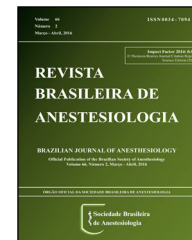




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SCIENTIFIC ARTICLE

Impact of hypotension and global hypoperfusion in postoperative delirium: a pilot study in older adults undergoing open colon surgery

Eduardo Tobar^{a,*}, Mario A. Abedrapo^b, Jaime A. Godoy^c, Jose L. Llanos^b,
Mauricio J. Díaz^b, Rodrigo Azolas^b, Gunther R. Bocic^b, Jaime A. Escobar^c,
Rodrigo A. Cornejo^a, Carlos M. Romero^a

^a Hospital Clínico Universidad de Chile, Departamento Medicina Interna Norte, Unidad de Pacientes Críticos, Santiago, Chile

^b Hospital Clínico Universidad de Chile, Departamento Cirugía Norte, Equipo de Coloproctología, Santiago, Chile

^c Hospital Clínico Universidad de Chile, Departamento de Anestesiología e Reanimación, Santiago, Chile

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KEYWORDS

Delirium;
Hypotension;
Global perfusion;
Central venous oxygen saturation;
Lactate;
Cerebral oxygenation

Abstract

Background: Post-operative delirium is a serious complication in patients undergoing major abdominal surgery. It remains unclear whether peri-operative hemodynamic and perfusion variables affect the risk for postoperative delirium. The objective of this pilot study was to evaluate the association between perfusion and hemodynamics peri-operative with the appearance of post-operative delirium.

Methods: Prospective cohort study of adults 60 years or older undergoing elective open colon surgery. Multimodal hemodynamic and perfusion variables were monitored, including central venous oxygenation (ScvO₂), lactate levels, and non-invasive cerebral oxygenation (rSO₂), according to a standard anesthesia protocol. Fisher's exact test or Student's *t*-test were used to compare patients who developed post-operative delirium with those who did not ($p < 0.05$).
Results: We studied 28 patients, age 73 ± 7 years, 60.7% female. Two patients developed post-operative delirium (7.1%). These two patients had fewer years of education than those without delirium ($p = 0.031$). None of the peri-operative blood pressure variables were associated with incidence of post-operative delirium. In terms of perfusion parameters, postoperative ScvO₂ was lower in the delirium than the non-delirium group, without reaching statistical significance ($65 \pm 10\%$ vs. $74 \pm 5\%$; $p = 0.08$), but the delta-ScvO₂ (the difference between means post-operative and intra-operative) was associated with post-operative delirium ($p = 0.043$). Post-operative lactate and rSO₂ variables were not associated with delirium.

* Corresponding author.

E-mail: etobar@hcuch.cl (E. Tobar).

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PALAVRAS-CHAVE

Delírio;
Hipotensão;
Perfusão global;
Saturação venosa
central de oxigênio;
Lactato;
Oxigenação cerebral

Conclusions: Our pilot study suggests an association between delta ScvO₂ and post-operative delirium, and a tendency to lower post-operative ScvO₂ in patients who developed delirium. Further studies are necessary to elucidate this association.

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Impacto da hipotensão e hipoperfusão global sobre o delírio pós-operatório: um estudo piloto com idosos submetidos à cirurgia aberta do cólon

Resumo

Justificativa: O delírio pós-operatório é uma complicação séria em pacientes submetidos à cirurgia abdominal de grande porte. Ainda não está claro se as variáveis hemodinâmicas e de perfusão no período perioperatório afetam o risco de delírio pós-operatório. O objetivo deste estudo piloto foi avaliar a associação entre perfusão e hemodinâmica no perioperatório com o surgimento de delírio pós-operatório.

Métodos: Estudo prospectivo de coorte de adultos com 60 anos ou mais de idade, submetidos à cirurgia eletiva aberta do cólon. As variáveis multimodais de hemodinâmica e perfusão foram monitoradas, incluindo oxigenação venosa central (ScvO₂), níveis de lactato e oxigenação cerebral não invasiva (rSO₂), de acordo com um protocolo padrão de anestesia. O teste exato de Fisher ou o teste-*t* de Student foram utilizados para comparar os pacientes que desenvolveram delírio pós-operatório com aqueles que não desenvolveram (*p*0,05).

Resultados: Avaliamos 28 pacientes, 73 ± 7 anos de idade, 60,7% do sexo feminino. Dois pacientes desenvolveram delírio pós-operatório (7,1%). Esses dois pacientes tinham menos anos de escolaridade que aqueles sem delírio pós-operatório (*p* = 0,031). Nenhuma das variáveis de pressão arterial no perioperatório foi associada à incidência de delírio. Quanto aos parâmetros de perfusão, ScvO₂ foi menor no grupo que apresentou delírio pós-operatório que no grupo que não apresentou delírio, sem atingir significância estatística (65 ± 10% vs. 74 ± 5%; *p* = 0,08), mas o delta-ScvO₂ (a diferença entre as médias no pós-operatório e intraoperatório) foi associado ao delírio (*p* = 0,043). As variáveis de lactato e rSO₂ no pós-operatório não foram associadas ao delírio.

Conclusões: Nosso estudo piloto sugere uma associação entre delta-ScvO₂ e delírio e uma tendência à diminuição da ScvO₂ no pós-operatório de pacientes com delírio. Estudos adicionais são necessários para elucidar essa associação.

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Introduction

Post-operative delirium (POD) is an important complication in older adults undergoing major abdominal surgery.¹ POD is associated with increased morbidity, mortality, and long-term functional and cognitive impairment.²⁻⁴

The most commonly recognized risk factors for POD are old age, previous cognitive disorder, sensory impairment, severe illness, and infection.^{5,6} Functional impairment, low education level, and alcohol abuse have also been suggested to increase risk. The impact of intra- and post-operative risk factors is controversial.⁷ One element that has received considerable attention is intra-operative hypotension. While some authors have suggested an association between intra-operative hypotension and POD, other studies have failed to confirm the finding.^{8,9}

During a major surgery, there is a risk of hemodynamic disturbance and brain or global hypoperfusion.

Pre-operative preparations, surgical bleeding, and the effects of anesthesia can increase the risk of real or relative hypovolemia, myocardial depression, and changes in vascular resistance that can trigger arterial hypotension and global or regional cerebral hypoperfusion, both during and after surgery. In addition, aging may reduce functional brain reserve and autoregulation of cerebral blood flow, making the organ more vulnerable to small hemodynamic changes.^{10,11} Although there is a clear relationship between hemodynamic alteration and perfusion, few studies have systematically evaluated whether global or regional hypoperfusion are associated with POD. Therefore, we conducted a pilot study on a cohort of older adults undergoing open colorectal surgery, with the objective of evaluating whether peri-operative disturbances in hemodynamic parameters, global perfusion, and/or cerebral oxygenation are associated with POD. Our hypothesis was that global and cerebral hypoperfusion are associated with the development of POD.

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