



## The role of postoperative blood recovery for patients with femoral neck fracture

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Postoperative blood recovery in eighty elderly patients (11 male, 69 female) treated for femoral neck fracture was prospectively studied. Twenty-eight patients underwent hemiarthroplasty for intracapsular fracture and 52 underwent Dynamic Hip Screw fixation for extracapsular femoral neck fracture.

The mean blood drainage in the postoperative period and the mean drop in haemoglobin level was higher in the DHS group as compared to the hemiarthroplasty group. Mean drainage in the first 6 postoperative hours was 150ml (range : 10-450 ml) in the DHS group, versus 50 ml in the hemiarthroplasty group (range : 10-100ml). Out of 52 cases of the dynamic hip screw fixation group, only 10 patients received autologous blood transfusion (19%), among which the drains collected more than 150 ml in only 4 (7%). The blood drainage in this group occurred in the first 6 hours only. Supplementary cross matched bank blood was transfused to patients in the DHS group (8%). Among 28 patients in the hemiarthroplasty group, only 6 patients received autologous blood reperfusion (21%), among which the drains collected more than 150 ml in only 4 (14%). Overall, only six patients out of 28 in the hemiarthroplasty and 10 out of 52 in the DHS group had enough blood in their drains to warrant re-perfusion.

We conclude that the routine use of Bellovac drains after femoral neck fracture surgery is not necessary and is not cost effective.

**Key words :** fracture ; neck of femur ; autologous ; blood ; DHS ; hemiarthroplasty.

### INTRODUCTION

Fracture of the proximal femur is a frequent injury, and adverse outcomes are common. Several factors suggest the importance of developing techniques to optimise intravascular fluid volume (7).

Symptomatic transfusion may be an effective blood-sparing protocol, associated with the transfusion of appreciably fewer units of red blood cells (RBCs) and lower mean haemoglobin (Hb) levels than are associated with the threshold transfusion policy (2, 8). Because of the disadvantages of allogeneic blood transfusion (ABT) such as the risk of transfusion-associated infections, incompatibility-related transfusion fatalities, or immunomodulatory effects, a continuing effort to reduce allogeneic blood transfusion is important.

Postoperative recovery involves collecting blood from surgical drains, followed by re-infusion, with or without processing.

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In the current study, we have assessed the value of postoperative recovery retransfusion for patients with femoral neck fracture, in which this method of blood transfusion was used routinely, and the idea was to check whether it was cost-effective.

## MATERIAL AND METHODS

Fifty-two patients underwent dynamic hip screw fixation (DHS) for intertrochanteric fracture. Seven patients were male and 45 were female. The mean age was 84.6 years (range, 31 to 91 years).

The study was conducted for six months in the year 2004. During the same period, twenty-eight patients had hemiarthroplasty for femoral neck fracture using Thompson's prostheses, 10 uncemented and 18 cemented.

The mean age in the hemiarthroplasty group was 82.1 years (range, 70 to 94 years). Twenty-four patients were female and four male.

Patients with pathological fracture and bleeding tendency were excluded from this study.

A Bellovac ABT (Astra-Zeneca) autotransfusion system was used for every patient. The bellow can hold 200 ml blood, when full ; it can be squeezed to the transfusion bag. Once collected, the blood was retransfused up to 6 hours following surgery. There is a 40-micron filter in the bag and another 40-micron filter in the giving set. Two drain tubes were inserted, one left in the space under the fascia lata and the other in the subcutaneous tissue under the skin. The tubes were connected through a Y shaped tube into the collecting bag with a filter. A record was kept about the amount of blood in the drains in each group and the amount of transfusion.

The shed blood was returned when an amount more than 100 ml was collected for the sake of transfusion at most 6 hours after surgery. The drains were left for a further 18 hours before they were removed ; no blood was retransfused after 6 hours from surgery to avoid infection. The preoperative, postoperative, and discharge haemoglobin, as well as the number of allogeneic blood trans-

fusions in the two groups were compared. The threshold for blood transfusion in the local hospital is when haemoglobin level is 7g/dl or below, unless the patient has ischemic heart disease, in which case the threshold for blood transfusion will be 8 g/dl.

## RESULTS

### DHS group

The mean postoperative blood drainage was 150 ml (range 10-450 m) in this group. Out of 52 cases, only 10 patients received autologous blood transfusion, among which the drains collected more than 150 ml (range, 160 -370 ml) in only 4. The latter four patients had unstable complex extra-articular fractures of the proximal femur (Boyd-Griffith Type 3 and 4) and required two units of blood bank transfusion in addition to the auto transfusion from the Bellovac.

Following DHS fixation, the mean drop in haemoglobin level on the 4<sup>th</sup> postoperative day was 2.53g/dl (range 0-5.5 g/dl).

### Hemiarthroplasty group

The mean postoperative blood drainage was 50ml (range 10-100 ml) in this group. The blood drainage in this group occurred in the first 6 hours only. Out of 28 cases, only 6 patients received autologous blood transfusion, among which the drains collected more than 150 ml in only 4, and in 2 patients more than 100 ml (range 110-150 ml).

The mean drop in haemoglobin level was 1.77 g/dl (range 1-4.5g/dl). The drop in haemoglobin level occurred in the first postoperative day in 90% of cases in both groups, the drop however continued in 10% and was maximal on the 4<sup>th</sup> postoperative day (table I).

Table I. — The variables in each group

	DHS group	Hemiarthroplasty
Mean postoperative drainage	150ml (range 10-450 ml)	50ml (range 10-100ml)
Frequency of autologous blood transfusion	10/52 patients (19.2%)	6/28 patients (21.4%)
Mean drop in haemoglobin on the 4th postoperative day	2.53g/dl (range 0-5.5)	1.77g/dl (range 1-4.5)

### Financial implications

A Readivac costs £5, while a Bellovac with a Y-connector costs £50. The hospital could therefore have saved £3600 if a Readivac instead of a Bellovac had been used in our patients. To be cost-effective, at least 150ml of blood need to be collected.

### DISCUSSION

The safety of surgical blood management practices is critically important because of the potential risks of transfusion reactions, immunosuppression, and disease transmission associated with use of allogeneic blood. Because of the implications for the effective management and allocation of blood bank resources, making the optimum choice requires careful preoperative decision making (5). Proper preoperative planning also can optimize the patient's perioperative course and recovery, again this planning is not always possible in the emergency management of femoral neck fracture surgery. Furthermore, the incidence of anaemia by numeric criteria in elderly patients ( $\geq 65$  years) is four to six times greater than can be predicted by the presence of clinical symptoms. The incidence of anaemia increases with age and is of particular concern because the elderly constitute a large proportion of patients undergoing orthopedic surgery (1).

Despite advances in surgical technique and the effective use of haemostatic agents, blood loss during orthopaedic procedures can be extensive. Blood salvage returns to the patient washed or unwashed autologous blood lost in surgery. The blood is collected by aspiration or drainage, filtered, and centrifuged before transfusion (4). Blood salvage can be applied both intraoperatively and postoperatively.

Intraoperative recovery of autologous blood requires special equipment and trained personnel. Cell-washing devices can provide the equivalent of 10 units of banked blood per hour (3). However, because cell-washing does not completely remove bacteria from recovered blood, this technique

should not be used if the surgical field has gross bacterial contamination (6).

The safety and usefulness of postoperative blood recovery after orthopaedic surgery also remains controversial (9). Because of the high cost and questionable benefit of this technique, postoperative blood recovery should be limited to cases in which large postoperative blood losses are anticipated, such as in bilateral joint replacement surgery (3). Several studies, however disputed this (8). In our current study, we have noticed that postoperative blood recovery is not cost effective for patients who have undergone surgery for intra-capsular and stable extra-capsular fracture of the neck of femur. These patients we believe lose blood during the accident and surgery.

### CONCLUSIONS

We recommend using Bellovac for patients with complex and unstable intertrochanteric fractures. Using Bellovac does not confer any added advantage in patients with stable intertrochanteric fracture and patients with intracapsular fractures.

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