

Intraoperative Temperature Management for Major Open Abdominal Surgery: A Comparison of Forced Air Warming to a Negative Pressure Conductive Warming Sleeve

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BACKGROUND

Intraoperative temperature management has become an increasing important measure for the Physician Quality Reporting Initiative (PQRI). Induction of anesthesia affects thermoregulatory control and leads to perioperative hypothermia¹. The prevention of perioperative hypothermia improves patient outcome². The primary objective of this study was to determine if a vacuum enhanced (<10mmHg) conductive warming system utilizing a single forearm warming sleeve, Dynatherm Medical vitalHEAT™ Temperature Management System (vitalHEAT) alone, is as effective as forced-air warming (Bair Hugger™) for maintenance of intraoperative body temperature in patients undergoing major abdominal surgery with general anesthesia.

METHODS

This was a single site, prospective randomized study where a total of 46 subjects were assigned to receive one of two intraoperative warming methods; the vitalHEAT System or the Bair Hugger System (control group and standard warming method used at our hospital). All subjects underwent a major open abdominal procedure (ie; whipple with a duration of 4 hours). Intraoperative temperature was recorded every 10 minutes and obtained from an esophageal temperature probe inserted at 30cm from dental occlusion. Sublingual temperatures were taken pre- and postoperatively.

RESULTS

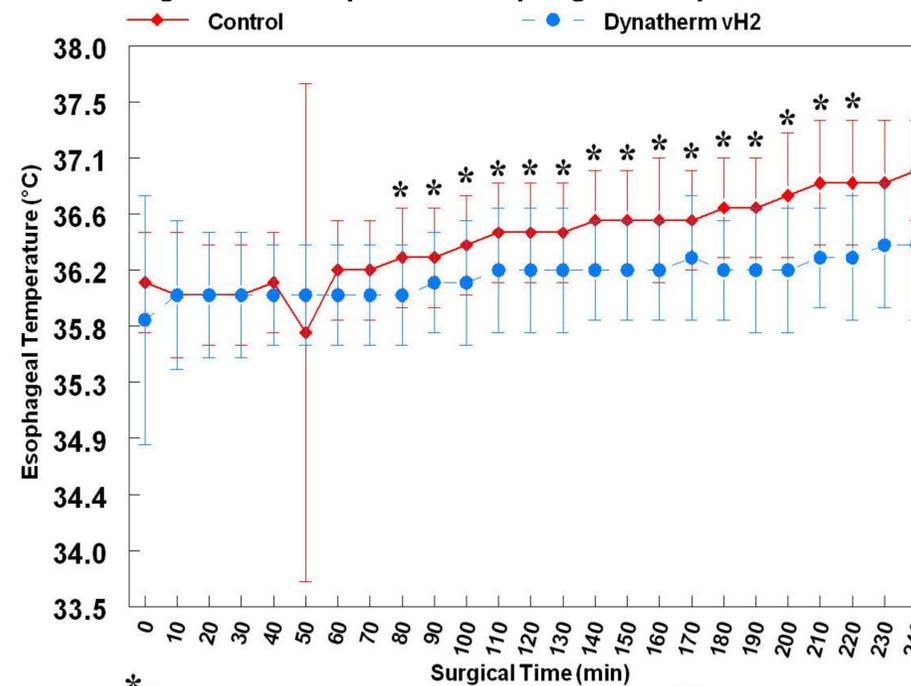
The mean sublingual preoperative temperatures for the vitalHEAT and Bair Hugger groups were 36.8°C and 36.5°C, respectively with a p-value of 0.168 using the t- test (Table 1). The mean final intraoperative temperature was 36.7°C for the Bair Hugger group and 36.2°C for the vitalHEAT group (t-test p=0.0062). All patients had a PACU temperature of greater than 36°C upon arrival. The mean PACU temperatures were 36.7°C and 36.5°C for the Bair Hugger and vitalHEAT groups respectively (t-test p=0.0469).

Table 1: A Comparison of Patient Demographics and Various Temperature Measurements

	Bair Hugger	vitalHEAT	Test	p-value
Sample Size	23	23		
Age [mean (SD)]	57.9 (11.2)	59.9 (13.8)	t-test	0.584
Weight [mean (SD)]	74.4 (15.2)	74.3 (16.2)	t-test	0.971
Height [mean (SD)]	168.1 (11)	168.4 (7.8)	t-test	0.910
Gender- Male	43.5%	43.6%	Chi-square	1
Pre-op Temp [mean (SD)]	36.5 (0.6)	36.8 (0.1.0)	t-test	0.168
% of Patients with an average intraoperative ≥ 36°C	79.4%	64.3	t-test	0.1107
Final Intraop Temp [mean (SD)]	36.7 (0.44)	36.2 (0.46)	t-test	0.0062*
Post-Op Temp [mean (SD)]	36.7 (0.3)	36.5 (0.3)	t-test	0.0469*

* Statistically significant difference between the Bair Hugger and vitalHEAT groups with a p value of < 0.05.

Figure 1: Intraoperative Esophageal Temperatures



vH200™ Warming Sleeve: The patient's upper extremity (hand/forearm) is sealed inside the Warming Sleeve, attached to the Control Unit via an umbilical connector. The Warming Sleeve includes an inner layer consisting of two warming pads encapsulated within an outer vacuum sleeve. The warmed fluid from the Control Unit flows through channels in the warming pads, and the heat is transferred to the hand and forearm. The vacuum sleeve seals around the warming pads, hand, and forearm to create a vacuum chamber.



CONCLUSION

According to the guidelines set by the Centers for Medicare and Medicaid Services, a normothermic temperature recording of ≥36°C for the last intraoperative temperature or first PACU qualifies as proper temperature management. The vitalHEAT System is an efficient warming alternative to the forced-air warming method and might be preferable for cases where the entire abdominal area and upper body need to be accessible.

REFERENCES

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