LETTER TO THE EDITORS

Intra-operative cell salvage and sickle cell trait in liver transplantation: time to reconsider?

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Dear Editors,

Sickle cell trait (SCT) characterized by the sickle haemoglobin (HbS) gene in a heterozygous state is the most common haemoglobinopathy worldwide that is typically asymptomatic in affected individuals [1]. In Europe, migration has increased the prevalence, raising concerns about its clinical impact [1]. For example, the use of intraoperative cell salvage may induce sickling because of hypoxia during processing [2]. Evidence of this is limited to a few case reports, including only one in liver transplantation that described sickling in salvaged blood and cautioned against its usage [3]. We present *in vitro* findings indicating that this is not universal and with appropriate screening, the technique may be used in selected individuals.

Our patient was a 24-year-old Nigerian man who underwent orthotopic liver transplantation for primary sclerosing cholangitis. SCT was diagnosed incidentally during assessment because of a positive family history. A haemoglobin variant screen confirmed his phenotype as 35% HbS, 3.2% HbA_2 and 1.1% HbF. The patient was otherwise fit and well with no preoperative anaemia (Hb 120 g%). Before surgery, a decision was made to avoid cell salvage with consent to have samples checked for sickling (Table 1). He was anesthetized with propofol, atracurium, remifentanil and desflurane, and the first 300 ml of blood loss was collected, processed in Haemonetics Cell Saver® V to be examined for sickling before starting homologous blood transfusion.

At the end of surgery, he lost 13L of blood, estimated as 2.5 times his total blood volume and received 16 units of packed red cells, 10 fresh frozen plasma, six cryoprecipitate, two pooled platelets and 7L of colloid in total. Four days later, patient underwent an urgent second liver transplant because thrombosis in both middle and inferior hepatic veins had led to graft infarction. Veno-venous bypass was utilized and retransplantation completed with minimal blood loss and the patient recovered well.

In SCT, each red blood cell contains a variable proportion of HbS, typically 20–30% and therefore has a different propensity to sickle [2]. With an average preoperative HbS of 35%, our patient had a higher theoretical risk of doing so making it reasonable to follow the recommendation by Bratford *et al.* [3]. However, other guidelines suggest that intraoperative cell salvage can be used in SCT patients if clinical circumstances justify it and on a case to case basis with informed consent [2,4].

Given conflicting guidance, we suggest that in SCT liver recipients, sickling in salvaged blood should be routinely quantified. Sickle Cell Index (SCI) is a rapid, simple and widely available measurement of both reversible and irreversible sickle states by microscopic examination of blood smears [5]. An SCI less than 30% is associated with rare sickle cell-related complications and may be an acceptable upper limit, below which salvaged blood could be returned [5]. In addition, sickling in salvaged blood can be minimized by reducing red cell exposure to hypoxia [4]. Adding oxygen to the reservoir has been shown to decrease SCI and plays a role in blood conservation strategy for SCT patients [5]. We suggest that both measures are worthy of further investigation.

Declaration of interests

None declared.

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Table 1. Findings of the peripheral blood films.

Sample description	Results
Preoperative	Low platelets Moderate number of target cells. No sickle cells seen.
Baseline from arterial line at induction	True thrombocytopenia. Red cell agglutination and marked poikilocytosis.
Collected and processed blood from cell saver	Occasional target cells. No sickle cells seen. Fibrin strands and occasional platelet clump. Platelet count unlikely to be accurate.
Arterial sample on transfer to Intensive Care Unit (ICU)	Thrombocytopenia. Red cell morphology appears unremarkable. Haemoglobin electrophoresis: HbS 7%
Second sample from ICU	Leucopenia and thrombocytopenia. No sickle cells seen.

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