# MISPLACEMENT OF AN ESOPHAGEAL TEMPERATURE PROBE

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## Abstract

Esophageal temperature monitoring is a form of core temperature measurement frequently used to monitor intraoperative hypothermia. It can prevent overheating and facilitate detection of malignant hyperthermia. The misplacement of an esophageal temperature probe into the tracheobronchial tree during lung lobectomy surgery can impose serious concern on patient safety. Esophageal temperature monitoring should be reconsidered in thoracic surgery. Safety measures should be taken when used.

## Introduction

Core temperature measurement during surgery that lasts more than thirty minutes under general anesthesia (GA) is considered standard of care[1]. Esophageal temperature monitoring is used, because of its high accuracy and ease of insertion[1]. Reports emerged, as early as, 1972 of nasogastric tubes being placed in the tracheobronchial tree and later esophageal temperature probes[2-6]. We report the intrabronchial misplacement of a temperature probe in a patient undergoing left lung lower lobectomy surgery, as well as, a review of the literature and a summary of alternative tools for perioperative temperature monitoring.

## Case Report

A 66 year-old-male patient known to have long standing controlled diabetes mellitus and hypertension presented for left lower lung lobectomy, after an incidentally found contrast enhancing lesion in the left lower lobe. The lung lesion was found on a computed tomography (CT) scan of the chest and abdomen done to screen for distant metastasis of prostate cancer. The CT scan showed a normal anatomy of the tracheobronchial tree and no hilar adenopathy. Preoperative bronchoscopy was completely normal and no endobronchial lesion was found. General anesthesia was induced and, facilitated by the use of rocuronium a 37 Fr left double lumen tube was inserted, tracheal and bronchial cuffs were inflated, following which the tube position was checked and confirmed using fiberoptic bronchoscopy. The lungs were mechanically ventilated to maintain an

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end-tidal carbon dioxide pressure of 30-35 mm Hg. Peak inflation pressure (PIP) was 16 cm water at that moment. A 9-Fr, 75-cm-long thermal probe (model no. M1024229 General Purpose Temperature Probe, Disposable, 9 French, 400 Series, GE *Healthcare Finland oy*) was lubricated with aqueous jelly, inserted nasally and blindly advanced for approximately 30 cm into the esophagus. No tracheal tube cuff leakage was detected and airway pressure remained constant. The first temperature reading obtained was 36 degree Celsius. Surgery started after positioning the patient in the left lateral decubitus position and clamping the bronchial cough, double lumen tube was checked again before incision using fiber optic bronchoscopy. No foreign body was detected at this stage. A forced air warming system, in addition to fluid warmer were used during surgery. Temperature varied throughout the surgery between 35-36.5 degree Celsius. No major temperature swift changes were detected. PIP minimally increased during one lung ventilation. Surgery proceeded uneventfully and after dissection, the bronchus was stapled. A foreign material was noticed and upon careful examination, it was identified as the temperature probe which was transected with the bronchus. The specimen was removed and the ligature was opened to allow withdrawal of the temperature probe and the proximal stump was ligated after copious irrigation. The trachea was extubated at the end of the surgery and follow up visits showed no post operative complications.

*Fig. 1*
*Specimen with transected temperature probe*

## Discussion

Inadvertent hypothermia is by far the most common perioperative thermal disturbance during anesthesia[7]. Hypothermia affects the whole organ body system. It impairs coagulation, contributes to wound infection, increases blood loss, increases blood pressure, heart rate and plasma catecholamine level thus increasing morbidity[7]. Core temperature measurement during surgery that lasts more than thirty minutes under general anesthesia (GA) is considered standard of care[1]. Esophageal temperature monitoring is used worldwide to continuously monitor core temperature because of its ease of use and high accuracy[1]. A well known limitation of this tool is that the respiratory gas flow may significantly perturb temperature reading especially in infants, children and cachectic adults, where the tissue plane between the trachea and esophagus is thin[8]. Misplacement of esophageal temperature probe into the tracheobronchial tree has been previously reported[6].Esophageal temperature probe is often accompanied with an esophageal stethoscope that must be positioned to the distal tip of the esophagus where the heart sounds are the loudest to get accurate temperature reading[1]. Tympanic and nasopharyngeal sites can be used to assess body core temperature taking into consideration their limitations[1]. The external auditory canal must be sealed by the probe. As a result of difficulties associated with obtaining appropriate sized thermistors and based on report of tympanic membrane perforation its usage has waned recently[8]. Also, nasopharyngeal temperature becomes inaccurate when used with uncuffed endotracheal tubes, or in the presence of air leak, mainly because of gas cooling the probe[1]. Another limitation is nose bleeds especially in children with large adenoids[8]. Axillary and other reported temperature monitoring

sites such as skin or foley catheters are unreliable for measuring core temperature[1].

The incident we had at our institution is of special interest because it happened during lobectomy surgery. Had the surgeon not examined the resected lung, that could have led to missing a foreign body in the suture line and further possible damage to lung while trying to remove the probe at the end of the surgery. Moreover, any late discovery of the foreign body postoperatively would have led to a risk of reoperation. It is important to notice how easy such complications can be missed or underestimated during surgery, especially that we had no temperature or ventilation disturbances and, fiberoptic bronchoscopy done twice was normal.

To avoid such a possible complication, passing the temperature probe under direct visual guidance using direct or video assisted laryngoscopy would be safer and more accurate. Esophageal stethoscope can also be used to ensure the placement of the probe at the distal third of the esophagus where the heart sound is loudest. Anesthesiologists should assume an active role in ensuring patient safety[9].

## Conclusion

We suggest a thorough discussion between the cardiothoracic surgeon and the anesthesiologist to balance the need of a core temperature monitor in the presence of possible detrimental complications. Both the surgeon and the anesthesiologist should follow patient safety practices, to prevent or diminish adverse events and patient harm.

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