TITLE: NAUSEA AND VOMITING AFTER GENERAL ANESTHESIA: A COMPARISON OF MORPHINE WITH OXYMORPHONE (Oxy)

AUTHORS: T.J. Losasso, M.D., D.A. Muzzi, M.D., S. Black, M.D.
AFFILIATION: Department of Anesthesiology, Mayo Clinic, Rochester, MN 55905

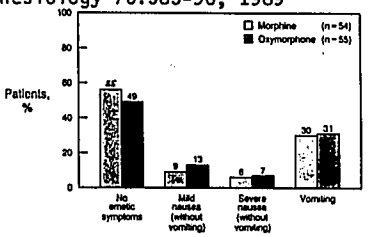
Administration of narcotics in the perioperative period contributes to postoperative nausea and vomiting (PNV). Oxy, a synthetic analogue of morphine, is approximately 10 times as potent as morphine with a similar duration of action.[1] Coblentz et al suggested that nausea and vomiting was notably absent with Oxy.[2] In contrast, Sinatra and coworkers reported a threefold higher incidence of PNV with Oxy compared to morphine.[3] We performed a prospective, randomized, blinded study to determine if the incidence and severity of PNV are different in patients receiving general anesthesia supplemented with Oxy or morphine.

With Review Board approval, 109 ASA 1-3 patients undergoing cervical or lumbar laminectomy were studied. Patients were randomly assigned to receive either intravenous (iv) morphine 0.3-0.5 mg/kg (n=55) or Oxy 0.03-0.05 mg/kg (n=54) to supplement general anesthesia. Anesthesia was induced with thiopental and the trachea was intubated. Anesthesia was maintained with 50% N_2O in oxygen, isoflurane, and a nondepolarizing muscle relaxant. Emetic symptoms (none, mild nausea, severe nausea, vomiting) were recorded by a blinded observer who interviewed patients while in the recovery room and after discharge to the ward. Patients received antiemetic medication only upon request. Nausea was defined as mild if an antiemetic was not requested or severe if an antiemetic was requested by the patient. The study period was terminated when the patient received the first dose of analgesic on the ward.

There were no significant differences in patient characteristics between the morphine and Oxy groups. The mean dose of morphine and Oxy administered was 0.38 and 0.039 mg/kg, respectively. There was no difference in the incidence or severity of emetic symptoms between the two groups (see fig).

Despite the previous report of a higher incidence of PNV with Oxy compared to morphine,[3] we found no difference in either the incidence or severity of emetic symptoms in patients receiving equipotent doses of these opioids to supplement general anesthesia. Our findings are understandable given the close structural similarity between morphine and Oxy.

References:
1. J Pharmacol Exp Ther 125:116-21, 1959
2. N Engl J Med 255:694-8, 1956
3. Anesthesiology 70:585-90, 1989



A1064

TITLE: DETECTION OF ANESTHESIA MACHINE LEAKS DURING CONTROLLED VENTILATION IN ANESTHETIZED DOGS

AUTHORS: L.C. Jameson, M.D, P.M. Popic, M.D
AFFILIATION: Anesthesia Department, University of Wisconsin, Madison, WI 53792

Anesthesia risk management programs emphasize anesthesia machine check out to prevent leaks that could compromise patient ventilation. Machine leaks have multiple sources and can occur at any time during the anesthetic. This study was designed to assess the physiologic effect of standard machine leaks on anesthetized dogs during controlled ventilation and the ability of current patient monitors to detect machine leaks.

METHODS: Seven, thirty kg, mongrel dogs* were anesthetized with 1.5% halothane (H), N2O/O2 using a Modulus I (OHMEDA) anesthesia machine. After intubation with a 6.0 OET, an 18 gu IV, femoral arterial line and clinical monitors were placed. The dogs were paralyzed with metubine and ventilated (Ohmeda 7000 Ventilator) to constant tidal volumes (Vt) (Ohio 5400 Volume Monitor). Peak airway pressure was below 15 cm H2O. Dogs were ventilated to a constant end tidal (ET) CO2 at a fresh gas flow (FGF) of 1.7 L/M (0.7:1.0 L/M of O2:N2O) and 5.0 L/M (2:3 L/M of O2:N2O). The standard leaks (2 or 4 L/M at 10 cm H2O anesthesia circle pressure) were placed in the inspired limb, expired limb, and the CO2 absorber of the anesthesia circle. Endotracheal cuff leaks were 5 cm H2O cuff pressure and cuff deflated. The standard leaks were introduced and the following data was collected every 30 sec for 5 min: ETCO2, tongue pulse oximetry (CritiCare Systems POET®II); inspired N2, O2, H, N2O, ETCO2 (Marquette Gas Analysis Medical Gas Analyzer 1100); (Vt), minute ventilation and respiratory rate; arterial BP and heart rate (HR) (Hewlett Packard 78205D Physiologic Monitor); three ABG (Corning 178 pH Blood Gas Analyzer) for each condition. The time to the following alarms was also noted: Vt-apnea alarm, POET ETCO2 (±2 torr previous value), peak airway pressure (PAP) alarm (7.5 cm H2O), and pulse oximeter (SpO2) (≥97% saturation). Statistical significance was considered $p<0.05$ using chi-square analysis.

RESULTS: A significant leak caused an increase in PaCO2 ≥ 1.5 torr. Over all conditions, there was no difference in frequency of significant leaks at either FGF (1.7 l/min, 47/51; 5.0 l/min 37/45). Apnea (Vt≤50 ml) occurred only at FGF of 1.7 l/min and leaks of 4 l/min (difference from 5.0 l/min $p\leq0.01$). When apnea occurred all alarms sounded within a 20 second period in this sequence: ETCO2 (POET®II), PAP, Vt-apnea. During apneic periods O2 saturation did not change more than 1% while PaCO2 rose by 11.2±4.6 torr (n=22). The ETCO2 alarm (±2 torr) sounded 41/47 occasions for 1.7 FGF and 32/37 occasions for 5.0 l/min FGF. A change of ≥15% Vt occurred on 41/47 and 30/36 occasions for 1.7 and 5.0 l/min of FGF. There were no differences in Vt or ETCO2 ability to detect a significant leak. The change in either Vt or ETCO2 did not significantly predict the ΔPaCO2. N2 was never present nor did the SpO2 O2 change during any significant leak. Subjective findings included change in ETCO2 waveform by informed observer 45 of 51 times at 1.7 l/min FGF and 30 of 45 times for 5.0 l/m FGF (not significantly different). The same observers noted a change in the ventilator sound but this could not be quantified. No significant change in HR or BP occurred.

DISCUSSION: Neither SpO2 nor N2 detection proved helpful in detecting significant machine leak during controlled ventilation with a rising bellows ventilator. All apnea alarms functioned effectively. Neither Vt or ETCO2 detected all significant leaks. ETCO2 may be more sensitive due to the change in waveform and the ease in setting tight alarm limits (± 2 torr). Change in waveform was a subjective finding and its general reliability in a naive situation is difficult to assess. Vt alarm limits, if left at default limits (150 ml), would only detect apnea. An automatic ± 15% Vt/Ve alarm could improve detection of machine leaks. The most effective method of detection in new machine leaks was tight ETCO2 and Vt alarm limits.

*Study approved by Research Animal Resources Center, Univ. of Wisconsin