

Equipment, Monitoring, and Engineering Technology

TITLE: LOWER ESOPHAGEAL CONTRACTILITY DOES NOT PREDICT MOVEMENT DURING SKIN INCISION IN PATIENTS ANESTHETIZED WITH ALFENTANIL AND NITROUS OXIDE

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Introduction. The frequency of spontaneous lower esophageal contractions (SLEC) has been proposed as a measure of anesthetic depth.¹ A recent study demonstrated that SLEC frequency predicts movement in response to skin incision during halothane anesthesia.² The present study tested the hypothesis that movement during skin incision could be predicted by SLEC frequency during alfentanil/nitrous oxide anesthesia.

Methods. Following approval of our Committee on Human Research, we studied 14 unpremedicated ASA I and II patients aged 23-59 yr, scheduled for breast or abdominal surgery. Anesthesia was induced with loading and maintenance infusions of alfentanil which were started simultaneously. Near the end of the loading infusion, STP, 1 mg/kg, and 70% N₂O in O₂ were administered. After inflating orthopedic tourniquets on both legs to 300 mmHg, vecuronium, 0.1 mg/kg, was given intravenously. Nitrous oxide was discontinued, an additional dose of STP 1 mg/kg administered, and the trachea of each patient intubated. Anesthesia was continued with N₂O 70% and the alfentanil maintenance infusion.

The alfentanil loading dose and infusion rate were determined by a modified Dixon method.³ We prospectively defined a group size of four and a dose interval of 25 mcg/kg. The first patient received a loading dose of 50 mcg/kg and a maintenance infusion dose of 50 mcg/kg/h. In subsequent patients, the dose was determined by the response of the *previous* patient: the alfentanil loading and maintenance doses were increased or decreased by 25 mcg/kg, depending on whether or not the previous patient moved.

Movement was evaluated by an observer unaware of the esophageal contraction frequency. A positive response was defined as movement of the extremities within 1 min of incision. Spontaneous contractions in the lower esophagus were evaluated using the Lectron® 302 monitor (American Antec, Inc.). The tip of the esophageal probe was positioned to maximize heart sounds. Water volume in the pressure-sensing balloon was adjusted to a baseline pressure of 3-5 mmHg and the threshold sensitivity set to 15 mmHg. We prospectively defined a 6-min observation period preceding, and a 3-min period following, skin incision.

Results. Figure 1 plots the number of patients moving (n = 7) and not moving (n = 7) in response to skin incision at different alfentanil infusion rates. The ED₅₀ for movement in response to skin incision was

64 ± 12 mcg/kg/h. In figure 2, movement during skin incision is plotted against the number of contractions during the 6 min preceding incision. Blood pressure and/or heart rate increased more than 10% in 75% of patients. SLEC frequency increased by ≥ 1 contraction/6 min in 57% of patients. There was no statistically significant correlation between hemodynamic and SLEC changes.

Discussion. Movement following skin incision could not be predicted by SLEC frequency, in contrast to results with halothane anesthesia, during which movement was reliably predicted.² Thus, esophageal contractility does not appear to be a useful indicator of anesthetic depth in patients anesthetized with alfentanil and nitrous oxide.

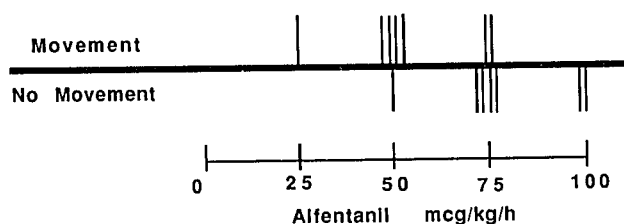


Fig. 1. The number of patients moving and not moving in response to skin incision at different alfentanil doses. Each line represents one patient.

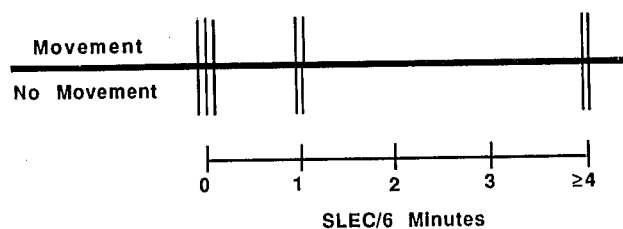


Fig. 2. The number of patients moving and not moving in response to skin incision at different spontaneous lower esophageal contractility (SLEC) frequencies. Each line represents one patient.

References.

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