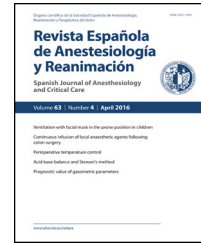




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ORIGINAL ARTICLE

Vancomycin added to the wash solution of the cell-saver. Effect on bacterial contamination[☆]

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KEYWORDS

Bloodless medical and surgical procedures;
Autologous blood transfusion;
Intraoperative blood salvage;
Scoliosis;
Anti-bacterial agents;
Vancomycin

Abstract

Objectives: The aim of this study is to test whether the addition of a low-dose of antibiotic (vancomycin) to the wash solution (saline) of the cell-saver reduces the incidence of bacterial contamination of the autologous red blood cell (RBCs) concentrate recovered.

Material and method: Experimental, randomized, double-blind, parallel group study performed on 20 consecutive patients scheduled for posterior spinal fusion surgery. Intraoperative bleeding was processed through a cell-saver: HaemoLite[®] 2+, in which the RBCs were washed according to randomization group, with saline (control group) or saline + 10 μg ml⁻¹ vancomycin (vanco group). Data regarding age, weight, processed and recovered volume, blood count, blood culture, and vancomycin concentration in RBCs concentrates obtained and incidence of fever after reinfusion were collected.

Results: Processed volume was 843 ± 403 ml and recovered volume 121 ± 29 ml, with haemoglobin concentration 10.4 ± 5.0 g dl⁻¹ and haematocrit 29.1 ± 15.9% (mean ± SD). Recovered RBC concentrate cultures were positive for coagulase-negative Staphylococcus in 5 cases (50%) of the control group while all cultures were negative in the vanco group (p=0.016). The difference between the theoretical concentration of vancomycin administered and the concentration determined in the recovered RBC concentrate was 1.31 μg ml⁻¹ (95% CI 1.19–1.43; p=0.074).

Conclusions: The addition of vancomycin at a concentration of 10 μg ml⁻¹ to the wash solution of the cell-saver achieved similar concentrations in the autologous blood concentrate recovered allowing for bacterial removal, with negative blood cultures in all cases.

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PALABRAS CLAVE

Alternativas a la transfusión;
Transfusión de sangre autógena;
Recuperación de sangre operatoria;
Escoliosis;
Antibióticos;
Vancomicina

Adición de vancomicina al suero de lavado del recuperador de sangre. Efecto sobre la contaminación bacteriana**Resumen**

Objetivos: Comprobar si la adición de bajas dosis de antibiótico (vancomicina) al suero de lavado del recuperador celular reduce la incidencia de contaminación bacteriana del concentrado de hematíes (CH) autógeno recuperado.

Material y método: Estudio experimental, aleatorizado, doble ciego, en forma de grupos paralelos, sobre 20 pacientes consecutivos, programados para cirugía de artrodesis vertebral posterior. La hemorragia intraoperatoria se procesó mediante un recuperador de sangre modelo HaemoLite® 2+, en cuyo proceso los hematíes se lavaron según grupo de aleatorización, con suero fisiológico (grupo control) o con suero fisiológico + 10 µg/ml⁻¹ de vancomicina (grupo vanco). Se recogieron los datos referentes a edad, peso, volumen procesado y recuperado, hemograma, hemocultivo y concentración de vancomicina del CH obtenido e incidencia de fiebre tras la reinfusión.

Resultados: El volumen procesado fue 843 ± 403 ml y el volumen recuperado 121 ± 29 ml, con hemoglobina 10,4 ± 5,0 g/dl⁻¹ y hematocrito 29,1 ± 15,9% (media ± DE). El hemocultivo del CH recuperado fue positivo a *Staphylococcus coagulasa* negativo en 5 casos (50%) en el grupo control mientras que fue estéril en todos los casos en el grupo vanco (p = 0,016). La diferencia entre la concentración teórica de vancomicina administrada y la determinada en CH recuperado fue de 1,31 µg/ml⁻¹ (IC 95% 1,19-1,43; p = 0,074).

Conclusiones: La adición de vancomicina a una concentración de 10 µg/ml⁻¹ en el suero de lavado del recuperador consigue concentraciones similares en la sangre autógena recuperada y permite la eliminación de las bacterias, obteniéndose hemocultivos negativos en todos los casos.

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Introduction

In a recently published study involving 24 units of blood recovered from scoliosis surgery in children, we showed that when cell saver systems with a fixed volume (even paediatric size) bowl are used for processing blood volumes that are small in absolute terms, but significant relative to the size and weight of the child, the characteristics of the salvaged blood obtained do not conform to the standard described in the machine's technical specifications and expected in adult patients. In blood salvaged from our patients, concentrations of haemoglobin (11 ± 5.3 g dl⁻¹) and haematocrit (32.1 ± 15.4%) were lower, and the product contained residual leukocytes (5.34 ± 4.22 × 10³ µl⁻¹) and platelets (37.88 ± 23.5 × 10³ µl⁻¹) (mean ± standard deviation). In addition, more than half of the blood cultures taken from salvaged blood (13 cases, 54.2%) were positive for commensal Gram-positive cocci from the skin, specifically, coagulase-negative *Staphylococcus*.¹

The aim of this study is to test whether the addition of low doses of antibiotics (vancomycin) to the wash solution of the cell saver, and therefore indirectly to the salvaged blood, would reduce the incidence of bacterial contamination in salvaged blood. We also set out to test whether the concentration of vancomycin added to the wash solution matches the concentration measured in the salvaged blood.

Materials and methods

After obtaining approval from the Research Ethics Committee of our institution, we conducted an interventional, randomized, double-blind, parallel group study of 20 consecutive patients scheduled for spinal fusion surgery. Blood shed during surgery was collected and processed through a HaemoLite® 2+ (Haemonetics Corp, Braintree, MA, USA) blood recovery system.

After obtained written parental consent, the 20 patients were randomized to 2 groups of 10 patients each, according to whether vancomycin or saline solution (SS) was added to the machine's wash solution. The randomization sequence was generated on the www.randomization.com website using the randomly permuted blocks method.

Blood was aspirated from the surgical field at a vacuum pressure of less than 150 mmHg, and immediately mixed with heparinised saline (30 U ml⁻¹) at a blood/saline ratio of approximately 7:1. It was stored in the cell saver's reservoir until the end of surgery. Subsequently, it was centrifuged in a paediatric bowl (100 ml) and washed with either SS (*control group*) or SS + 10 µg ml⁻¹ vancomycin (*vanco group*) to obtain the salvaged blood product.

To ensure blinding, a colleague who was not involved in treating our patients, cell salvage or blood sample extraction, was asked to introduce either 10 mg of vancomycin diluted in 10 ml of SS (*vanco group*), obtained by diluting

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