TITLE: USE OF FORCED AIR WARMING SYSTEM FOR INTRAOPERATIVE WARMING

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Intraoperative hypothermia (IH) is a recognized problem in anesthetic management. Recently, a warming system using forced warm air channeled through a disposable blanket (Bair Hugger, Augustine Medical Inc.) has been reported as effective in rewarming hypothermic patients postoperatively[1]. This is a report of our clinical experience in the use of this system intraoperatively.

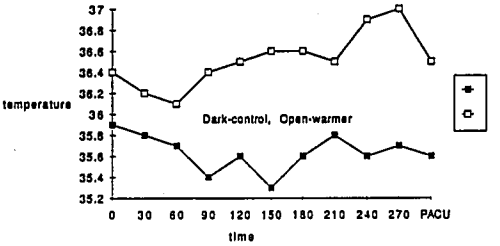
Thirteen patients undergoing spinal surgery by the orthopedic service were studied in a retrospective fashion. Patients were anesthetized using a balanced anesthetic technique of narcotics, low dose isoflurane and induced hypotension. Patients were monitored appropriately; including esophageal temperature (T) monitoring. The control group of 6 patients had T conservation by warming fluids and inspired gases as well as the operating suite. The second group of 7 patients had warming of inspired gases and fluids and had a forced air warming blanket applied to the legs. No attempt to warm the room (above 25° C) was used in the second group. Patient core T was recorded intraoperatively and upon admission to the PACU as was duration of stay in the PACU.

The 6 patients in the control group underwent procedures lasting an average of 290 min and had average EBL's of 850 ml. This group showed a range of T from 35.9° C to 35.3° C during the procedure with a net loss of .2° C. The average admission T to the PACU was 35.6° with an average stay of 150 min. The 7 patients with the forced air warmer underwent procedures lasting an average of 313 min and had EBL's of 1135 ml. This group had core T ranging from 36.1° to 37° with a net gain of .6° C. The average stay was 120 min. The T gains, and PACU stay were significantly different when analyzed statistically.

Traditional management of IH has been directed towards the prevention of losses. These preliminary data suggest that use of a forced air warmer not only prevents losses but may actually warm patients. In our sample, the study group had longer procedures, lost more blood, yet were warmer at the end of the procedure and had significantly shorter stays. Further study of this system is warranted in a randomized prospective fashion.

References

1. Anesthesia and Analgesia, 70:424-427, April, 1990.



A463

Title: INCREASED WORK REQUIRED TO BREATHE DURING FIBEROPTIC BRONCHOSCOPY
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The purpose of the study was to measure the additional work (W) imposed on spontaneous breathing when a pediatric or adult fiberoptic bronchoscope (FB) is passed through an endotracheal tube (ET).

W was determined by integrating the changes in airway pressure and tidal volume (V_T) during simulated spontaneous room air breathing with a piston driven mechanical model. Two sinusoidal peak inspiratory flow rates were used (30 and 60 L/min), V_T was 1000 ml, and inspiratory-to-expiratory (I:E) ratio was 1:2. W was measured without (baseline) and with a 4.0- or a 5.9-mm OD FB (Olympus) fully inserted into a 7.0-, 8.0-, or 9.00-mm-ID ET (n = 3 for each size tube). Data were subjected to a multivariate analysis with Duncan's multiple range as a post hoc test and alpha of 0.05.

W was significantly increased by the larger FB diameter, the higher peak flow rate, and the smaller ET diameters (Table).

These laboratory data suggest that the overall work of breathing increases significantly in spontaneously breathing patients during fiberoptic bronchoscopy. With most ET and FB combinations, we measured greater increases in work required to breathe than would be predicted solely on the basis of cross-sectional area changes during static laminar flow.

TABLE. Additional Work Imposed on Spontaneous Breathing by Endotracheal Tubes with and without Fiberoptic Bronchoscopes, at Two Sinusoidal Peak Inspiratory Flow Rates

Endotracheal Tube ID (mm)	Fiberoptic Bronchoscope OD (mm)	Work/Breath (kg-m) Peak Flow Rate 30 L/min	60 L/min
7.0	--	0.025b	0.092f
7.0	4.0	0.113h	0.331k
7.0	5.9	>1.000l	>1.000l
8.0	--	0.016a	0.064e
8.0	4.0	0.053d	0.178i
8.0	5.9	0.257j	>1.000l
9.0	--	0.011a	0.045c
9.0	4.0	0.027b	0.103g
9.0	5.9	0.089f	0.255j

Work values are means. Means are significantly different unless labeled with the same letter ($P < 0.05$).