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An Unusual Cause of High Airway Pressures Using an Oesophageal Calibration Bougie in Bariatric Surgery- A Case Report

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Abstract

Background: Bariatric anaesthesia poses various challenges for the anaesthesiologist. We report a case of high airway pressures from the presence of the calibration bougie used in sleeve gastrectomy. This is the first time we have encountered raised airway pressures with the use of a calibration bougie. This underlines the need to be vigilant and consider the calibration bougie as a causative factor for raised airway pressures.

Case presentation: The patient had a high Body Mass Index of 44 and no comorbid conditions. High airway pressures were noted on insertion of the calibration bougie by the anaesthesiologist. The common causes for intraoperative high airway pressures were ruled out and a fresh endotracheal tube was reinserted without any problems. After the second endotracheal tube was placed and the bougie was reinserted, the recurrence of the problem alerted us to the possibility of the bougie being the causative factor. With a change in ventilatory settings, the problem was circumvented and the procedure completed without any further problems.

Conclusion: Bariatric anaesthetists should be aware that the calibration tube can lead to high airway pressures. This could be exacerbated especially if there are any unidentified underlying tracheal abnormalities. It is imperative to rule out the more common causes of high airway pressures. In retrospect it might have been useful to have used a reinforced endotracheal tube to determine if the problem recurred.

Keywords: Calibration Bougie, Bariatric surgery, High airway pressure, Sleeve Gastrectomy

Introduction

High BMI reduces the overall pulmonary compliance by up to 35% [1]. There is a further compromise associated with laparoscopic procedures and intraoperative positioning [2]. The introduction of the calibration bougie into the distal end of the oesophagus raised the peak airway pressures which adds an extra dimension of complexity for the anaesthesiologist. As this was the first time this phenomenon was encountered by our team, I believe this might be of importance to highlight the potential problems that can be caused by the calibration bougie and to be watchful for changes in airway pressures. A literature search reveals no reported cases wherein the calibration bougie has raised airway pressures.

Patient Information and Clinical Findings

A 37-year-old male with a BMI of 44 presented for a laparoscopic sleeve gastrectomy. On direct laryngoscopy, he had a grade 1 cormack-lehanne airway. Intubation was done with a size 8 cuffed covidien lo-contour endotracheal tube (ETT). Tracheal intubation was uneventful and he was placed on volume control ventilation. The tidal volume (TV) was set at 650 millilitres and a respiratory rate of 12 breaths per minute, an inspiratory to expiratory ratio of 1:2 and positive end expiratory pressure of 5 cms H_2O [3]. The peak airway pressures were 21 cm H_2O with a mean of 11 cm H_2O. The stomach was decompressed with an in-and-out orogastric tube. On introduction of the size 36 French calibration bougie, the airway pressures went up to 40 cm H_2O with a drop in tidal volumes. The high airway pressure differentials check list was run through. The patient had equal and clear air entry in both lung fields. The endotracheal tube position was confirmed. There were no visible occlusions to the circuit or the ETT. On switching to manual ventilation with a bag, it required high pressures to ensure adequate ventilation. A decision was made to change the tube over to a new ETT in the event of a distal occlusion. The ETT was replaced by the lead anaesthetist. The starting airway pressure on volume control mode was a peak of 20 cm H_2O and a mean of 9 cm H_2O. On reinserting the calibration bougie, a similar problem with higher airway pressures was encountered. Air entry was equal and clear bilaterally. The logical assumption was the last device inserted had caused the increased pressure which in this case was the calibration bougie. The calibration bougie was subsequently removed. The airway pressure's normalised immediately. The issue was discussed among the surgical team and a decision was made to re insert the bougie but ventilate the patient on pressure control mode. Again, pressures of up to 30 cm H_2O were needed to achieve a tidal volume of around 450-500 ml. This improved with patient positioning, which was the steep reverse Trendelenburg position.

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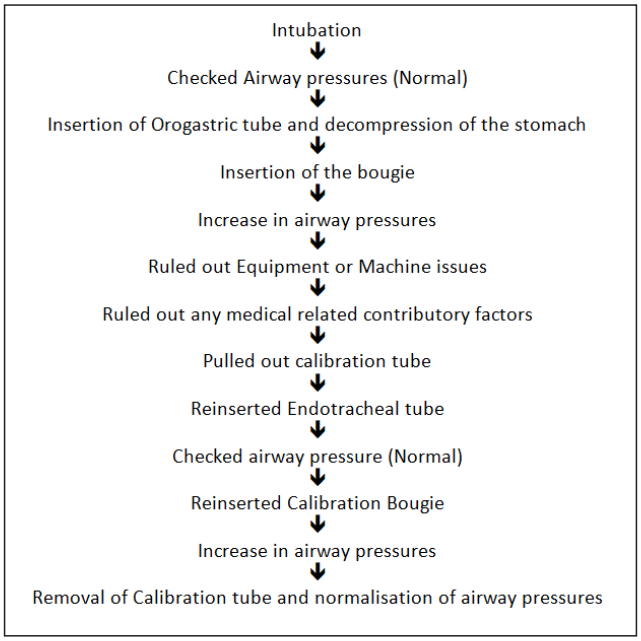

Timeline

Investigations

There were no follow up investigations done.

Diagnostic Assessment

Our approach to the unexpected high airway pressures encountered was to quickly rule out any anaesthetic machine or equipment malfunctions. The ventilator settings and function were checked and confirmed. There was no kinking or compression of the circuit or water condensation. The Heat & Moisture Exchange filter (HMEFs) was checked for any blockage. The ETT was checked for any kink's or blockages. A quick check ruled out any external thoracic compression that could have altered the compliance. As this occurrence was post induction, Anaphylaxis and Asthma [4] were high on the list of differential diagnoses. On auscultation there were no external sounds and air entry was equal bilaterally. This ruled out bronchospasm, pulmonary oedema or pneumothorax. The vital parameters remained within normal limits throughout. The patient was well paralysed so there was no ventilator desynchrony. Apart from the obesity contributing to the decreased compliance, there was nothing else of clinical note to pin point. Working with the principle of undoing the last step performed prior to the high airway pressures, this led us to suspect the calibration bougie. I have not come across any case reports of the calibration bougie contributing to high airway pressures. I believe this is an eye opener and something for the bariatric anaesthetist to be aware of.

Therapeutic Intervention

The procedure was done in the steep reverse Trendelenburg position which relieved much of the thoracic pressure. The abdominal insufflation pressures were lowered to help with ventilation.

Follow-up and Outcome

There was no harm done to the patient and there was no morbidity. On follow up, the patient was comfortable with no respiratory distress or any signs of a sore throat. We discussed the matter with the patient as we were keen to get an ENT specialists opinion as well as imaging of the neck and thorax. Unfortunately, the patient declined our request.

Discussion

To the best of our knowledge, we have not come across any case reports of high airway pressures caused by the calibration bougie during bariatric surgery. After excluding the anaesthetic machine and patient related causes, the only issue we could single out was the insertion of the calibration bougie leading to high airway pressures. Removing the bougie normalized all pressures which immediately confirmed the causative factor. In my experience of over 350 bariatric procedures, this was a first instance of the calibration bougie increasing the airway pressures. The obvious question was what could the possible mechanism be for the bougie causing the high airway pressures. The patient refused any further examinations to rule out tracheomalacia [5], any narrowing of the tracheal tree or an abnormally small tracheal diameter. The other reasoning was that the ETT cuff was perhaps just beyond the cords and the calibration bougie pressed on the softer posterior tracheal wall leading to narrowing of the tracheal lumen. Physical compression of the tube directly with the calibration tube was probably less likely.

Conclusion

- This case highlights the importance to be vigilant and aware of uncommon causes that might alter normal parameters thereby jeopardising patient safety.
- Understanding that there may be altered or abnormal anatomy.
- Rule out common causative factors.
- If in doubt, remember the last object, device or drug could be the causative factor.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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