

ESTIMATED BLOOD LOSS IN CRANIOTOMY

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ABSTRACT

Introduction: Estimated blood loss is an estimation of how much blood is lost during surgery. Surgical procedure requires a preparation of blood stock, but the demand for blood is often larger than the actual blood used. This predicament happens because there is no blood requirement protocol being used. This study aims to determine the estimated blood loss during craniotomy procedure and its conformity to blood units ordered for craniotomy procedure. **Methods:** This study is a retrospective study using data from Wahidin Sudirohusodo General Hospital's medical records in the period of January 2010-December 2012. We found 89 craniotomy patients that meet the inclusion criteria comprise of 66 men and 23 women. **Results:** This study showed that the average estimated blood loss in craniotomy was 3.20 units of whole blood (1120 ml) and the average of the demand of blood ordered was 4.0 units of whole blood (1400 ml). There was no mismatch between the amount of blood ordered for surgery and estimation of blood loss ($p=0.73$). **Conclusion:** Estimated blood loss in craniotomy procedure in Wahidin Sudirohusodo hospital, Makassar is 3.20 units of whole blood (1120 ml) was in accordance with amount of blood ordered for surgery.

Keywords: Estimated blood loss, craniotomy

INTRODUCTION

Estimated blood loss is an estimate of blood loss that occurs during surgery. Surgical procedures often require the provision of a blood transfusion, but the demand for blood transfusions is often carried out excessively without proper demand analysis. The amount of blood loss in a surgery varies depending on the type of surgery, the surgeon's expertise and the patient's condition. Estimation of blood loss is important to determine the amount of blood demand prepared for surgery operations which will reduce the amount of wasted blood.¹⁻⁴

Blood transfusion is the administration of blood or blood components directly into the patient's circulation which is mostly given to treat anemia, increase blood volume, or improve immunity. The use of proper blood and blood components is needed to ensure the availability of blood and avoid the risk of exposure to diseases that can be transmitted by transfusion.^{1,5}

Ideally a blood request protocol is created based on historical data on the use of blood on the institution, considering that there's a large number of blood requests protocol within the past 30 years. The Wahidin Sudirohusodo General Hospital in Makassar at the present does not yet have a blood request protocol, thus the amount of blood prepared for surgery is based on "habit" or experience of the clinician. Data from Wahidin Sudirohusodo General Hospital's blood bank on blood usage were as follows: In 2010, 38% ordered blood units were canceled, 58% were returned; in 2011, 31% blood units ordered were canceled, 36% were returned; and in 2012, 32% blood units ordered were then canceled, and 40.9% were returned. The high percentage of canceled and returned blood units showed the ineffectiveness use of blood transfusions. Canceled blood is the blood that had been prepared for the surgery but was not distributed; while the returned blood is the blood that has been distributed in preparation for surgery, but has returned because it was

not transfused. Both of these types of blood cannot be used on another patient so it increases the operational costs of the blood bank in terms of storage and cross-matching test procedure that had been carried out⁶⁻⁸

One of the surgical procedures that requires blood preparation is craniotomy. The craniotomy is a surgical procedure of the head by partially opening the skull. This procedure is usually carried out on some forms of neurological diseases, trauma and skull fractures. An accurate assessment of the amount of blood loss is important in terms of maintaining the flow of oxygen to the brain.^{6,9,10}

The preparation of blood transfusions for a surgical procedure is excessive, in the terms that the use of blood that has been cross-matched is only 23.14%, while 76.86% is not reusable.^{2,3,8} To the best of the author's knowledge, until now, there is no study carried out the estimation of the loss of blood transfusion in craniotomy surgery.

The purpose of this research is to determine the estimated blood loss in craniotomy surgery that will improve the efficiency of blood request. The result of the research is expected to become a new reference in the demand for blood for craniotomy and add scientific information about the estimated blood loss in craniotomy.

METHODS

This study was conducted retrospectively by taking the data from Wahidin Sudirohusodo's Medical Record Installation, in the of period 2010-2012. The sample population consists of 1293 patients who underwent the craniotomy. The number of samples that met the inclusion criteria as many as 89 patients. Inclusion criteria for this study: the comprehensiveness of the data from the medical records, suffering intracerebral hemorrhage trauma without other trauma, pre- and post-operative examination of Hb.

Estimated blood loss is the approximate amount of blood loss after craniotomy surgery, calculated by the formula :

$$\text{Estimated blood loss} =$$

$$Hb_{(pre-op)} - Hb_{(post-op)} + \text{blood transfusion unit used during surgery}$$

(1 unit of blood is equivalent to 1 g / dl)

Hb_(pre-op) is the hemoglobin of routine blood tests were tested before surgery, whereas Hb_(post-op) is hemoglobin of routine

blood tests that were tested 6-72 hours after surgery. Hemoglobin is tested using a hematology analyzer Sysmex XT - 2000i. All data obtained are grouped and analyzed using statistical methods are then presented in tabular form.

RESULTS

Sample Characteristics

Based on the data from Wahidin Sudirohusodo General Hospital's medical records, in the period of 2010-2012. There were 89 samples of patients undergoing craniotomy with age range of 15-70 years which comprise of 66 men (74.16%) and 23 women (25.84%) (Table 1).

Table 1. Sample Characteristic

Sex Variable	n=89	%
Male	21	74,16
Female	23	25,84

Estimated blood loss in craniotomy

Patients undergoing craniotomy surgery that requires blood in preparation for surgery was as many as 89 patients with average blood demand of 2.89±1.03 bags of whole blood. Based on blood loss estimation formula resulted in an average of 3.29±1.77 bags of whole blood (Table 2).

There was no significant statistical difference between the number of blood units demanded with the estimated blood loss in craniotomy surgery (p=0.293). This shows that the amount of blood prepared for craniotomy requested in Wahidin Sudirohusodo General Hospital, Makassar were in accordance with the estimated blood loss. Utilization of blood for the preparation of the craniotomy surgery was efficient.

The ability of the surgeons and the condition of the patients during craniotomy procedure influenced the amount of blood loss. Operators who master the use of tools such as electrocautery and the use of crystalloid or colloid fluids to replace blood loss will help minimize the amount of blood loss so the need for blood preparation can be reduced.

Limitations of this study are incomplete medical record data, and the number of patients underwent craniotomy but was accompanied by multiple fractures lead to difficulties to obtain more samples.

Table 2. Estimated blood loss during craniotomy surgery

Craniotomy surgery	N	Mean	r*	p*
Blood request	89	2,89±1,03	0,113	0,293
Estimated blood loss	89	3,29±1,77		

*Pearson's correlation analysis

DISCUSSION

This study shows that the amount of blood demand for the preparation of surgery and the estimated blood loss in craniotomy surgery in Wahidin Sudirohusodo General Hospital, Makassar were appropriate where the number of operational preparation blood demand of estimate blood loss in surgery of craniotomy was 1.52 to 5.06 bags of whole blood (2-5 bags). It is suggested to make the

standard operational procedures in requesting the amount of blood for each type of operation conducted.

CONCLUSION

Estimated blood loss in craniotomy procedure in Wahidin Sudirohusodo hospital, Makassar was in accordance with amount of blood ordered for surgery.

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