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# A CASE REPORT OF PHARYNGEAL KINKING OF ENDOTRACHEAL TUBE IN A CHILD UNDERGOING SINUS SURGERY: A RARE COMPLICATION.

**Anesthesiology**

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## ABSTRACT

This is a case of concealed pharyngeal kinking of polyvinyl endotracheal tube (ETT) leading to ventilation difficulty in a 11 year old child undergoing sinus surgery. Tube can kink at any site that is not visible to us. One must keep in mind the unanticipated kinking of ETT as differential diagnosis and change the tube as early as possible.

## KEYWORDS

Case report, polyvinyl endotracheal tube, kinking, child, sinus surgery.

## INTRODUCTION :

Kinking of endotracheal tube (ETT) is an ever present threat in anaesthesia, especially pediatric anaesthesia.[1] Kinking is a frequent cause of tracheal tube obstruction partially or completely with polyvinyl chloride (PVC) disposable tubes.[2] Kinking can occur anywhere in the tube. Kinking can be due to change in head or tube position, structural defect or due to softening because of body temperature leading to increased pliability.[3,4] Here we are reporting a case of concealed pharyngeal kinking of polyvinyl endotracheal tube (ETT) leading to ventilation difficulty in a 11 year old child undergoing sinus surgery. Though uncommon, pharyngeal kinking should be kept in mind to prevent fatal outcomes of ventilation failure in pediatric patients.

## CASE :

A 11 year old, 32 kg child with chronic sinusitis was scheduled to undergo functional endoscopic sinus surgery (FESS) under general anaesthesia (GA). Following uneventful induction, intubation was done with 6.0 size cuffed PVC ETT( portex, blueline, single use). Tube was moved from right to left side of mouth prior to fixation at 18cm at mouth level. Throat packing done and 15 degree head up given before incision. Thirty minutes after surgery suddenly end-tidal carbon dioxide ($ETCO_2$) rose from 36 to 65 which didn't come down with increasing the respiratory rate and peak airway pressure went from 19 to 35cm $H_2O$, while maintaining saturation at 98%. Upward sloping pattern in capnograph was noticed. Tidal volume dropped to 100ml. On manual ventilation not much change in lung compliance was felt. On inspection from outside tube was not kinked and circuit, machine revealed no abnormality. Chest auscultation revealed decreased breath sound with no added sounds. As $ETCO_2$ was rising quickly and saturation started dropping to 93%, ETT was removed and replaced with another 6.0 size portex blueline disposable PVC tube. Ventilation improved. Rest anaesthesia course was uneventful.

Inspection of the tube revealed "V" shape kink distal to the point where inflation tube for pilot balloon is attached, at nearly 13cm from tube tip (figure 1a), the portion that remains intra oral at or just beyond the soft palate. The bent was there on concave side. The same tube regained its original "U" shape in few minutes at room temperature (figure 1b).

## DISCUSSION :

In pediatric FESS cuffed ETT prevents against aspiration, hence a definitive airway as it protects it. Tracheal tube obstruction due to kinking is a known complication of intubation with PVC preformed tubes. Though site of kinking vary, it is more common at mouth level. Kinking can also occur at intracuff area, at point where cuff inflation tube is attached, at distal part of connector, at level of glottis or tip of the tube may fold leading to obstruction.[4] Pharyngeal kinking remains concealed making it difficult to diagnose. The reason for kinking can be : change in head position, especially flexing the neck or turning the head, movement of tube from one side of mouth to another or introduction of other equipment in mouth leading to change in tube position, inserting with drilling movement introducing some torque in to tube, structural fault where inflation tube enters wall of tube or in to cuff area as wall thickness becomes half at that point, thermo sensitivity of PVC tube which causes the tube to soften at body temperature in prolonged surgeries thus increasing the pliability and predisposition to kinking.[4] At 36 degree Celsius ETT softens and kinks at low angles.[5] Apart from this, tubes vary in their resistance to kink, smaller tubes being more prone to kink than larger ones.[4] Tube kinking instances are higher in pediatric anaesthesia and surgery done in prone position. As per Hubler et al[5] PVC tubes come with preformed bending and bend along concave side doesn't alter the stability while the same in opposite direction leads to kink.

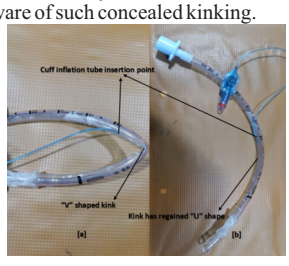
In our case head position was not altered. Digital manipulation of tube or correction with suction catheter or stylet was not tried as we did not suspect intra oral kinking at first. As $ETCO_2$ was rising quickly and all other measures failed to bring it down we replaced the tube. Regain of its original shape in few minutes after removal rules out any manufacturing defect of the tube. Though it was not a prolonged surgery bending due to thermal softening could be the cause for kinking or while shifting the tube from right to left side of mouth a force would have acted perpendicular to torque of natural curve of the tube causing the pharyngeal kink. Though armoured tubes are preferred due to fewer predispositions to kink at mouth level, there is no literature stating the same for intraoral kinks. As per Hubler et al[5], change in the ETT design so that cuff line exits the tube outside the oral cavity may help preventing pharyngeal kinking.[5]

## CONCLUSION:

Any part of the tube that is not visible outside can get kinked. So it has to be quickly diagnosed to prevent ventilation failure and its consequences during pediatric anaesthesia. As pharyngeal kink can mimic bronchospasm, systematic check must be carried out. If problem persists, it's better to replace the tube as soon as possible.

## LEARNING POINTS :

1) Smaller PVC tubes are more prone to kink and body temperature is an important contributing factor even if surgery is not a prolonged one.
2) Kinking of PVC tubes can occur at any site from tube tip to the distal connector without any obvious cause.
3) One must be aware of such concealed kinking.



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