



ELSEVIER

www.obstetanaesthesia.com

ORIGINAL ARTICLE

## Intra-operative fluid warming in elective caesarean section: a blinded randomised controlled trial

M. Woolnough, J. Allam, C. Hemingway, M. Cox, S.M. Yentis

*Magill Department of Anaesthesia, Intensive Care and Pain Management, Chelsea & Westminster Hospital, London, UK*

### ABSTRACT

**Background:** We assessed the effect of warming intravenous fluids during elective caesarean section under combined spinal-epidural anaesthesia in a blinded, randomised controlled trial.

**Method:** Seventy-five women having elective caesarean section were randomly assigned to receive all intravenous fluids at room temperature, or heated in a cabinet set at 45°C or via a Hotline® fluid warmer (Smiths Medical International Ltd, Watford, Herts, UK). After 10 mL/kg crystalloid preload, combined spinal-epidural anaesthesia was performed. Core and ambient temperatures, thermal comfort and shivering were measured every 15 min thereafter. The primary outcome was the temperature at 60 min.

**Results:** Temperature decreased in all groups. Although the temperature decrease at 60 min was similar in the heated cabinet and Hotline® groups, the room temperature group exhibited a greater decrease [difference 0.4°C (95% CI 0.2–0.6°C);  $P = 0.015$ ]. More women felt cold in the room temperature group (8: 32%) than in the heated cabinet set (3: 12%) and Hotline® (1: 4%) groups ( $P = 0.02$ ), but the incidence of shivering was similar: 11 (44%), 9 (36%) and 7 (28%) respectively. Apgar scores and neonatal cord gases were similar.

**Conclusion:** Warming intravenous fluids mitigates the decrease in maternal temperature during elective caesarean section under combined spinal-epidural anaesthesia and improves thermal comfort, but does not affect shivering. Intravenous fluids should be warmed routinely in elective caesarean section, especially for cases of expected long duration, but the use of pre-warmed fluids is as efficient and cheaper than using a Hotline® fluid warmer.

© 2009 Elsevier Ltd. All rights reserved.

**Keywords:** Caesarean section; Intravenous fluid warming; Temperature; Thermal comfort; Shivering

### Introduction

Following neuraxial blockade, a redistribution of body heat from the core to the periphery<sup>1</sup> and impairment of central autonomic thermoregulatory control<sup>2</sup> may result in a decrease in core body temperature. The extent of this decrease in temperature is related to the height of sensory block,<sup>3</sup> and in obstetric patients, high levels of blockade are required for caesarean section. Moreover, the common addition of opioids to the spinal or epidural component of anaesthesia for caesarean section may exacerbate hypothermia.<sup>4,5</sup>

Peri-operative hypothermia is detrimental and in non-obstetric cases has been associated with increased wound

infection rates and length of hospital stay,<sup>6</sup> operative blood loss<sup>7</sup> and anaesthetic recovery time.<sup>8</sup> Despite this, it has been found that patients undergoing neuraxial anaesthesia for non-obstetric surgery are often poorly monitored and managed for hypothermia.<sup>9</sup> There are few published data from obstetric patients and although caesarean sections are relatively short procedures, the risk of hypothermia remains.<sup>10</sup> Furthermore, the incidence of intra-operative shivering during caesarean section has been reported as high as 60%,<sup>11–13</sup> although this is not always associated with a reduction in body temperature.<sup>14</sup> Shivering is known to have many potentially detrimental effects including increased oxygen consumption, carbon dioxide production and cardiac work, as well as causing maternal discomfort.<sup>15</sup>

At the time of this study, active warming was not routine during elective caesarean section in our unit since surgery is usually relatively brief, warming is potentially costly and significant hypothermia is rarely a clinical problem postoperatively. Although upper body forced warm air blankets may improve maternal thermal stability<sup>12</sup> and comfort<sup>13</sup> during caesarean section, they

Accepted February 2009

Presented in part at the Obstetric Anaesthetists' Association annual meeting, Belfast, Ireland: May 2008.

Correspondence to: Melanie Woolnough, Obstetric Anaesthetic Fellow, Magill Department of Anaesthesia, Intensive Care and Pain Management, Chelsea & Westminster Hospital, 369 Fulham Road, London, SW10 9NH, UK. Tel.: 07713635427.

E-mail address: melwoolnough@doctors.net.uk

are intrusive, especially when the mother wishes to hold her baby. Warming intravenous fluids is non-intrusive, but current fluid warming devices are cumbersome and the disposable elements are expensive. In one small study, warming intravenous fluids during elective caesarean section reduced the incidence and severity of shivering without significantly affecting temperature, but the investigators did not examine maternal comfort or fetal outcomes.<sup>14</sup> We are unaware of any other study examining the effect of warming intravenous fluids during caesarean section.

We therefore conducted a prospective, randomised controlled trial of warming intravenous fluids during elective caesarean section. We also wished to investigate whether infusing fluids pre-warmed in a heating cabinet was as efficient as using an in-line intravenous fluid warmer.

## Methods

Following approval by the Research Ethics Committee, healthy women with uncomplicated single pregnancies, due for elective caesarean section at >37 weeks of gestation, were invited to participate in the study. The study was publicised in the antenatal clinic and women booked for elective caesarean section were given an information sheet at their pre-admission appointment 1-3 days before surgery. At the time of their pre-operative anaesthetic assessment on the morning of surgery, written consent was sought. Exclusion criteria were pyrexia, preeclampsia/eclampsia, drug therapy other than antacids and vitamins/minerals, and increased risk of intra-operative haemorrhage (such as placenta praevia or accreta).

Patients were allocated using computer generated random numbers and sealed envelopes to one of three groups:

*Room temperature (RT)*: all intravenous fluids were stored and given at room temperature through the Hotline® fluid warmer switched off.

*Cabinet (CAB)*: all intravenous fluids were stored in a warming cabinet (QED Scientific, Derbyshire, UK) set at 45°C and administered without further warming during infusion. Earlier bench tests had shown that when 1-L bags of crystalloid, stored in the cabinet at this setting, were delivered through our standard giving set under gravity or pressurised, the temperature of the fluid delivered at the distal end was 40-41°C. When this pre-warmed fluid was passed through the study apparatus, which also included the Hotline® fluid warmer switched off, there was a further drop in fluid temperature to 37-38°C.

*Hotline®* fluid warmer (HL; Smiths Medical International Ltd, Watford, Hertfordshire, UK): all intravenous fluids were warmed during administration via a Hotline® fluid warmer pre-set (by the manufacturers) at 42°C.

In order to maintain blinding, all fluids in the three groups were given via a Hotline® fluid warmer, which was only switched on (by the operating department practitioner) in the HL group. All fluids therefore passed through a standard blood giving set (Baxter, Newbury, Berkshire, UK) and a Hotline® giving set in series. The investigator was not allowed to touch the fluid bags or give any intravenous drugs. The drip counter and the Hotline® giving set were covered in tubular bandage so that the blinded investigator was unable to see if there was any condensation (a small window, shielded from the investigator, was left over the drip counter so that the anaesthetist in charge of the case was able to see that the drip was running). If any patient required blood or blood products, a second Hotline® was available for warming these according to standard practice.

Patients' core temperatures were measured immediately before transfer to the operating theatre using an infrared tympanic thermometer (ThermoScan Exac-Temp®, Braun, Weybridge, UK), with the same ear used for repeated measurements. The same thermometer (with disposable sleeves) was used for all patients, by the same operator. Ambient room temperature and relative humidity were recorded by a separate digital thermometer/hygrometer (Hygro-Thermometer, Digital Meters, Lancashire, UK). Temperature and humidity were measured every 15 min after combined spinal-epidural (CSE) insertion until arrival in the recovery room.

Following arrival in theatre, routine monitoring (electrocardiogram/pulse oximetry/non-invasive blood pressure) was applied and intravenous access gained via a 16-gauge cannula. Patients received a 10-mL/kg fluid preload of Hartmann's solution, infused over 15 min before CSE anaesthesia, our standard practice. The anaesthetist in charge of the case administered the CSE and supervised the clinical management according to his/her normal practice, whilst a separate investigator not involved with the anaesthetic recorded the temperature and humidity and, at the same time points, maternal thermal comfort, pain and shivering. A numerical rating scale was used for thermal comfort, describing 0 as 'the worst imaginable cold', 5 as 'comfortable' (thermally neutral), and 10 as 'insufferably hot'. Parturients were considered as feeling cold if they scored <4 on the thermal comfort scale and feeling warm if they scored >6. Similarly, pain was scored from 0 (no pain) to 10 (worst imaginable pain). The blinded investigator also assessed the degree of shivering in the upper chest, neck and arms on a three-point scale,<sup>16</sup> where 0 = no shivering, 1 = mild, intermittent shivering and 2 = intense, continuous shivering.

Patients' characteristics and other anaesthetic and surgical data were collected including age, body mass index, gestation, parity, height of block, incidence of

Download English Version:

<https://daneshyari.com/en/article/2757952>

Download Persian Version:

<https://daneshyari.com/article/2757952>

[Daneshyari.com](https://daneshyari.com)