Rev Bras Anestesiol. 2016;66(5):451–455

REVISTA BRASILEIRA DE ANESTESIOLOGIA
Publicação Oficial da Sociedade Brasileira de Anestesiologia
www.sba.com.br

SCIENTIFIC ARTICLE

Perioperative warming with a thermal gown prevents maternal temperature loss during elective cesarean section. A randomized clinical trial

Ricardo Caio Gracco de Bernardis[a], **Monica Maria Siaulys**[a], **Joaquim Edson Vieira**[b,*], **Lígia Andrade Silva Telles Mathias**[c]

[a] *Hospital Central da Irmandade da Santa Casa de Misericórdia de Sao Paulo, São Paulo, SP, Brazil*
[b] *Departamento de Cirurgia, Faculdade de Medicina, Universidade de São Paulo, São Paulo, SP, Brazil*
[c] *Departamento de Cirurgia, Faculdade de Ciências Médicas da Santa Casa de São Paulo, São Paulo, SP, Brazil*

Received 27 October 2014; accepted 30 December 2014
Available online 19 November 2015

KEYWORDS
Body temperature;
Perioperative care;
Anesthesia;
Spinal;
Cesarean section;
Intraoperative complications/prevention and control

Abstract
Background and objectives: Decrease in body temperature is common during general and regional anesthesia. Forced-air warming intraoperative during cesarean section under spinal anesthesia seems not able to prevent it. The hypothesis considers that active warming before the intraoperative period avoids temperature loss during cesarean.
Methods: Forty healthy pregnant patients undergoing elective cesarean section with spinal anesthesia received active warming from a thermal gown in the preoperative care unit 30 min before spinal anesthesia and during surgery (Go, $n = 20$), or no active warming at any time (Ct, $n = 20$). After induction of spinal anesthesia, the thermal gown was replaced over the chest and upper limbs and maintained throughout study. Room temperature, hemoglobin saturation, heart rate, arterial pressure, and tympanic body temperature were registered 30 min before (baseline) spinal anesthesia, right after it (time zero) and every 15 min thereafter.
Results: There was no difference for temperature at baseline, but they were significant throughout the study ($p < 0.0001$; repeated measure ANCOVA). Tympanic temperature baseline was $36.6 \pm 0.3\,^{\circ}C$, measured $36.5 \pm 0.3\,^{\circ}C$ at time zero and reached $36.1 \pm 0.2\,^{\circ}C$ for gown group, while control group had baseline temperature of $36.4 \pm 0.4\,^{\circ}C$, measured $36.3 \pm 0.3\,^{\circ}C$ at time zero and reached $35.4 \pm 0.4\,^{\circ}C$ ($F = 32.53$; 95% CI 0.45–0.86; $p < 0.001$). Hemodynamics did not differ throughout the study for both groups of patients.

* Corresponding author.
E-mail: joaquimev@usp.br (J.E. Vieira).

http://dx.doi.org/10.1016/j.bjane.2014.12.007

Conclusion: Active warming 30 min before spinal anesthesia and during surgery prevented a fall in body temperature in full-term pregnant women during elective cesarean delivery.

PALAVRAS-CHAVE
Temperatura corporal;
Cuidados no perioperatório;
Anestesia;
Espinhal;
Cesariana;
Complicações no intraoperatório/ prevenção e controle

O aquecimento no perioperatório com avental cirúrgico térmico impede a perda de temperatura materna durante a cesariana eletiva. Estudo clínico randômico

Resumo
Justificativa e objetivos: A redução da temperatura corporal é comum durante a anestesia tanto geral quanto regional. O sistema de ar forçado aquecido no intraoperatório durante a cesariana sob anestesia peridural não parece conseguir impedi-la. A hipótese considera que o aquecimento ativo antes do período intraoperatório evita a perda de temperatura durante a cesariana.
Métodos: Quarenta pacientes grávidas, saudáveis, submetidas à cesariana eletiva com anestesia espinal receberam aquecimento ativo de um avental térmico na unidade de cuidados pré-operatórios 30 minutos antes da anestesia e durante a cirurgia (Go, n = 20) ou nenhum aquecimento ativo a qualquer momento (Ct, n = 20). Após a indução da anestesia espinhal, o avental térmico foi colocado sobre o tórax e membros superiores e mantido durante o estudo. Temperatura ambiente, saturação de hemoglobina, frequência cardíaca, pressão arterial e temperatura corporal timpânica foram registradas 30 minutos antes (fase basal) da anestesia espinhal, logo após a anestesia (tempo zero) e a cada 15 minutos subsequentemente.
Resultados: Não houve diferença de temperatura na fase basal, mas as diferenças foram significativas ao longo do estudo ($p < 0,0001$; ANCOVA de medida repetida). A temperatura timpânica na fase basal foi de 36,6 ± 0,3 °C, mediu 36,5 ± 0,3 °C no tempo zero e atingiu 36,1 ± 0,2 °C no grupo avental, enquanto a temperatura basal do grupo controle foi de 36,4 ± 0,4 °C, mediu 36,3 ± 0,3 °C no tempo zero e atingiu 35,4 ± 0,4 °C (F = 32,53; IC de 95% 0,45-0,86, $p < 0,001$). A hemodinâmica não diferiu ao longo do estudo em ambos os grupos de pacientes.
Conclusão: O aquecimento ativo 30 minutos antes da anestesia espinhal e durante a cirurgia evitou a queda da temperatura corporal em mulheres grávidas a termo durante a cesariana eletiva.

Introduction

The reduction in body temperature is a common occurrence following the induction of anesthesia even when active warming measures are taken during the intraoperative period.[1,2] However, when such measures are established immediately prior to anesthesia, the onset of hypothermia is slower, and its intensity is milder due to increases in peripheral and core temperatures without any modification to metabolic rates.[3–6]

Body temperature decreasing with general or regional anesthesia is caused by a core-to-peripheral redistribution of heat, as demonstrated by several previous studies.[7–12] Perioperative hypothermia and its complications have been widely studied in patients subjected to non-obstetric surgery. There is no guidelines for the obstetric population, but the NICE provides a framework with which to improve perioperative thermal management that could be transferable to obstetrics.[13] The incidence of shivering can be as high as 60% in these patients.[14–16] Previous studies based on the use of forced-air warming unit during intraoperative periods during cesarean delivery reached conflicting results for hypothermia and shivering in patients given epidural (reducing) or spinal anesthesia (not changing).[17,18]

Several methods have been developed to help maintain normothermia during surgery, including warming patients before inducing anesthesia. The forced-air system is by far the most commonly used intraoperative warming approach. However, blanket-forced air warming, circulating-water garments, or water mattresses do not easily allow the changing of position on the bed, especially when the patient is in a sitting position.

Therefore, we designed a study to establish the efficacy of a pre-warming system that keeps the garment throughout the perioperative period, without interruption, initiated 30 min before the induction of spinal anesthesia for elective cesarean delivery. The aim of this study was to test the hypothesis that active warming 30 min before spinal anesthesia should better prevent a fall in pregnant body temperature. A secondary goal evaluated the incidence of shivering, as well as thermal comfort during the procedure.