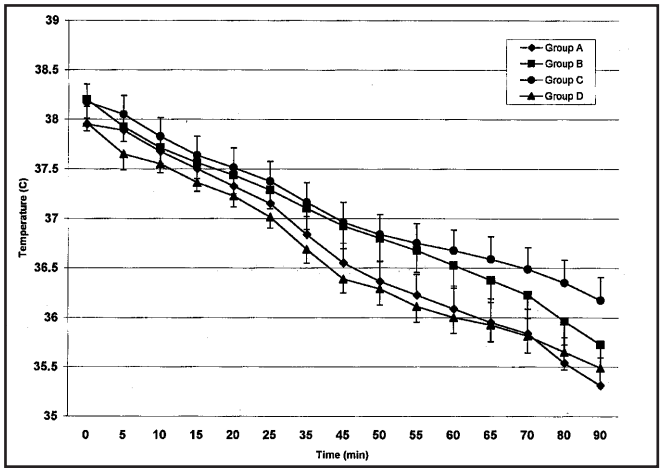
Darvall Warm Air Heating Works

Effectively warms cats and dogs during surgery

Hypothermia (body temperature below 35oC) has been shown to occur in up to 80% of anaesthetized cats and dogs by the end of anaesthesia and surgery. Causes of this problem include small body size relative to body surface area, vasodilatation and lack of shivering during anaesthesia, breathing cold, dry anaesthetic gases from non-rebreathing systems as well as heat loss during surgery from open body cavities (Pottie et al, 2007, Sessler DI, 1997).

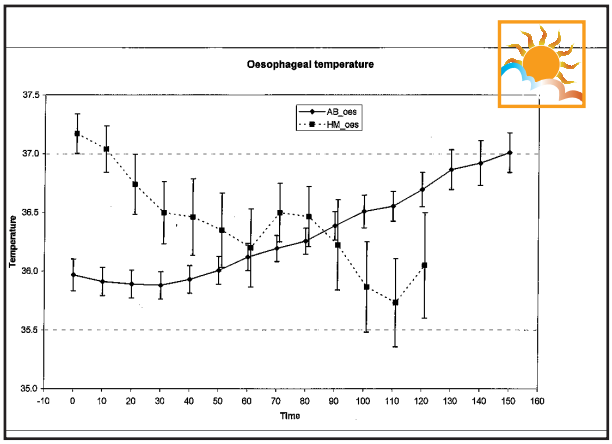
Most warming devices used on anaesthetised animals including electric under blanket or over blanket heating, warm circulating water under blankets, infra red heating lights and competing warm air blanket systems designed for human beings claim to prevent heat loss . In most cases these devices have proven to be ineffective in raising the body temperature of hypothermic dogs and cats during surgical procedures (Tan et al 2004; Machon et al 1999). Simple surface contact with heating devices such as from electric heat blankets or any other type of warming blanket seems unable to result in sufficient heat transfer to raise body temperature.



Graph 1. Mean body temperature (oC) +/- SEM of anesthetised cats covered with a forced air warming blanket in trials A though D. Trial A (off/off); Trial B (on/off); Trial C (on/on) amd Trail D (off/on). From Machon et al, 1999

In the early 1990 s forced warm air heating was developed for human beings using air filled blankets with 1 to 2 mm punched holes for air flow in the patient contact surface (Bair Hugger Patient Warming System, Augustine Medical). When placed over patients recovering from anaesthesia they were were shown to prevent further heat loss and potentially re-warming patients (Lennon et al 1990; Sessler et al 1997). It is interesting that these methods have been shown to be effective as part of the re-warming process when patients are recovering from anaesthesia. At this time these patients can shiver, have a rise in cardiac function (both causing metabolic heat generation) and return of vaso-motor function. It is also interesting to note that these warm air blankets with 1 to 2 mm punched holes for air flow have been shown to be variably effective or ineffective in raising the body temperature of hypothermic human beings during major abdominal surgery (Kelley et al 1990).

In anaesthetised cats and dogs forced warm air heating systems incorporating blankets with 1 to 2 mm punched holes for air flow in the patient contact surface (Bair Hugger Patient Warming System, Augustine Medical) have been tested for their efficacy in both prevention of hypothermia and for rewarming during anaesthesia and surgery (Tan et al 2004; Machon et al 1999). This warming system was unable to prevent heat loss and was ineffective in raising body temperature during anaesthesia of cats (2.3 to 4.5 kg) and dogs (average 26 kg) [see graph 1].



Graph 2. Plot of oesophageal temperature vs. time comparing Darvall forced warm air blanket and heat mat. From Lau et al,2008

The Darvall warm air heating system is different. Darvall blankets designed for use on cats and dogs during surgery or for caged animals in recovery or ICU have a porous patient contact surface with lower surface air flow. These blankets are designed to be positioned around and underneath animals to permit the hair-coat to trap warm air. Recent research using 24 dogs (average 17.3 kg, range 2.7 to 46 kg) anaesthetised for surgery showed that this warm air heating system does consistently raise the body temperature (see graph 2) such that these animals are normo-thermic or near normo-thermic prior to recovery (Lau et al, 2008).

References

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