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Letter to Editor

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Decreasing End tidal CO₂ in a case of Ascending Aortic Aneurysm

Case

Fifty year old gentleman came with complaints of chest discomfort, breathlessness on lying supine and effort intolerance for past 3 months to Cardiovascular OPD. CXR showed a mediastinal mass (Figure 1) CECT revealed it to be a massive ascending aorta aneurysm. Salient findings on CT were 1. Close proximity of the aneurysm to the underlying sternum 2. Tracheal and B/L main stem bronchi compression(Figure 2). Coronary angiogram was normal. ECHO showed severe AR with EF around 60 %. The patient was posted for aortic valve and ascending aorta replacement. Keeping in mind that aneurysm rupture can occur during intubation, sternotomy and surgical manipulation our plan was to go for invasive lines and two large bore peripheral cannulas under local anaesthesia and then proceed for femoro femoral bypass post induction. Being a high risk case, we planned for continuous TEE monitoring too. Another dreaded complication that can occur is a cannot ventilate scenario even after intubation, mainly because of the compression extending down to the main bronchus by the aneurysm for which a manual JET ventilator was to be kept ready.

On the day of surgery, patient was induced and intubated without much hemodynamic disturbance after securing invasive lines under local anaesthesia. TEE probe was inserted after adequate lubrication .Plan was to go on femoro femoral bypass initially and then proceed for sternotomy. After positioning the patient and ten minutes into surgery, when the surgeon was exposing the femoral vessels, airway pressure increased from 20 cmH₂O to 30 cmH₂O with a decrease in expired tidal volume to less than 200ml. There was increased resistance to hand ventilation too. EtCo₂ gradually decreased to 7 mmHg(Figure 3). We ruled out rupture of the aneurysm since the patient was hemodynamically stable. We could hardly ventilate the patient. We assumed that the pre existing tracheal compression by the aneurysm got
exaggerated under general anaesthesia with muscle relaxation. Plan A was to try JET ventilation and plan B was to proceed for Emergency femoro femoral bypass if plan A fails. But on withdrawing the TEE probe to the oral cavity EtCo$_2$ gradually increased to the baseline value, airway pressure normalised and hand ventilation was possible without much resistance. We concluded that the introduction of TEE probe has compressed the trachea from behind thereby narrowing the effective tracheal diameter which was already compromised by the aortic aneurysm. We then inserted a paediatric TEE probe which has a smaller diameter and thereby could image ascending aorta and the aortic valve without causing tracheal compression.

Discussion

Airway obstruction is a known mechanical complication of TEE probe in paediatric airway resulting in increased Ventilatory pressures. Given the scenario of an already compromised adult airway there is no reason why TEE probe can’t cause such a complication in adults$^1$. Changing over to pressure control mode of ventilation or some minor ventilatory adjustments like increasing the expiratory time would perhaps reduce the amount of auto-PEEP generated and would generally suffice to achieve gas exchange in case of mild/partial airway obstruction. But a severe airway obstruction with a TEE probe in situ as in our patient, warrants removal of the probe to rule out the cause of obstruction. At the same time to avoid omitting Transesophageal echo in such a complex case we used the paediatric TEE probe which has a smaller diameter$^2$ (8mm when compared to adult probe with a 15 mm diameter) for intraoperative evaluation of the ascending aorta, aortic valve and the coronaries but at the cost of resolution of the images when viewing structures like Right Ventricle, Left Ventricle especially through transgastric route$^3$. 
References


Legends

Figure 1. CXR showing Mediastinal mass and tracheal shift

Figure 2. CECT showing Ascending Aortic Aneurysm with compressed bronchus.

Figure 3. Sequence of End tidal Co2 changes- 2 min (adult), 5 min (adult) and 10 min (paediatric) following TEE probe insertion.
Fig 1
Fig 2