERY

Status: PENDING
05/09/2023 10:51:21
Sample Type:
Arterial
Baseline ABG
Sample No.: 308
Operator:
PHILLI
Instrument:
Model: GEM 3500
S/N: 73113464
Name: GEM PREMIER

Measured (37.0C)

pH	7.37	
pCO2	42	mmHg
pO2	232	mmHg
Na+	133	mmol/L
K+	3.4	mmol/L
Ca++	1.08	mmol/L
Glu	81	mg/dL
Lac	0.8	mmol/L
Hct	29	%

Derived Parameters

Ca++(7.4)	1.07	mmol/L
HCO3-	24.3	mmol/L
HCO3std	24.2	mmol/L
TCO2	25.6	mmol/L
BEecf	-1.0	mmol/L
BE(B)	-1.0	mmol/L
SO2c	100	%
THbc	9.0	g/dL

BASELINE ABG ANALYSIS

- The intact tumour weighing 1.5 kg was removed

- After resection of the mass, there was expansion of the collapsed left lung and double lung ventilation was continued with the DLT

- Surgery lasted for 6 hours

- Prior to extubation, proper suctioning was done. After confirming adequate spontaneous breathing efforts, reversal was given, and patient was extubated uneventfully and shifted to SICU for observation

- Input/Output charting was done and euvolemia was maintained

  Input – 2780ml (Crystalloid 2140ml; 2 PCV)

  Output – Blood loss 1100ml; Urine output 800ml

MEDIASTINAL MASS SPECIMEN

INTRAOP HEMODYNAMIC MONITORING

TIME	PR (bpm)	BP (mmHg)	SPO_2	INTERVENTION
9 AM	84	110/70	100%	
10 AM	78	120/84	100%	
11 AM	75	**70/50**	100%	Crystalloid, 1st PCV, Inj Norad infusion 0.05 mcg/kg/min
12 AM	80	84/62	100%	2nd PCV, Inj Norad infusion 0.04 mcg/kg/min
1 PM	82	96/74	100%	Inj Norad infusion 0.02 mcg/kg/min
2 PM	89	118/82	100%	

POST OPERATIVE PERIOD-

- Patient was monitored in the ICU for 2 days
- Postoperative analgesia was achieved with epidural infusion of 0.125 % bupivacaine + fentanyl 2 mcg/ml at 5-7 ml/hr till POD 4
- Additional analgesic cover was given with Paracetamol
- Chest physiotherapy and incentive spirometry was done

POST OP CHEST X-RAY : POD 0

ONE LUNG VENTILATION (OLV)

The mechanical separation of the two lungs to allow ventilation of only one lung

INDICATIONS OF ONE LUNG VENTILATION

Absolute

1. Isolation of each lung to prevent contamination of a healthy lung
   a. Infection (abscess, infected cyst)
   b. Massive hemorrhage
2. Control of distribution of ventilation to only one lung
   a. Bronchopleural fistula
   b. Bronchopleural cutaneous fistula
   c. Unilateral cyst or bullae
   d. Major bronchial disruption or trauma
3. Unilateral lung lavage
4. Video-assisted thoracoscopic surgery

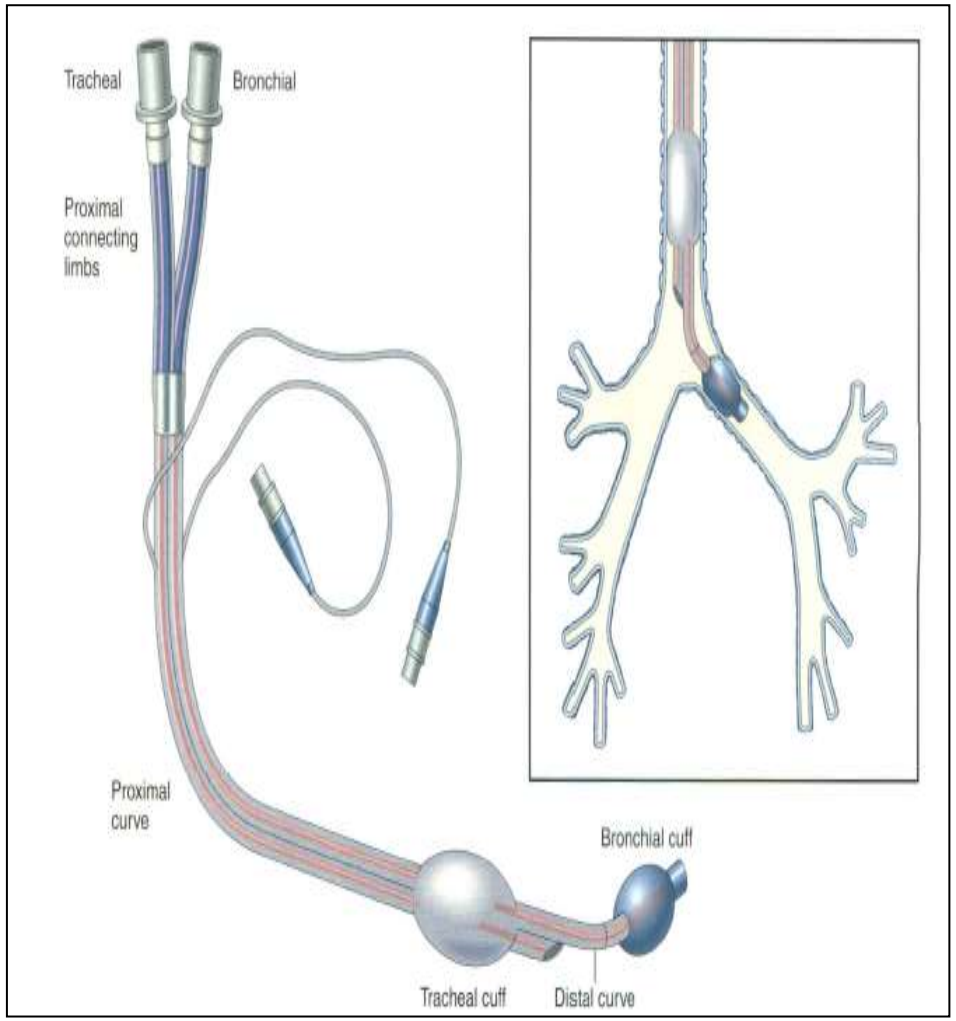
Relative

1. Surgical exposure—high priority
   a. Thoracic aortic aneurysm
   b. Pneumonectomy
   c. Lung volume reduction
   d. Minimally invasive cardiac surgery
   e. Upper lobectomy
2. Surgical exposure—low priority
   a. Esophageal surgery
   b. Middle and lower lobectomies
   c. Mediastinal mass resection, thymectomy
   d. Bilateral sympathectomies

DOUBLE LUMEN TUBE(DLT)

- Bifurcated tube that can be used to achieve isolation of either the right or the left lung
- All DLTs share the following characteristics:

1. Longer **bronchial lumen** (enters either the right or left main bronchus)
2. Shorter **tracheal lumen**
3. A preformed curve that allows preferential entry into either bronchus
4. A bronchial cuff
5. A tracheal cuff



LEFT SIDED DLT

ANAESTHETIC CHALLENGES

- Airway management is a primary concern in these cases, as the mass can compress the trachea or bronchi, leading to airway obstruction
- Anterior location of mass, SVC syndrome, evidence of major vessel or bronchial compression and pleural effusion are varying indicators of airway compromise
- Imaging studies, such as CT scans, provide critical information about the size, location, and proximity of tumor to vital structures
- A difficult airway plan should be established, and equipment for emergent surgical airway access should be readily available
- A rigid bronchoscope should be kept standby incase of airway collapse distal to the tube

- Fiberoptic bronchoscopy, C-MAC video laryngoscope and awake intubation techniques may be considered to secure the airway safely. In this patient we did C-MAC guided intubation with DLT

- Usage of muscle relaxant during induction should be limited due to central airway collapse in case of airway compromise. As bag mask ventilation was possible in this patient, we continued with the use of muscle relaxant

- Spontaneous breathing with total inhalational induction is an alternative technique

- Adequate depth of anaesthesia is crucial to prevent patient movement during surgery, as this could be catastrophic given the proximity of the mass to critical structures

- ECMO and Cardio-pulmonary bypass machine can be kept standby in very high risk patients
- The mediastinal mass can exert pressure on major blood vessels, leading to impaired venous return and hemodynamic instability. Continuous monitoring of arterial blood gases and central venous pressure can help guide fluid and hemodynamic management during the procedure
- Lung protective ventilation with adequate PEEP and thoracic epidural helps in improving postoperative pulmonary function
- Comprehensive post operative care with adequate analgesia and chest physiotherapy and ICU observation, incase of complications, should be ensured

TAKE HOME MESSAGE

- Effective communication between the anaesthesia team, surgeons, and nursing staff are paramount in ensuring good management and patient safety in such challenging cases

- Close attention to airway management, hemodynamic stability, strong analgesic cover intra and post operatively and postoperative care is crucial to achieve successful outcomes while minimizing complications

- Each case should be individually tailored to address the unique characteristics of the mass and the patient's physiological status

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THANK YOU