

## Normothermia and kinking of PVC tube - what is the alternative?

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### ABSTRACT

Discovering intraoperative airway obstruction in a prone position can be aptly described as an anesthetist's nightmare, more so when no observable and common cause can be detected. We report a case of intraoral endotracheal tube kinking in a 45-year old female patient who was undergoing removal of epidermoid cyst of the 4th ventricle in a prone position. The kink, that was intraoral, was noticed at an unusual position 2 cms beyond the inflation lumen cut off point. This case report reinforces upon anesthesiologist to be more vigilant in patients undergoing surgery in the prone position.

**Key words:** Endotracheal tube, kinking, prone position

### INTRODUCTION

Discovering intraoperative airway obstruction in a prone position is an anesthetist's nightmare, as there is limited access to the same by virtue of the position of the patient. Even though there are a number of causes of the same, the obstruction secondary to endotracheal softening because of warm oral temperature combined with neck flexion is rare. It is also one of the seldom thought causes. The present case report emphasizes the importance of considering the same and rules it out too during the similar episodes.

### CASE REPORT

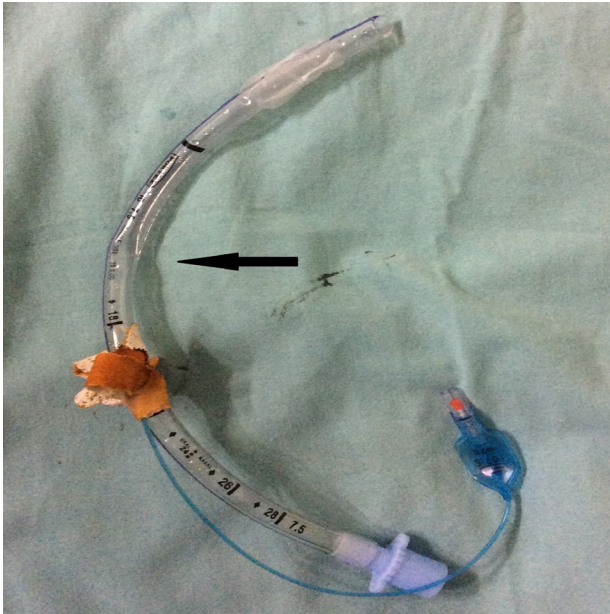
We report a case of intraoral endotracheal tube kinking in a 45-year old female patient undergoing removal of epidermoid cyst of the 4th ventricle in a prone position. The preanesthetic check up including airway evaluation was unremarkable. Standard noninvasive monitoring was done using anesthesia monitor (S/5™ critical care monitor, Datex Ohmeda, Helsinki, Finland). An intravenous line was secured with 18 G cannula. An arterial cannula was placed in the left radial artery for invasive blood pressure monitoring and arterial gas analysis. Induction was achieved with injection glycopyrrolate (10 mcg/kg), morphine (0.1 mg/kg), propofol (1.5 mg/kg). After confirming mask ventilation, neuromuscular blockade was achieved through intravenous vecuronium (0.1 mg/kg) and intubation was accomplished with 7.5 mm cuffed endotracheal polyvinylchloride (PVC) tube.

In view of prolonged surgery and anticipated blood loss, the subclavian vein was cannulated for central venous pressure monitoring. A temperature probe was inserted through the nasopharynx for temperature monitoring. After securing the airway and preloading, the patient was turned into a prone position with head pins firmly secured and mechanical ventilation was initiated on volume control mode. The surgery lasted for about four hours. Towards the end of surgery, when duraplasty was being done, a rise in airway pressure was observed, which increased up to 40 cm of H<sub>2</sub>O with ventilator flashing constant alarm for the same. Immediately hand ventilation was initiated and an attempt was made to rule out the causes of any obvious obstruction. Although the resistance in the bag was still high, the saturation and EtCO<sub>2</sub> were well within normal limits. Any obvious cause of high pressure could not be found with all other parameters in near normal range including chest auscultation. Since the closure of the surgical incision had already started, hand ventilation was continued with continuous and vigilant monitoring of all the parameters. At the end of surgery, the patient was turned into a supine position and since spontaneous efforts

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of the patient were being well transmitted to the reservoir bag, neostigmine (50 mcg/kg) was administered to reverse the neuromuscular blockade. The trachea was extubated after thorough suctioning and upon extubation; a gross kink was revealed in the endotracheal tube at a point 2 cms beyond the insertion of inflation tube of pilot balloon that had lead to increased airway pressures in the intraoperative period (Figure 1). Post extubation, the parameters of the patient were unremarkable and patient was transferred to high dependency unit for further management.



**Figure 1.** Kinking of the Endotracheal tube.

## DISCUSSION

Kinking of PVC tube with surgeries in prone position, in the intra operative period is a known but rare phenomenon. To diagnose it in the first instance is a great challenge. Many theories have been proposed for this occurrence. While flexion at atlantoaxial joint, leading to kink has been reported by Campoy<sup>1</sup>, Hubler reported that any increased temperature of endotracheal tube beyond 36 °C may cause kinking to occur at astonishingly low angles<sup>2</sup>. Few other authors have reported kink in the PVC tube at either a cuff portion or at a point of insertion of cuff inflation tube<sup>3</sup>. In the present case, it was 2 cm beyond the insertion of inflation tube. Surprisingly, the temperature on the monitor was 37 °C at the time of extubation which probably lead to the kinking of the tube at this unusual position.

Although difficulty in ventilation in the intraoperative period can result from a number of causes that include gas delivery malfunction, any visible obstruction or kink in the circuit, poor compliance, acute episode of bronchospasm and tension pneumothorax. All these causes were ruled out and since the surgery was near end and hand ventilation was possible, it was decided to continue with hand ventilation till extubation.

Bradway and Ogden have also described the use of Berman airway for the removal of intraoperative kink in a PVC tube<sup>4</sup>. One possible maneuver that can be used to rule this particular situation is to pass a catheter or bougie down the endotracheal tube and ascertain the distance at which any difficulty in passage of the same is encountered. The same can be done in a prone patient as well and can probably guide whether intraoral kinking is the causative situation. However, it is only a hypothesis and the clinical benefit of the same, if any, has to be ascertained. We admit that this thought occurred to us retrospectively, and since situations like this cannot be created, it seems to be a practical approach to rule out this entity.

## CONCLUSION

In surgeries being performed in prone position especially with prolonged surgical time, the intraoral kinking leading to endotracheal obstruction must be kept in mind. Also, the use of reinforced flexometallic endotracheal tubes may avoid the occurrence of such problem. However, it is not always safe as it been also reported with various complications in the intraoperative period<sup>5</sup>.

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