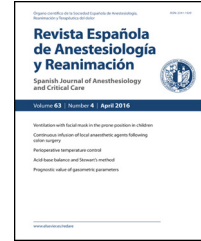




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ORIGINAL ARTICLE

Haematological alterations in the cardiac patient after use of an autotransfusion system[☆]

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KEYWORDS

Cell saver;
Haematology;
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Abstract

Objective: There are studies that declare blood recovered with the autotransfusion system that is potentially heparinised and mixed with other drugs, can cause haematological alterations in the patient, according to existing evidence. The proposal was to compare the haematological values of the patients before reinfusing red blood cells from the cell saver and 12 h after reinfusion.

Material and methods: Observational analytical study of 479 patients who underwent cardiac surgery where the cell saver was used. Haematological variables were collected before reinfusion and 12 h after reinfusion.

Results: Statistically significant haematological values before reinfusion and 12 h after reinfusion were: haemoglobin (9.5–12.5 g/dL), haematocrit (26–38%), platelets ($214.2\text{--}164.2 \cdot 10^3/\mu\text{L}$), total proteins (7.6–5.1 g/dL), PCR (8.5–22.1 mg/L) and D-dimer ($493.3\text{--}875.5 \mu\text{g/L}$) with $p < 0.05$.

Conclusions: With the use of the cell saver an increase was observed of haemoglobin, haematocrit, PCR and D-dimer values together with a decrease in platelet and total protein numbers.

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PALABRAS CLAVE

Recuperador celular;
Hematología;
Reinfusión;
Cardíaca

Alteraciones hematológicas en el paciente cardíaco tras uso de un sistema de autotransfusión**Resumen**

Objetivo: Existen estudios que declaran la sangre recuperada con el sistema de autotransfusión que está potencialmente heparinizada y mezclada con otros fármacos, lo que puede provocar alteraciones hematológicas en el paciente, a tenor de la evidencia existente. Se planteó comparar los valores hematológicos de los pacientes antes de reinfundir glóbulos rojos procedentes del recuperador celular y 12 h después de la reinfusión.

Material y métodos: Estudio analítico observacional en el cual se estudiaron 479 pacientes intervenidos de cirugía cardíaca donde se utilizó el recuperador celular. Se recogieron variables hematológicas antes de reinfundir y 12 h después de haber sido reinfundidos.

Resultados: Los valores hematológicos estadísticamente significativos antes de la reinfusión y 12 h después de la reinfusión fueron: hemoglobina (9,5 a 12,5 g/dl), hematocrito (26 a 38%), plaquetas (214,2 a 164,2 $10^3/\mu\text{l}$), proteínas totales (7,6 a 5,1 g/dl), PCR (8,5 a 22,1 mg/l) y dímero-D (493,3 a 875,5 $\mu\text{g/l}$), con $p < 0,05$.

Conclusiones: Con el uso del recuperador celular se observó un aumento de los valores de hemoglobina, hematocrito, PCR y dímero-D junto con la disminución de cifras de plaquetas y proteínas totales.

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Introduction

The American Heart Association,¹ the Society of Thoracic Surgeons and the Society of Cardiovascular Anesthesiologists² have described the cell saver (CS) autotransfusion system as an alternative to blood transfusion in cardiac surgery. The CS is an electronic device that salvages intraoperative blood loss and processes it for reinfusion. The process consists of separating and washing the red blood cells with physiological saline before reinfusion. The remaining contents, namely, plasma, platelets, clotting factors and products from the surgical site, are discarded.³ Several studies have highlighted the safety, efficacy and efficiency of the CS.^{4–6} Others, however, claim that salvaged blood can be heparinised and mixed with anaesthetic drugs, and this can alter haemoglobin and haematocrit levels.^{7–10} Reinfused red blood cells (RBC) are rich in haemoglobin and haematocrit but poor in 2,3-diphosphoglycerate (2,3 DPG), which slows the transfer of oxygen to tissues.¹¹ These red blood cells contain no plasma, platelets or clotting factors, and thus trigger an inflammatory cascade that causes haematological abnormalities,^{7,8} such as coagulopathy,¹² and increases morbidity by 2–8%.¹³ In this context, it is impossible to predict the platelet and plasma content of reinfused blood from the CS,¹⁴ and this limits its clinical usefulness.¹⁵ The evidence shows that further studies are needed to determine the validity^{16–18} and clinical effects of such red blood cells transfusion in patients, such as significantly longer partial thromboplastin times.² These theoretical issues have been raised in earlier studies in which no CS protocol is used.¹⁸ We aimed to compare the blood count values of patients both before and 12 h after reinfusion of RBCs from the cell saver. We hypothesised that reinfusing RBCs processed in the CS in cardiac surgery

causes changes in their baseline blood count values.

Material and methods

This is an observational analytical study in patients scheduled for cardiac surgery by the Cardiovascular Surgery Department and Heart Unit between January 1 and December 31, 2016. All data were obtained from the surgery scheduling form.

Study subjects

All patients that had undergone surgery using the Fresenius Continuous Autologous Transfusion System (CATS[®]) were eligible for the study. Inclusion criteria were: willingness to participate and sign an informed consent form after receiving a verbal and written explanation of the characteristics of the study, aged over 18 years, having undergone aortic valve surgery, mitral, tricuspid or coronary bypass using the CATS. Any patient in whom CATS was not used based on the indications for surgery (implantation of a pacemaker, implantation of a cardioverter-defibrillator, and vascular surgery), did not meet study criteria and were excluded.

All patients were prepared for surgery using the same, standard, procedure: on admission to the operating room, the patient was placed in the supine position and heart rate, blood pressure, oxygen saturation and depth of anaesthesia (using the bispectral [BIS] index) were monitored. Peripheral (ProtectIV Plus 18 G) and arterial (LeaderCath 3 fr) lines were placed in the left arm, a double-lumen blue FlexTip (Arrow 7 fr) central venous catheter was placed in the subclavian vein, and a foley catheter (Rusch Gold ch 14) was

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