TITLE : DIFFERENCES BETWEEN PaCO2 AND PETCO2 INDUCED BY THE LATERAL DECUBITUS POSITION DURING ANESTHESIA

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Several studies have demonstrated that the gradient between arterial and end-tidal PCO2 (P(a-ET)CO2) increases with general anesthesia. However, controversies exist regarding the stability of this gradient during the maintenance of anesthesia (1). Lateral decubitus (LD) increases the ventilation to perfusion inadequacies and could therefore increase P(a-ET)CO2. This study was conducted to evaluate the evolution of P(a-ET)CO2 during the time-course of general anesthesia after the patients have been placed in the LD position.

13 consenting ASA I-II patients, undergoing kidney surgery in the flexed LD position under general anesthesia were studied after institutional approval was obtained. All patients were mechanically ventilated with a tidal volume and a respiratory rate maintained constant throughout the study. Heart rate (HR), mean arterial pressure (MAP), esophageal temperature (T°) and PETCO2 (Perkin Elmer mass spectrometer) were continuously monitored. Arterial blood samples for blood gas analysis (corrected to patient T°) were drawn through an indwelling radial catheter after induction (T1), 15 min after flexed LD (T2), and every 30 min (T3 - T6) until the end of surgery, and after patients were replaced in the supine position (T7).

The results are summarized in the table and given as mean ± SD. P(a-ET)CO2 increased significantly at T4 and T5 when compared to T1. However, interindividual variations were important either before or after LD positioning. No correlation was found between P(a-ET)CO2 and MAP, T° or the duration of anesthesia.

In conclusion, this study demonstrates that P(a-ET)CO2 increases during surgical procedures performed in LD. This phenomenon could be related to ventilation/perfusion mismatch induced by combination of LD position and prolongation of anesthesia.

	T1	T2	T3	T4	T5	T6	T7
MAP (mmHg)	82 ±15	85 ±10	91 ± 7	91 ± 9	85 + 9	91 ±12	99* ±19
P_{aCO_2} (mmHg)	36.5 ± 7.0	36.4 ± 5.0	36.2 ± 5.3	35.9 ± 5.2	35.3 ± 5.6	35.2 ± 5.8	34.9 ± 6.8
$P_{ET CO_2}$ (mmHg)	29.7 ± 5.8	28.2 ± 4.2	27.3 ± 3.7	26.3 ± 3.6	25.6 ± 4.1	26.3 ± 3.9	26.9 ± 5.2
$P_{a-ET CO_2}$ (mmHg)	6.8 ± 4.2	8.5 ± 4.2	8.9 ± 4.2	9.6* ± 4.1	9.6* ± 4.1	8.9 ± 4.3	8.0 ± 4.8

* p < 0.01 versus T1

(two way analysis of variance + Neuman Keuls Tests)

References
1. Anesth. Analg. 62 : 1065-1069, 1983
2. Acta Anaesthesiol. Scand. 33 : 629-637, 1989

A491

Title: **THE EFFECT OF HELIUM ON ENDOTRACHEAL TUBE FLAMMABILITY DURING KTP/532 LASER USE**

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Introduction: During carbon dioxide (CO2) laser, a helium/oxygen (He/O2) gas mixture, increases ignition time (IT) of unmarked polyvinylchloride (PVC) endotracheal tubes (ETT) as compared to nitrogen/oxygen (N2/O2).[1,2] This study was undertaken to determine if He/O2 use increases IT during KTP/532 laser.

Methods: A six L/min gas flow was directed into a hole at the base of a heat-resistant glass cylinder from an anesthesia machine with an auxilliary input of He. The laser beam was directed through a second hole on the side of the cylinder, at the ETT sample suspended inside the chamber. A commercial gas analyzer in the inflow line verified the O2 concentration. Gas mixtures tested were 21%, 30% and 40% O2 in N2, and 30% and 40% O2 in He. 1"-2" ETT segments were suspended at the focal length of the laser beam. Fourteen samples for each gas mixture were exposed to a continuous laser beam with a 400 mm objective lens at 10 watts until ignition (presence of a clear flame). The IT in seconds, for each sample, was recorded. The beam was turned off at 60 seconds if ignition did not occur.

Both the CO2 (Coherent CO2 Laser, with micromanipulator and 400 mm lens) and KTP/532 (Laserscope Microbeam II, calibrated at 10 watts using calibration pod provided, 0.4 mm spot size) lasers were tested for each gas mixture and concentration.

Data were analyzed using ANOVA and Kruskel-Wallis test for the CO2 and KTP/532 laser ignition times respectively. P<0.05 was considered significant.

Results: The results are shown in Table 1. Using the CO2 laser, IT was prolonged with He/O2 (p=0.0001) and decreased with increasing O2 concentration in both N2 (p=0.0001) and He (p=0.006). These results are similar to previous published work.[2] With the KTP laser, however, the IT was positively skewed and unpredictable. The IT was not affected by the use of He rather than N2 nor by the changes in the O2 concentration in either N2 or He.

Discussion: Our results with the CO2 laser were similar to those in previous studies.[2] However, with the KTP/532 laser, the use of He and the change in O2 concentration had no impact on IT. This indicates that with respect to the ignition of ETT, the use of He rather than N2 during KTP/532 laser surgery confers no added margin of safety. Any safety measures used for one type of laser must be tested before being accepted as safe for another type with different wavelength and penetration characteristics.

References
1. Van Der Spek AFL, et. al.: Br J Anaesth 60:709-729,1988.
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Table 1
Mean Time to Ignition (Seconds)

	%O2	CO2	KTP/532
Nitrogen	21	51.29 ± 11.39	17.44 ± 23.26
	30	41.28 ± 10.83	15.6 ± 19.47
	40	21.51 ± 6.42	12.83 ± 19.14
Helium	30	60 ± 0	9.89 ± 5.33
	40	50.34 ± 10.96	11.04 ± 14.47

Mean ± S.D.