What Anesthesia Can Do to Young Children

JP Monrigal, JC Granry: Paediatric Anaesthesia 1997;7: 295-300.

Anesthesia in Young Children

Reference: JP Monrigal, JC Granry. The benefit of using a heat and moisture exchanger during short operations in young children. Pediatric Anaesthesia 1997;7: 295-300.

Brief Summary

In pediatric anesthesia, heat and moisture conservation is very important. The use of a small volume heat and moisture exchanging filter can prevent loss of body heat. Such a device providing effective filtration can also prevent cross infection, where anesthetic equipment is used on several consecutive patients. This paper describes the use of the Pall BB25 breathing system filter in pediatric anaesthesia.

Methods

Forty children in the age range one to nine years, body weight 9.5 - 21 kg, undergoing routine urological or abdominal surgery, were randomized to the filter or control group. Halothane was used for induction of anaesthesia, maintenance was with isoflurane, halothane or propofol. Fentanyl was used for analgesia and atracurium was used where muscle relaxation was required for intubation in older children. Uncuffed tracheal tubes were used for intubation and the length of tube protruding from the mouth was recorded. Controlled mode ventilation was used. Operating room temperature was recorded. Patients were placed supine on a heated mattress and body temperature was recorded using a rectal probe. Frequency of ventilation, tidal volume, peak inflation pressure and respiratory leak were all monitored. Sidestream capnography was used to monitor end-tidal CO_2 connected to the filter port, or to the tracheal tube in the control group. Relative and absolute humidity and temperature of the anaesthetic gases were monitored.

Results

The authors found no difference in ventilator parameters, including no deleterious effect on effective deadspace in the ventilator circuit. The use of the filter increased the temperature and humidity of the anaesthetic gas very rapidly, from the dry anaesthetic gas level of 19 ℃ and 0.16 mg H_2O to 27.5 ℃ and 22.3 mg H_2O, within the first minute of the procedure. Samples taken from the Y-piece show constant, significant differences between the filter and control group throughout the operating time. Results from Y-piece probe:

	Filter Group	Non-filter Group
Temperature in 1st minute	27.5 ℃	25.2 ℃
Temperature after 2 minutes	28 ℃	25.4 ℃
Mean temperature	28.3 ℃	25.6 ℃
Mean absolute humidity	22 mg water/litre	12 mg water/litre

Conclusions

The authors note that there is no clear definition of optimal humidification in the airway, especially in

pediatrics. However the values they measured in the filter group were always higher than the level of 20 mg H_2O/litre commonly quoted as the threshold for prevention of damage to the airway epithelium.

They conclude, "To maintain homeostasis as closely as possible, the introduction of a heat and moisture exchanging filter into the circuit is justified by the constant and immediate increase in humidity and temperature produced at the airway level, even for anesthesia of short duration."