

Role of Drainage Clamping For the Control of Blood Loss in Cemented Bipolar Hemiarthroplasty

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Abstract

Introduction: To reduce hematoma and blood loss in cemented bipolar hemiarthroplasty, drainage has been a regular practice. This study is aimed at evaluating the outcome of clamped drainage in blood loss and wound healing following cemented bipolar hemiarthroplasty.

Materials and Methods: A total of 40 patients with fractured neck of femur operated with cemented bipolar hemiarthroplasty, who underwent a prospective cohort study, were randomized equally into two groups: 6 h post-operative clamped and non-clamped suction drainage. Gender distribution, pre-operative hemoglobin levels, hip pathology, and affected side were comparable and were recorded between the two groups.

Result: Blood loss and calculated blood loss volumes were recorded higher for the non-clamped patients. Almost 110 ml blood loss was noticed more in the non-clamped patient group. No significant difference in adverse events or need for transfusion noticed.

Conclusion: This study showed a statically significant reduction in post-operative drainage amount between clamped and non-clamped drainage groups; however, this difference was not large enough to warrant increases blood transfusion requirements in patient with unclamping drainage.

Key words: Blood, Drain, Fracture, Hemiarthroplasty

INTRODUCTION

In fractured neck of femur, cemented bipolar hemiarthroplasty has been widely applied. Cemented bipolar hemiarthroplasty has relieved pain, corrected deformity and has restored and improved joint movement, thus making it widely accepted surgery by patients and performed by an orthopedic surgeon. A volume of 1000-2000 ml of blood loss has been associated in this surgery in lieu of extensive soft tissue and bone dissection.¹⁻³ Hematomas are due to the lack of complete hemostasis as there is exposure of medullary canal, increase wound tension, decrease in

soft tissue perfusion all of these leads to hampering of wound healing. There is an increased risk of deep vein thrombosis (DVT), longer hospital stay, surgical procedures (subsequent), and increase health care economic burden due to prolonged wound drainage.⁴ Skin temperature was lower in drainage site was found by Koyano *et al.* by performing wound skin temperature thermography, and thus suggested that drainage can suppress inflammation.⁶ Lower infection rates were observed by Waugh and Stinchfield when drainage was used, thus decreasing list of hematoma formation and wound tension.⁵ These all have promoted wound healing and functional joint recovery.⁷ Contraindicately, this results have not been found similar promising in other studies with or without closed suction drainage.^{5,8-10} Since the results on the use of drainage remains doubtful; definite information is mandatory to achieve patients expectations and desired outcomes.^{11,12} In total, knee arthroplastic surgeries data have been reported that clamping drainage can reduce blood loss and the need for blood transfusion post-surgery in cemented bipolar

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hemiarthroplasty and no such similar reports have been reported. Henceforth, we have conducted this study to emphasize the role of clamping the drainage for 6 h post-operatively to a better management of post-operative cemented bipolar hemiarthroplasty by reducing blood loss and minimizing post-operative complications.

MATERIALS AND METHODS

Patients with fractured neck of femur who underwent cemented bipolar hemiarthroplasty between May 2014 and August 2015 were included in this study. Patients with previous history of hip surgery, current infection, and medical ailments contraindicating surgery were excluded from this study. Using a random number list generated by the computer, patients were randomly allocated who meet the inclusion criteria. The surgeons who performed the surgery were unaware of the patients grouping into clamped and non-clamped drainage. Patients were unaware of their drainage tube clamping or non-clamping. All the anticoagulation's were stopped 1 day prior to the surgery. All patients, who underwent the surgery, were positioned in lateral decubitus position and were operated via posterior approach under spinal anesthesia by the same surgical team. 30 min to prior to surgical skin incision, 1 g of ceftriaxone was given. Short external rotators muscles were sutured back after the surgical procedure, the wound closed with a drainage tube placed under the deep fascia. After this, patients were randomized either under clamped drainage group or the non-clamped drainage group based on formal randomization. The drainage in the clamped group was kept clamped for the first 6 h post-operatively. Non-steroidal anti-inflammatory drugs were used as analgesia post-operative. Surgical wounds and drain were checked at the 2nd day, and then, it was removed in both groups. Quads strengthening and extension-flexion movement were encouraged immediately after surgery under the guidance of a trained physiotherapist. Blood loss parameters were the main results of interest in this study. Immediately and 48 h post-operatively, hemoglobin (Hb) levels were measured. According to Gross, total blood loss was calculated based on maximum perioperative decrease in Hb. The drainage blood was recorded when the tube was removed 24 h post-operatively. Hb levels <9 g/dl are an indication for the blood transfusion. Within the initial 6 weeks post-operative period, adverse events such as delay in wound healing and recovery due to hematoma redness of the incision, superficial or deep infection, and DVTs recorded. Any deep infection was diagnosed based on a positive culture from the wound. Continuous data were expressed as mean \pm standard deviation and tested with Student's *t*-test for difference. The Chi-square test was used to analyze the categorical data. *P* < 0.05 was considered to be statically significant.

RESULTS

A total of 40 patients were recruited into the study. There were 12 women and 9 men in the clamped group with the mean age of 63 ± 4.5 years with a body mass index of 25.8 ± 2.1 kg/m². Affected side was left in 10 cases unclamped and for 10 in the clamped group and right for 8 cases unclamped and for 12 in the non-clamped group. Pre-operative Hb was 13.5 ± 1.0 and 13.1 ± 2.1 g/dl for the clamped and non-clamped, respectively. No statistical significant difference between these two groups for these parameters. The drainage blood was recorded, and the Hb level was tested 24 h after the tube removal. The drainage blood measure was 157.3 ± 16.3 and 243.3 ± 60 ml in the clamped and non-clamped group with Hb 10.9 ± 1.2 and 10.3 ± 1.0 g/dL (*P* = 0.021) for each group. The calculated blood volumes were 1040 ± 110.2 ml for the clamped group and 1320 ± 140 ml for the non-clamped group (*P* = 0.012) (Table 1).

Transfusion was performed for the one patient in the clamped group and four patients in the non-clamped group that was not a significant difference (*P* = 0.287). Two superficial, three hematomas, and two redness of incision in the clamped group, while one superficial, two hematomas, and one redness of incision in the non-clamped grouped found. No statically significant between the two groups was found for adverse events (*P* = 0.461).

DISCUSSION

Just like in the total knee arthroplasty (TKA), the effect of closed suction drainage on blood loss and wound complication has been arguable in the cemented bipolar hemiarthroplasty. Certain randomized studies and meta-analysis have not been in favor of the routine use of drainage.¹⁰⁻¹⁵ Kim *et al.* did find a correlation between the incidence of wound complication and the use or nonuse of closed-suction drainage.⁷ Various types of drains have been analyzed in the TKA with promising effects on reduction of blood loss and the need for the blood transfusions.^{13,16} Releasing the tourniquet has significant influence on the blood flow in a short time after the reestablishment of the

Table 1: Comparison of various parameters in the respective group

Parameters	Clamped	Unclamped
Drain (ml)	157.3 \pm 16.3	243.3 \pm 60
Hb (g/dL)	10.9 \pm 1.2	10.3 \pm 1.0
Blood volume (ml)	1040 \pm 110.2	1320 \pm 140
Blood transfusion	1	4
Hematomas	3	2
Adverse events	None	None

Hb: Hemoglobin

blood flow.¹⁷ It has been found that clamping for a short time can provide the same effect as persistent drainage under the compression of elastic bandage after the tourniquet release.¹⁶ Cemented bipolar is different from TKA as it is impossible to compress the wound and use a tourniquet. Regional pressure acts to stop blood loss and clamping the drainage, the drainage post-operatively may result in great pressure, thus contributing to hemostasis.¹⁸ Just like in total knee replacement, the ideal duration of clamping is uncertain from the literature; however, a longer clamping duration has been associated with delayed wound healing, skin edge necrosis, hematoma, and increased risk of infection.^{16,19} compared to the non-clamped group, the in wound problems or post-operative complications in the clamped group is the same. The most ideal result in the less blood loss and the need of blood transfusion without complication of wound healing resulting from hematoma. In this study, 6 h clamping period can reduce post-operative blood loss by 100 ml without more wound problems. Longer clamping time for 8 h or 12 h may be tested in further studies. Short post-operative period is the shortcoming of this study.

CONCLUSION

The purpose of this study was to conclude if post-operative clamping had an effect on blood loss, post-operative complications, and Hb levels after cemented bipolar hemiarthroplasty. The result of our study suggested that clamped drainage for 6 h post-operatively could reduce post-operative blood loss without an increase in wound healing complications or other post-operative complications as compared with the non-clamped drainage. Further study has been under investigation to further increase the period of clamping time and their efficient consequences.

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