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Title: COMPLIANCE CHANGES LITTLE ON FENTANYL-OXYGEN INDUCTION

Author: Franklin L. Scamman, M.D.

Affiliation: University of Iowa Hospitals and Clinics, Department of Anesthesia, Iowa City, Iowa 52242

Introduction. That intravenous narcotics can cause muscle rigidity in humans is well known. Fentanyl, in particular, has been incriminated in causing a "stiff" chest and abdominal wall, reducing total respiratory compliance. Sokoll et al¹ reported that fentanyl 5 mcg/kg caused a 5% increase in "H" reflex amplitude (an index of monosynaptic reflex activity). Furthermore, addition of 70% N₂O caused an increase in abdominal wall electromyogram during exhalation. Kallos et al², using Innovar at a fentanyl dose of 7 mcg/kg, found, following paralysis with succinylcholine, that there was a left shift of 10 cm H₂O in the compliance curve. However, the pre- and post-paralysis slopes were unchanged. Comstock³ reported that when using oxygen-fentanyl induction for open-heart surgery, that 8 of 10 patients had to be paralyzed after receiving 21 mcg/kg of fentanyl in order to prevent severe CO₂ retention due to "rigidity" and an inability to ventilate with bag and mask. The following study was designed to measure changes in total respiratory compliance during fentanyl-oxygen induction in order to elucidate the cause of the inability to ventilate patients during induction of anesthesia with narcotics.

Methods. Five adults, ASA class 1 or 2 suffering from carcinoma of the larynx scheduled for total laryngectomy received tracheostomies under xylocaine local. Premedication consisted only of morphine, meperidine, atropine or scopolamine. Following intubation, a fentanyl infusion was started at a constant rate to ensure administration of 30 mcg/kg over 10 minutes. Simultaneously, mechanical ventilation with 10 cc/kg at a respiratory rate of 10 was started. The ventilator was set to give a 1 second plateau during which airway pressure was recorded. Fresh gas inflow was always 6 l/min. When apnea appeared, (commonly between 1 and 3 minutes) control airway pressure was recorded. Thirteen minutes after the start of the infusion, the pressure was recorded and 60% N₂O begun. Eighteen minutes after the start, pressure was again recorded and pancuronium 0.05 mg/kg administered. At 23 minutes, a final pressure reading was made. Compliance calculations were corrected for circle compliance.

Results. In all 5 patients, compliance was decreased at 13 minutes (average 16% below control). There was a further decrease at 18 minutes (average 38% below control). Compliance returned to normal in all patients at 23 minutes (average 3% above control). "Rigidity" of the abdomen and extremities was marked at 18 minutes.

Discussion. The small change in compliance (-16%) with fentanyl infusion would be missed by many anesthetists. Our findings do not explain the inability to keep CO₂ normal in Comstock's study. The further decrease in compliance with N₂O was expected but not severe. It is concluded that most of the inability to ventilate patients by bag and mask who are receiving high dose fentanyl results from a cause

other than chest and abdominal wall rigidity. This is most likely a closed glottis.

References.

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