INTRAOPERATIVE AUTOLOGOUS BLOOD TRANSFUSION IN SPINAL SURGERY

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ABSTRACT

We evaluated the effectiveness of intraoperative autologous blood in reduction of the need for transfusion of homologous blood in major spinal surgery in two patient groups. In Group A (30 patients) autologous blood and in Group B (30 patients) homologous blood were used. All patients who underwent major spinal surgery in two groups were compared; the homologous blood requirement was reduced from mean 2.77 units (Group B) to mean 0.82 units (Group A). This difference was statistically significant (p<0.01). Differences in both preoperative and postoperative hematocrit values were statistically insignificant in two groups. It seems beneficial to use autologous blood in the operations where the estimated blood loss is high, especially in spinal surgery.

Key words: *Spinal surgery, intraoperative autotransfusion.*

INTRODUCTION

Homologous blood transfusion introduces the risk of disease transmission, isoimmunization and graft versus host reaction (1, 7). Autologous transfusion eliminates these risks. It is widely used in cardiovascular, vascular, orthopaedic, and transplantation surgery. In orthopaedic surgery, it is mostly preferred in spinal fusions, total hip replacements, total knee replacements, and in open reduction and internal fixation of the pelvic or femoral fractures (3).

The cell-saver machine brings to the operating room a portable method which is the same as that used in blood banks to separate cells from plasma and also wash and deglycerolize banked frozen red blood cells (4). Use of a system of this kind is indicated for intraoperative transfusion when a blood loss greater than 1500 ml is expected, in order to be cost-effective (8).

MATERIAL AND METHOD

We made this study on 60 patients. In Group A (30 patients) intraoperative aoutologous blood transfusion and when necessary homologous blood transfusion was used. In Group B (30 patients) only homologous blood transfusion was used. The whole group were from the patients who underwent major spinal surgery. For each patient, the type of procedure, age, sex, estimated loss of blood, transfusions of homologous and autologous blood, and hematocrit values were recorded. Sex, mean ages, and the diagnoses are shown in Table I and II. Mean operating times in both groups were as follows: Group A: 4.5 hours, Group B: 4.3 hours.

Table 1. Sex and age distribution

	Group A	Group B
Sex (male / female)	15 / 15	16 / 14
Mean age	29.4 (11-65)	30.6 (11-64)

Table 2. Diagnoses

	Group A	Group B
Spinal trauma	6	14
Scoliosis	7	7
Ankylosing spondylitis	12	1
Spondylolisthesis	1	2
Congenital kyphosis	3	1
Pott's disease	–	4
Scheuermann's disease	1	–
Brucellosis	–	1
Total	30	30

The cell saver machine (Dideco Company, Italy) was used for intraoperative autologous blood transfusion. This technique involves suctioning blood with accompanying debris and irrigating fluid from the surgical wound into a double-lumen heparin-washed tube. The aspirate is filtered and pumped into a holding reservoir. Fat, surgical debris, white cells, and platelets are filtered through a 140 micron screen. Using a rol-

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ler-type pump, the filtrate is pumped into a centrifuge along with a liter of saline wash, approximately seven times the volume of the red cells present. Heparin free hemoglobin, myoglobin and activated clotting factors are diluted out with the plasma. Waste is spun off, and the packed red cells are pumped into a reinfusion bag, and returned to the patient.

RESULTS

In Group A patients in whom we used autotransfusion, preoperative hematocrit values were ranging between 30-45% (mean: 38%). The reinfused blood was measured as a mean value of 376 cc (range: 145-800 cc). Intraoperative homologous blood transfusion requirement in this group was between 0-2 units (mean: 0.82 units). Hematocrit values that were recorded postoperatively were ranging between 29-44% (mean: 35.6)

In Group B patients, only homologous blood was used intraoperatively, and the mean preoperative hematocrit value was 38.2% (range: 30-45%), whereas the mean postoperative value was 34.5% (range 26-42%). The mean intraoperative homologous blood requirement in this group was 2.77 units (range: 1-6 units).

Althoungh the differences in the amount of homologous blood transfusion requirement in two groups were statistically significant ($p<0.01$), the differences between hematocrit values were statistically insignificant ($p>0.05$) (student t test). This results are summarized in Table III.

DISCUSSION

Although mechanical considerations make blood salvage in orthopaedics more difficult than during procedures in which blood tends to pool in body cavities, intraoperative salvage can make a significant contribution to blood conservation in orhopaedic surgery. Among the orthopaedic procedures, spinal surgery; either anterior or posterior has a significant advantage in this meaning, because surgical area has a relatively good blood pool for aspiration (2, 4-9). This is important to reduced as much as possible (9).

Intraoperative salvage has been shown to be effective in hip and spinal surgery with reductions in use of homologous blood and increase in average postoperative hematocrits (2, 6, 8). This helps the surgeon to be less anxious about the blood loss and the duration of the operation, and for the patient autologous blood transfusion eliminates the risk of alloimmunization or infectious disease from a transfusion.

The complications of intraoperative autotransfusions are very few; like hemoglobinuri, coagulopathy and infections (4). There are no reports of clinical problems associated with the debris or fat from orthopedic procedures.

The two major limitations of this procedure are; first the need of a trained collaborator in operating the device; second, the machine saves only one half of the red blood cells that are shed in the wound, and therefore replacement of the other half is needed (4). Predeposited blood from the patient himself, acute isovolemic hemodilution ore induced hypotensive anesthesia techniques can be used in this meaning (7). In our study we had to use homologous blood transfusion for the same reason.

In the absence of infection or tumor, the use of intaoperative autologous blood is recommended for major orthopaedic surgery (2, 4-9). With the results of this study, we think this technique is useful in major spine surgery, and we intend to use it in the other major orthopaedic operations.

Table 3. Hematocrit changes and homologous blood requirement in the groups.

	Hematocrit (mean)			Homologous blood
	Preop	Postop	Difference*	requirement**
Group A	38	35.6	–2.4	0.82
Group B	38.2	34.5	–3.7	2.77

* : Statistically insignificant ($p > 0.05$).
** : Statistically significant ($p < 0.01$).

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