Anterior Mediastinal Mass- A Catch- 22-Case Report- Different Strategies of Anaesthetic Management with Case Discussion

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ABSTRACT
Anterior mediastinal mass may present from subtle swelling to severe cardiopulmonary compromise in form of stridor, dyspnea and cyanosis labelled as superior vena cava syndrome (SVC). Clinical presentation depends on the size, location and extent of pathology along with neighbouring structures affected. GA is notorious for exacerbating extreme compression. Team work eventually counts and discussion and preparation with surgeon along with adequate plan B that will quickly restore airway, ventilation and oxygenation is a must. The golden concept of awake fibroptic intubation cannot be overemphasized. Adequate preparation with long endotracheal tubes, endobronchial tubes (long enough to be placed beyond the obstruction) along with use of rigid bronchoscope to help in lifting mass off the trachea or heart and preparation for jet ventilation is needed.

Keywords: mediastinal mass, compression, awake fibroptic intubation

INTRODUCTION
Anterior mediastinal mass have always given chills down our spine and proved to be a challenge. These may present from subtle swelling to severe cardiopulmonary compromise in form of stridor, dyspnea and cyanosis labelled as superior vena cava syndrome (SVC). Understanding the nature of mass, relation to vital surrounding structures, exact location, pathophysiology, meticulous preparedness, planning with surgeon and keeping an alternative plan to ventilate and oxygenate in emergency situation is all that is required to handle this formidable task.1

Case report
A 24 years old male presented with shortness of breath and intermittent low grade fever for 2 months. General physical examination was unremarkable except the presence of a swelling approx. 10*10*15 cm on the chest wall. X ray chest (AP, lateral, fig 1,2), CT scan and biopsy confirmed the presence of a giant cell tumor arising from the rib cage and extending in superiomediatinal region (along left upper lobe and superior segment of left lower lobe) not involving any vital structures like pleura and pericardium. CT scan confirmed the pressure effects on tracheal wall due to which patient had dyspnea. There was a reduction in tracheal cross sectional area upto 30%. No calcification or necrosis seen. Trachea was central from upper one third but deviated towards right in lower one third and left sided margin near the bifurcation was not clearly defined. No signs of lymphadenopathy (hilar or mediastinal) was seen. H/O dyspnea grade III which was exaggerated on lying supine and relieved in right lateral decubitus position. ECHO was not significant (EF- 55%).
An elective thoracotomy for removal of tumour mass was planned in cardiothoracic vascular surgery operation theatre (CTVS OT). On the day of surgery patient brought in OT and routine monitors attached while the patient in sitting position. Difficult airway cart was kept ready containing flexible fibroscope, rigid bronchoscope, small size ETT. Peripheral venous access along with arterial line in left lateral decubitus position was secured (after allens test was positive). We decided for double lumen tube (DLT) in view of chances of unilateral obstruction and need for lung isolation intraoperatively. For intraoperative and postoperative pain management we opted for epidural catheter placed in T9-T10 interspace. Preoxygenation with 100% O2 started in supine position initially but adequate manpower was available in case of change of position may be required later on after induction. Premedication done with inj. fentanyl (100 mcg), inj. glyco (0.2mg). After adequate bag mask ventilation was confirmed, inj. propofol 160 mg given followed by inj scoline (100mg). There was adequate chest rise on applying PPV. A left sided double lumen tube (37 F) was successfully placed and confirmed with flexible fibroptic bronchoscope. Maintainence of anaesthesia was done with O2, N2O, inj. vecuronium and
sevoflurane. Intraoperatively vitals were well maintained. Patient was put in right lateral decubitus position (fig 3). After adequate positioning, DLT position was again confirmed. Intraoperative course was uneventful. Mass was resected successfully with removal of 3rd - 5th ribs because of encroachment by mass. 2 units of PCV along with 2 units of FFPs were transfused intraoperatively. Inj. bupivacaine (0.5%) in increments of 5 ml was given through the epidural catheter intraoperatively along with monitoring of vitals. Extubation was done successfully after completion of surgery. Postoperatively patient remained stable and ventilation was adequate. Patient was monitored on table for one hour and then shifted to ICU.

DISCUSSION

Mediastinal masses have always been a challenge for anaesthesiologist. The symptomatic patients as in our case are at risk of sudden cardiovascular collapse after GA induction due to mass effect. Anterior mediastinal mass usually presents with airway compression features or s/s of cardiovascular compression i.e. SVC syndrome. Clinical presentation depends on the size, location and extent of pathology along with neighbouring structures affected.²,³

Patients with compression of trachea have always given goobumps to the anaesthetists. Careful general physical examination along with history is very important. Relatives should be asked the most comfortable position of patient along with h/o cough, stridor, cyanosis, orthopnea etc. that give an alarm. Sometimes the symptoms are often subtle. As in this case, patient had symptoms of mild dyspnea. Compression of trachea on CT scan raised an alarm for risk of tracheobronchial or cardiovascular collapse intraoperatively. CT, MRI are the keystones for diagnosis of mediastinal mass as it delineates the precise location, extent, involvement of surrounding structures, compression which helps in anaesthetic planning later on. In our case lower trachea was involved hence no use of tracheostomy (preoperatively or in emergency).³

King et al have reported that a 50% reduction of tracheal diameter increases the chances of cardiopulmonary compression and sudden airway obstruction under GA. While respiratory symptoms usually start at 35% obstruction, but these findings are usually individualized. However tracheal diameter narrowing >50% pose significant airway complications intra and postoperatively aswell.⁴

Tempe et al have emphasized that in cases of a reduction in tracheal cross sectional area upto or > 50%, full preparation for cardiopulmonary bypass should be made. Femoral vessels should be cannulated under local anaesthesia preoperatively and priming of perfusion pump should be done, to save time in case of crisis.³

We must be prepared for a catastrophic situation even if patient has mild or no symptoms at all. Anterior mediastinal mass patients have following options awake fibroptic intubation (AFI), routine intravenous or inhalational induction. Out of these AFI is the most attractive technique in terms of safety and ability to visualize the extent, level and degree of tracheobronchial compression. Also ‘safe bronchus’ i.e least obstructed and patent bronchus can be identified preoperatively and in case of a situation of “any port in the storm” we can always ventilate through that bronchus. Final mantra being - “all eggs should not be put in the same basket”.³,⁵

GA is notorious for exacerbating extreme compression by way of

A) Reduction of FRC
B) Normal transpleural pressure gradient which is present in awake spontaneous respiration is lost under GA. It is paramount in opening of bronchi and small Airways.
C) Extrinsic chest wall muscle tone is lost and weight of the mass may further compress the airway or even cardiovascular collapse may be precipitated leading to a CICV (can’t intubate, can’t ventilate) situation
D) Lastly cases have been reported when there was a sudden increase in tumour size and haemorrhage upon induction in supine position.³,⁶

Team work eventually counts and discussion and preparation with surgeon along with a plan B that will quickly restore airway, ventilation and oxygenation is a must. The golden concept of awake fibroptic intubation cannot be overemphasized. We omitted any opioid or benzodiazepine in our premedication that can lead to partially obstructed airway.⁷
We were lucky to have an uneventful intra and perioperative period but the situation and luck can change according to changing patient scenario.

Adequate preparation with long endotracheal tubes, endobronchial tubes (long enough to be placed beyond the obstruction) along with use of rigid bronchoscope to help in lifting mass off the trachea or heart and preparation for jet ventilation. Rigid bronchoscope is a boon and should always be on a standby as it can be used in stenting the airway and also in jet ventilation. Occasionally during intubation there are chances of sudden airway obstruction due to ETT or bleeding- these testing situations, spontaneous respiration of patient emerges as final hope. Change of position may also come as rescue. Finally when “on the horns of dilemma” CPB is an option.3,8

Other methods described in literature are DL with ETT in situ, percutaneous aspiration under local anaesthesia and use of supraglottic airway device along with bronchoscopy for intubation. The technique of reduction in size of swelling by aspiration, radiotherapy, chemotherapy as described by Tempe et al, had no role in our case as mass was neither cystic nor malignant in nature.

Finally the last nail in coffin, in case of severe haemodynamic collapse and respiratory compromise when every attempt to maintain ventilation, oxygenation have failed, surgeon needs to proceed with emergency sternotomy/ thoracotomy to lift the mass and allievate compressive effects.9

Conclusion
Keeping a strong distant vision with full preparedness for any misadventure is the final key to success. AMM have a dubious nature and may suddenly lead to airway compromise and cardiovascular collapse. Adequate preoperative history, examination, CT, MRI, Echo cannot be ignored. CT helps to locate precise mass location and relation with surrounding structures. Useful strategic plan with awake fibroptic intubation and maintainece of spontaneous ventilation, knowing the limitation of every technique and drug, adequate preparation with various sizes of ETT, rigid bronchoscope and CPB (elective in case of severe obstruction >50%) and ofcourse a surgeon-skilled and prepared for extreme crisis is the key to success.

Finally we must know when to abandon one technique to switch to another and prevent the treacherous “CICV” situation. A calm skilful mind with adequate luck is required in such cases.

Consent
A proper informed, written consent was obtained from the patient for presenting this case report. He was explained that his privacy will be maintained and that details of name, images etc will not be displayed but anonymity cannot be guaranteed.

References