Continuous Esophageal Temperature Monitoring with Auscultation of Heart and Lung Sounds, a Dependable but Forgotten Adjunct to Physiological Monitoring During Anesthesia

Introduction

Over the years advances in anesthesia changed the practice of anesthesiology from an art to a science, causing the anesthesiologist to rely heavily on equipment and monitoring devices that measure physiological changes accurately and rapidly. The physiological parameters typically monitored are blood pressure, heart rate, electrocardiogram, oxygen saturation; and respiratory parameters such as rate and depth of respiration (tidal volume), expired carbon dioxide concentrations (end tidal CO_2) and even the exact concentration of anesthetic gases. Measurement of these parameters enables the anesthesia provider to gauge the effect of the drugs and the surgical manipulations on the patient easier than some of the older more "hands on" methods. However, some of the older "hands on" methods are simply tried and true, providing critical information more clearly and rapidly than most monitoring equipment. Auscultation of heart and lungs sounds via an Esophageal Stethoscope is an older more "hands on" technique; yet it still detects physiological changes before those changes can be detected by other monitoring devices.

Problem

In every aspect of clinical patient care from a doctor's office visit, emergency department assessment, inpatient assessment, emergency care in the field, pre-operative assessment to post-operative care the following parameters are measured: blood pressure, pulse, pulse oximetry, temperature, and auscultation of heart and lung sounds via a stethoscope. Yet, for some reason when the patient is under anesthesia the monitoring of temperature and auscultation of heart and lungs sounds are not routinely performed, leaving the patient at risk.

Why monitor core body temperature with an Esophageal Stethoscope?

New initiatives and evidence based practice guidelines recommend to maintain normothermic temperature, measure and record the patient's body temperature for all surgeries greater than a ½ hour in length. How can you maintain a patient's body temperature without monitoring the patient's core temperature frequently?

Why listen to heart and lung sounds with an Esophageal Stethoscope?

Physiological monitors can't immediately detect minor disturbances that could ultimately cause patient harm, such as:

- Airway secretions with a need for suctioning
- Light anesthesia with swallowing and borborygmi
- Wheezing
- Migration of endotracheal tube
- Immediate detection of partial or complete airway obstruction
- Disconnection

The decreased use of the simple and easy to use Temperature Monitoring Esophageal Stethoscope is ultimately putting the patient at risk.

Standards Temperature Monitoring

A. SCIP-Inf-10 "Measure: Surgical patients should be actively warmed during surgery or have at least one recorded body temperature equal to or greater than 98.8 degrees Fahrenheit within 30 minutes prior to the end of anesthesia to 15 minutes after anesthesia ends. (Patient's with intentional hypothermia are excluded from this measure.)"

B. ASA Standards for Basic Anesthesia Monitoring

STANDARD II

During all anesthetics, the patient's oxygenation, ventilation, circulation and temperature shall be continually evaluated

"5. Body Temperature

5.1 To aid in the maintenance of appropriate body temperature during all anesthetics.

5.2 Every patient receiving general anesthesia should have body temperature measured when clinically significant changes in body temperature are intended, anticipated or suspected."

C. World Health Organization (WHO) Guidelines for Safe Surgery states:

Guideline – "A means of measuring body temperature should be available and used at frequent intervals where clinically indicated (e.g. prolonged or complex anesthesia, children)."

E. Malignant Hyperthermia Association of the United States (MHAUS)

"MHAUS recommends that all patients undergoing general anesthetics that exceed 30 minutes in duration should have their temperature monitored using an electronic temperature probe. Skin liquid crystal temperature sensors are not recommended as they have been found to be unreliable indicators of changing temperature during human malignant hyperthermia (MH) events."

F. American Society of Peri-Anesthesia Nursing (ASPAN) standards

ASPAN's Evidence-Based Clinical Practice Guideline for the Promotion of Perioperative Normothermia states:

"Frequent intraoperative temperature monitoring should be considered in all cases (Class I, Level C)"

Standards for Auscultation of Heart and Lung Sounds

A. ASA Standards for Basic Anesthesia Monitoring

STANDARD II

During all anesthetics, the patient's oxygenation, ventilation, circulation and temperature shall be continually evaluated

"Ventilation

3.1 Objective- To ensure adequate ventilation of the patient during all anesthetics.

3.2 Methods-

3.2.1 Every patient receiving general anesthesia shall have the adequacy of ventilation continually evaluated. Qualitative clinical signs such as chest excursion, observations of the reservoir breathing bag and ***auscultation of breath sounds are useful***."

"4. Circulation

4.1 Objective- To ensure the adequacy of the patient's circulatory function during all anesthetics.

4.2 Methods

4.2.3 Every patient receiving general anesthesia shall have, in addition to the above, circulatory function continually evaluated by at least one of the following: palpitation of pulse, ***auscultation of heart sounds***, monitoring of tracing of intra-arterial pressure, ultrasound peripheral pulse monitoring, or pulse plethysmography or oximetry."

B. American Association of Nurse Anesthetists (AANA)

"Ventilation-

Purpose: To assess adequate ventilation in patient.

Standard: ***Ventilatory adequacy shall be assessed by continuous auscultation of breath sounds***…"

Conclusion

Esophageal temperature monitoring and auscultation of heart and lung sounds are important parameters to measure during all general anesthesia procedures. Continuous temperature monitoring provides the feedback loop enabling adjustment in thermal management for prevention of hypothermia and monitoring for malignant hyperthermia. Continuous auscultation enables detection of subtle clues that patient's share to let us know how they are doing while under anesthesia. If we fail to listen we will not hear. Reliance on physiological monitors alone to monitor and protect patients while under anesthesia is not enough. Esophageal Stethoscopes are easy to use, economical, provide continuous contact with the patient, and produce practical feedback which may sometimes avert an adverse event.

References

1. Surgical Care Improvement Project (SCIP) SCIP Inf-10
2. ASA Standards for Basic Anesthesia Monitoring
3. World Health Organization (WHO) Guidelines for Safe Surgery
4. American Association of Nurse Anesthetists (AANA) Standards
5. Malignant Hyperthermia Association of the United States (MHAUS)
6. ASPAN's Evidence-Based Clinical Practice Guideline for the Promotion of Perioperative Normothermia
7. Schwartz A. The Precordial/Esophageal Stethoscope-A Vigilance Monitor No Longer Taught to Anesthesiology Residents, American Society of Anesthesiologists (ASA) Abstract 2001.
8. Smith J, et al. Nurse Anesthesia Program Requirements for Esophageal/Precordial Stethoscope Earpieces: A Survey. AANA Journal, June 2009, Vol.77, No. 3
9. Manecke Gr, et al. Auscultation revisited: the waveform and spectral characteristics of general anesthesia. International Journal of Clinical Monitoring and Computing. 14 (4) 231-40.
10. Reicher, D. Tips from the Top, Scripps Memorial Hospital, Encinitas, California Fall 2006