Insertion of a temperature probe into the ProSeal® laryngeal mask airway drainage tube

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Abstract
Background: Temperature monitoring is one of the minimum mandatory monitoring standards of anaesthesiology. Intraoperative hypothermia and hyperthermia can both be detrimental for patients. We introduced a temperature probe into a Proseal® laryngeal mask airway (LMA) drainage tube, and measured patient temperatures and evaluated temperature dynamics.

Methods: After obtaining informed consent, a thermistor probe (Datex S5®) was inserted into the drainage tube of a Proseal® LMA. This was done to monitor the intraoperative core body temperature in the distal one-third of the oesophagus, and was undertaken prospectively in 123 patients in whom the placement of an orogastric tube was not mandatory (e.g. orthopaedic, gynaecological and ophthalmic surgery). To confirm the position of the thermistor probe, a fibre-optic bronchoscope was inserted in the drainage tube immediately after removal of the temperature probe.

Results: An increase in temperature, of 2°C ± 1.2°C, was observed from the midpoint to the tip of the drainage tube in more than 95% of cases. As the thermistor crossed the distal end of the drainage tube and entered the lower third of the oesophagus, there was a rapid increase in temperature.

Conclusion: This is a useful method for monitoring core temperature in cases where a gastric tube is not required intraoperatively. This method can be used in all supraglottic devices that have a drainage tube, and is effective, cheap and reliable, with easy accessibility for accurate core temperature measurement.

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Introduction
Perioperative core temperature disturbances are common and have been associated with serious adverse outcomes.1,2 Consequently, core temperature monitoring plays a significant role in modern anaesthesia practice and is one of the minimum mandatory intraoperative monitoring standards. Temperature-monitoring sites that are closest to blood temperature reflect “true” core temperature during anaesthesia and surgery.1 Urinary bladder and rectal temperatures change very slowly following an alteration in body temperature. Skin surface temperature is usually lower than core temperature, depending on ambient temperature and vasomotor tone, and is unreliable in the perioperative period.4,5

Commonly, core temperature is monitored using a thermistor probe introduced into the nasopharynx or distal third of the oesophagus, or via the tympanic membrane. If the position of the probe is in close proximity to highly perfused tissues, it will accurately reflect core temperature. Supraglottic airway devices are an integral part of modern anaesthetic airway management, but they may preclude the use of an oesophageal thermistor to monitor core temperature. Mitchell et al studied 30 patients who were anaesthetised and ventilated using the ProSeal® laryngeal mask airway (LMA). Core temperature was monitored by a thermistor probe, inserted through the drainage tube of the Proseal® LMA. The authors observed that this method was accurate (when compared to nasopharyngeal and aural temperature) at a depth of 15-20 cm from the drainage tube tip.6

In our tertiary institution, we routinely insert a thermistor probe (Datex S5®) via the Proseal® LMA drainage tube to monitor intraoperative core body temperature from the distal third of the oesophagus (see Figure 1). We use this technique in
those patients for whom an orogastric tube is not mandatory, e.g. orthopaedic, gynaecological or ophthalmic procedures.

Having obtained their informed consent, we studied 123 patients. We observed an increase in temperature from the midpoint to the tip of the drainage tube of 2°C ± 1.2°C in more than 95% cases. As the thermistor crosses the distal end of the drainage tube and enters the lower third of the oesophagus, there is a rapid increase in temperature of 3.8°C ± 1°C, suggesting that the temperature probe is correctly positioned. The temperature probe was marked at the level of the opening of the Proseal® drainage tube. Thereafter, the temperature probe was removed, and the distance from the mark to the end of the probe was measured. A fibre-optic bronchoscope was then inserted to the same length as had been previously measured on the probe, to confirm the position of the tip of the thermistor probe in relation to the distal third of the oesophagus. The distance from the proximal end of the Proseal® drainage tube to the tip of the bronchoscope was recorded (see Table I):

<table>
<thead>
<tr>
<th>ProSeal® laryngeal mask airway size</th>
<th>Distance (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No 2.5</td>
<td>23.2 ± 1.2</td>
</tr>
<tr>
<td>No 3</td>
<td>27.5 ± 2.3</td>
</tr>
<tr>
<td>No 4</td>
<td>28.5 ± 1.3</td>
</tr>
<tr>
<td>No 5</td>
<td>29.1 ± 2.2</td>
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</tbody>
</table>

Note: The thermistor probe is too large to pass through the ports of Proseal® sizes less than 2.5.

The temperature probe may be used as a possible guide for correct placement of the Proseal®. An insitu probe reduces the incidence of distal cuff folding, in a way that is similar to other methods of insertion, i.e. using a suction catheter, stylet or gum elastic bougie. While inserting the Proseal® with the thermistor probe in the drainage tube, the rise in temperature (approximately 2°C ± 1.3°C), can help detect the accurate positioning of the Proseal®.

We find this to be a useful method for the monitoring of core temperature in cases where a gastric tube is not required intraoperatively. This method can be used in all supraglottic devices that have a drainage tube. It is an effective, cheap, reliable and easily accessible method of accurate core temperature measurement.

References