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THE EFFECT OF POSTOPERATIVE RETRANSFUSION IN NON-ANAEMIC PATIENTS UNDERGOING TOTAL JOINT REPLACEMENT

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Abstract

The aim of this prospective pilot study was to evaluate the effect of the ORTHO P.A.S. postoperative retransfusion system in non-anaemic patients undergoing total hip or knee arthroplasty.

Between February and April 2004 (3 months), blood retransfusion was performed at the authors' institution in 20 consecutive non-anaemic patients who underwent elective, unilateral, primary cementless total hip arthroplasty (10 cases) or cemented total knee arthroplasty (10 cases) for primary osteoarthritis. The average duration of the surgery was 71 minutes. The mean intraoperative blood loss was 357.5 ml.

The mean blood volume returned to the patient was 668 ml. No complications were observed during postoperative retransfusion. Postoperative homologous blood transfusion was required only in 7 cases (35 %).

The study findings indicate that the usage of the postoperative retransfusion system is of great clinical importance in indicated cases. It may increase the efficiency and reduce the cost of blood-ordering practices associated with total joint arthroplasty.

Key words

Total point replacement, Blood loss, Postoperative retransfusion system

INTRODUCTION

Normally performed total hip and knee arthroplasties are associated with considerable blood loss, and most patients need postoperative transfusion (*1, 2*). Blood transfusion is associated with several well-recognised risks and complications, including transfusion-related and allergic reactions, transmission of infectious agents, and immunomodulatory effects (*3, 4).* Therefore, one of the main goals of blood management for patients undergoing total joint replacement is to reduce the need for transfusion with allogenic blood. Autologous transfusion is relatively a safe and effective option, but the repetitive collection of the blood is not free of problems. Vasovagal episodes, anginal attacks, tetany, compartment syndrome, bacterial con-

tamination, febrile non-haemolytic and septic reactions, phlebitis, vascular damage, and clerical errors can sometimes occur. Also, about one-half of autologous blood donated before joint arthroplasty is not transfused (*5*).

Studies of postoperative blood retransfusion are very rare in the international orthopaedic literature (*6, 7*). The aim of this study was to evaluate the effect of postoperative retransfusion using the ORTHO P.A.S. postoperative retransfusion system (EUROSETS Medical Devices, Medolla, Italy) in non-anaemic patients undergoing total hip or knee arthroplasty.

MATERIAL AND METHODS

Between February and April 2004 (3 months), blood retransfusion was performed at the authors' institution in 20 consecutive non-anaemic patients who underwent elective, unilateral, primary cementless total hip arthroplasty (10 cases) or cemented total knee arthroplasty (10 cases) for primary osteoarthritis. The median age at the operation of 10 males and 10 females was 60.9 years (range, 42 to 83 years). Patients affected with coagulation disorders, thrombocytopenia, or other haematological diseases were excluded from the study, as were relative anaemic individuals on the basis of the preoperative haemoglobin level < 120 g/L. The average level of haemoglobin one day before surgery was 140.3 g/L (range, 121 to 164 g/L). Use of all steroidal and anti-inflammatory drugs was discontinued at least one week before surgery. The underlying pathology was primary osteoarthritis of 3rd or 4th degree in all cases. The operation was carried out under spinal anaesthesia in horizontal laminar airflow theatres. Antibiotic prophylaxis with a second-generation cephalosporin was maintained for 24 hours. Ten patients received total hip replacement with an uncemented cup and a straight uncemented stem, the other 10 patients received a cemented total knee replacement. The normally mixed standard-viscosity polymethylmethacrylate Palacos-R bone cement (Biomet Merck, Darmstadt, Germany) was used in these cases.

The duration of the surgery from the time of incision to closure of the wound averaged 71 minutes (range, 55 to 84 minutes). Intraoperative blood loss was measured by the anaesthesiologist according to the contents of the suction bottle and the increase in the weight of surgical swabs. The mean was donation was used. The three suction drains used were removed 48 hours after the surgery. Postoperative blood loss was measured according to the volume in the vacuum drainage bag. Thromboembolic prophylaxis using elastic stockings and administration of a low molecular weight heparin was used before and after the implantation.

The ORTHO P.A.S. system enables postoperative blood gathering from drainages of the operation wound and after its filtration it is retransfused (*Fig. 1*). This is a technique for blood regaining which is not normally used in other cases. The system consists of a disposable set and a multi-purpose unit – a vacuum generator which enables blood suction in the required valves and prevents haematoma formation in the wound. The whole system is sterile and closed. The sucked blood is filtered through a 120 μm macrofilter and afterwards through a 40 μm microfilter; the blood is not washed and is given back to the patient. Before sewing up, it is necessary to wash the wound with sterile physiological solution. Only the blood gathered within the first six hours after the sewing and with a maximum capacity of 1500 ml can be used for autotransfusion. The collected blood cannot be returned back to circulation if there is bacterial or malignant contamination, massive haemolysis occurrence, blood coagulability defect, and hepatic or renal malfunction.

RESULTS

Using the ORTHO P.A.S. retransfusion system we retransfused blood in 20 patients within the first 6 hours after total hip or knee replacement. The blood loss

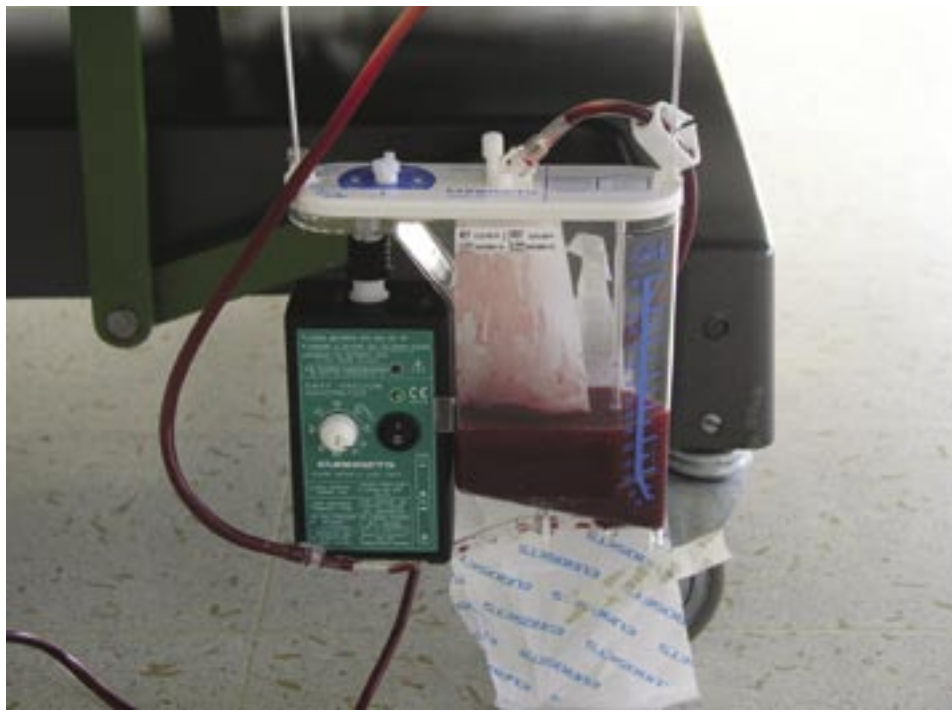

Fig. 1
ORTHO P.A.S. at collecting and filtrating blood from operation wound.

was replaced after the operation only with this gained homologous blood from the ORTHO P.A.S. system in 13 cases (65 %). The average level of haemoglobin 24 hours after the surgery was 109.1 g/L (range 85 to 135 g/L) and the third day post-operatively 100.7 g/L (range, 81 to 135 g/L). The homologous blood transfusion was infused only when the haemoglobin level fell below 90 g/L and the anaemia was symptomatic. It occurred in 6 cases (30 %) with 1 blood unit donated and in 1 case (5 %) with 2 donated blood units. The mean blood volume returned to the patient after a total hip arthroplasty was 565 ml (range, 250 to 1050 ml) and, after a total knee arthroplasty, it was 771 ml (range, 550 to 900 ml). After the end of the retransfusion deadline up to the first 24 hours after the operation, hip replacement patients had an additional blood loss of 260 ml (range, 100 to 490 ml). The corresponding value for knee replacement patients was 368 ml (range, 160 to 1430 ml) (*Table 1*).

There were no serious complications requiring further surgery, no haematomas, seromas or pulmonary emboli. No deep infection occurred.

Table 1

	total hip arthroplasty	total knee arthroplasty
No 10	10	10
Men/Women	4/6	6/4
Homologous blood transfusion	4	3
Intraoperative blood loss (ml)	420	295
Retransfused blood (ml)	565	771
Further blood loss 6 to 24 h post-op.	260	368

DISCUSSION

Perioperative blood loss cannot be reliably predicted in non-anaemic individuals (*8*). The inability to predict the need for transfusion in most patients has clinically and economically important consequences (*9*). A high percentage of cases with applied perioperative blood are performed in individuals with a preoperative haemoglobin concentration of ≥ 110 g/L (*10).* Indeed, when unpredicted transfusions are needed, patients often receive allogenic blood, which increases the risk of allergic reactions, transmission of infectious agents, and immunomodulatory effects. Patients are often asked to donate blood before surgery so that autologous blood can be used if a perioperative transfusion is needed. However, the collection and transfusion of autologous blood are not free of problems (*5*), and an increased risk of perioperative allogenic transfusion exists in patients who have donated autologous blood before surgery. Therefore, any means to return the patient's lost blood would be valuable.

Our experience can only be correlated with the results published by *Farris et al. (11).* This is the only study found in world literature concerning the same topic. These authors observed no complications related to autologous retransfusion up to 6 hours after the surgery in a sample of 153 patients. A rise of temperature or shivering was observed for 6 to 12 hours after the surgery in 22 % of the patients. We did not observe any such complication in our sample. We agree with this study that postoperative retransfusion has a positive effect for the operated patients and that the risk of postoperative wound infections is not increased by this procedure.

We found in this study that the ORTHO P.A.S. system seems to be a simple, safe and effective system limiting the necessity to administer homologous blood for patients after total hip or knee arthroplasty.

CONCLUSIONS

We believe that the risks and costs associated with allogenic and autologous blood transfusion in patients undergoing total joint arthroplasty should be reduced by all possible means. Our study suggests that postoperative blood loss retransfusion might help to minimise the different risks of blood transfusions and may reduce the cost for blood management in patients treated with large joint replacement.

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VÝZNAM POOPERAČNÍHO RETRANSFUZNÍHO SYSTÉMU PO NÁHRADÁCH VELKÝCH KLOUBŮ U NEANEMICKÝCH PACIENTŮ

Cílem této prospektivní studie bylo vyhodnotit efekt pooperačního retransfuzního systému ORTHO P.A.S. mezi neanemickými pacienty, kteří podstoupili totální endoprotézu kyčle nebo kolena.

Mezi únorem a dubnem 2004 (3 měsíce) byly v nemocnici autorů provedeny pooperační retransfuze krve u souboru 20 neanemických pacientů, kteří podstoupili elektivní, jednostrannou, primárně necementovanou totální endoprotézu kyčle (10 případů) nebo cementovanou totální endoprotézu kolena (10 případů) pro primární osteoartrózu. Průměrná doba trvání výkonů byla 71 minut. Průměrná peroperační krevní ztráta byla 357,5 ml.

Průměrné množství krve vrácené pacientům bylo 668 ml. Během retransfuzí nebyly pozorovány žádné komplikace. Pooperační transfuze homologní krve byla nutná pouze v 7 případech (35 %).

Výsledky studie naznačují, že použití pooperačních retransfuzních systémů mělo ve většině studovaných případů velký význam. Systém snižuje nejen riziko nežádoucích účinků běžně užívaných transfuzí, ale snižuje i náklady na převody krve spojené s totálními endoprotézami.

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