Anesthesiology
V 75, No 3A, Sep 1991

A929

TITLE: DESFLURANE IN PEDIATRIC ANESTHESIA: MAINTENANCE AND EMERGENCE CHARACTERISTICS

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INTRO. Desflurane (D) is a new volatile anesthetic with a low blood/gas solubility coefficient (0.42). Recent work (1,2) suggests that D should facilitate rapid recovery. This study compared the maintenance and recovery dynamics of D with halothane (H) in pediatric patients.

METHODS With IRB approval and parental consent anesthesia was induced in all patients with H and 60% N_2O because of well documented irritation and laryngospasm associated with D induction in children (3). The trachea was intubated without relaxants. Respiratory gases were monitored via a Datex analyzer. In Group I, 1 MAC D (pediatric MAC 8-10%)(4) was substituted for H immediately after intubation and delivered via controlled normocapneic ventilation. Maintenance D concentration was then adjusted in response to surgical stress and hemodynamics. Group II patients continued 1 MAC H titrated as per same criteria. Supplementary i.v. agents were avoided in all cases. Following surgery, all patients received regional anesthesia and H or D was abruptly discontinued from maintenance concentration. The trachea was extubated on awakening (eye opening with purposeful movement). Times to awakening and recovery room fitness for discharge (RRDT) were noted. Responses during recovery (shivering, agitation, pain, vomiting) were recorded.

RESULTS Both groups were similar in age, weight, anesthesia time and delivered MAC multiple. Peak HR after incision was greater with D than H ($p<0.05$). Otherwise, intra-operative hemodynamics were comparable. Following its cessation, end tidal D concentration fell to <0.5% in all patients by 3 minutes. D patients were awake and extubated significantly earlier than H (8±3.4 min. vs 13.8±5.3) with no emergence complications. RRDT was shorter with D but did not achieve statistical significance. Nausea and vomiting was higher in the H group (44% vs. 11%).

TABLE

Group	Age (yrs)	Wt. (kg)	Anesth. Time(min)	Awake Time(min)	RRDT (min)
I	3.5±2.4	16.1±6.8	58.7±25	8.0±3.4	54±18
II	3.0±2.3	14.0±4.6	60.4±21	13.8±5.3	71±37
Sig.	NS	NS	NS	p<0.05	NS

I = D Maint. n=9 II = H Maint. n=9

DISCUSSION One to 1.5 MAC D with N_2O allowed for safe maintenance, emergence and recovery. The lower solubility of D allowed for earlier awakening. Given stable maintenance with quicker and perhaps qualitatively better emergence characteristics than H, D may be useful in pediatric outpatient surgery. Further trials with a large number of patients are thus in order.

REFERENCES

(1) Anesthesiology 73 (3A) A1246 (1990)
(2) Anesthesiology 73 (3A) A313 (1990)
(3) Anesth. Analg. 72 (2S) S320 (1991)
(4) Lerman, J., unpublished data

A930

TITLE: A NEW ENDOTRACHEAL TUBE CONNECTOR FOR SAMPLING END-TIDAL CO2 IN INFANTS

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Introduction: The optimal site to sample end-tidal CO2 in infants ventilated with the Mapleson D circuit remains controversial.(1) The results of a previous laboratory study suggested that sampling end-tidal CO2 at the point of narrowing of the endotracheal tube (ETT) connector is as accurate as distal sampling. To confirm these findings, we used a laboratory model and a clinical study to evaluate a new low dead space endotracheal tube connector with a sideport which samples end-tidal CO2 at the point of narrowing of the ETT connector.

Methods: In the laboratory model, a 2 liter glass jar (test lung) with a fan within it for gas mixing was connected to a standard 3.5mm ETT, ETT connector with sideport, elbow and Ayre's T-piece. The model was ventilated by an Air-Shields Ventimeter which delivered a tidal volume of 30 cc at a rate of 25/m. There was no leak in the system. Fresh gas flow (FGF) was delivered by a calibrated flow meter to the Ayre's T-piece at rates of 3,5 and 10 l/m. A blended mixture of CO2 in oxygen was introduced into the test lung at a rate of 0.5 l/m and the system was ventilated until the system reached equilibruim. End-tidal C02 was sampled simultaneously within the test lung and at 1 cm increments from the tip of the ETT to the FGF inlet by a calibrated Datex infrared capnometer which sampled at 150 cc/m. In the clinical study, eight ASA 1 or 2 infants aged 1 day to 12 months undergoing surgery requiring endotracheal intubation were studied. The trachea was intubated with an oral ETT with no audible leak up to 25cm H20 pressure. All infants were ventilated by an Air-Shields Ventimeter which delivered a tidal volume of 10cc/Kg. A #19g catheter was placed 1 cm above the ETT tip through the elbow sampling port. The low dead space ETT connector with sampling sideport was used in each infant (Fig). End-tidal C02 was sampled at the ETT tip, sideport and standard elbow sampling port by the same end-tidal gas monitor. FGFs of 3, 5 and 10 L/m were tested randomly. A spirometer was used to maintain a constant tidal volume with changes in FGF rate. The catheter was removed before measurements were made at the side-port. Repeated measures ANOVA and the Student-Neuman-Keuls test were used for statistical analysis ($p<0.05$).

Results: In the laboratory model, there was no statistical difference between end-tidal CO2 at the point of narrowing of the ETT connector and within the test lung. In the clinical study, there was no statistical difference between end-tidal CO2 sampled at the tip of the ETT and at the sideport, even at a FGF of 10 L/m. However, statistically significant differences were observed when the standard sampling site was compared to the more distal sites ($p<0.05$). This was true in all patients studied, independent of tidal volume, weight or FGF.

Conclusion: The need for distal sampling of end-tidal CO2 in children has recently been questioned.[1] Difficulties with distal sampling include frequent catheter occlusion, increased cost and increased risk of disconnection. This study demonstates that a low dead space ETT connector with a sampling sideport distal to the point of narrowing of the connector is as accurate as distal sampling without the disadvantages of distal sampling.

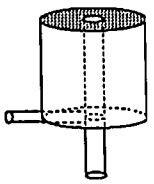

Fig.

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1. Anesthesiology, 73:265,1990.

Acknowledgement: Endotracheal tube connectors provided by Respiratoy Support Products.

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