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RESEARCH

ESTIMATED BLOOD LOSS IN OPEN HEART SURGERY

(Taksiran Kehilangan Darah di Bedah Jantung Terbuka)

Riesti Ekasanti, Rachmawati Muhiddin, Mansyur Arif

ABSTRAK

Taksiran kehilangan darah merupakan perkiraan kehilangan darah di setiap tindakan pembedahan. Permintaan darah untuk persiapan pembedahan elektif sering tidak sesuai dengan jumlah darah yang ditransfusikan selama tindakan tersebut karena belum ada panduan mengenai jumlah permintaan darah untuk tata langkah bedah. Penelitian ini bertujuan untuk mengetahui taksiran kehilangan darah pada pembedahan jantung terbuka dan kesesuaian dengan permintaan darah dalam kegiatan tersebut. Penelitian dilakukan secara observasional retrospektif seraya mengambil data rekam medis di Instalasi Rekam Medik RSUP dr. Wahidin Sudirohusodo Makassar antara bulan Januari 2009–Desember 2012. Sebanyak 32 pasien yang menjalani bedah jantung terbuka didapatkan dengan presentasi laki-laki sebanyak 22 pasien (68,75%) dan perempuan sebanyak 10 orang (31,25%). Jumlah taksiran kehilangan darah bedah jantung terbuka rerata 2,80 kantong darah lengkap (980 mL) dan permintaan darah untuk kegiatan tersebut rerata sebanyak 4,00 kantong (1400 mL). Antara jumlah permintaan darah persiapan bedah dan taksiran kehilangan darah ($p=0,149$) terdapat ketidaksesuaian. Taksiran kehilangan darah di bedah jantung terbuka di RSUP dr. Wahidin Sudirohusodo Makassar di RSUP dr. Wahidin Sudirohusodo Makassar adalah 2,80 kantong darah lengkap (980 mL), yang tidak sesuai dengan jumlah permintaan darah persiapan bedah.

Kata kunci: Taksiran kehilangan darah, bedah jantung terbuka

ABSTRACT

Estimated blood loss is an estimation of how much blood is lost during surgery. The amount of transfusion requirement in elective surgery preparation is often ordered inappropriately with the amount of blood that is transfused during the surgery because there is still no guideline about the quantity of blood required for each type of surgery. This research aimed to know the estimation of blood loss during the open heart surgery procedure compliance with surgical blood ordering. This research is a retrospective research using data from the medical record installation of Dr. Wahidin Sudirohusodo Hospital from January 2009 to December 2012. The researchers found that there were thirty-two open heart surgery patients, consisting of 22 males (68.75%) and 10 females (31.25%). The results of this research showed that the average estimated blood loss in open heart surgery was 2.80 units of whole blood (980 mL) and the average of the blood demand ordering was 4.0 units of whole blood (1400 mL). There was a mismatch between the surgical blood ordering and the estimated blood loss ($p=0.149$). In conclusion, the estimated blood loss in the open heart surgery procedure at Dr. Wahidin Sudirohusodo Hospital in Makassar was 2.8 units of whole blood (980 mL), which was not in accordance with the ordered blood for preparation of surgery.

Key words: Estimated blood loss, open heart surgery

INTRODUCTION

Estimated blood loss is an estimation of the amount of blood loss prepared by the surgeon to estimate the chances of bleeding during or after surgery caused by the surgery itself or by the presence of complications that occur during the surgery.^{1,2} Blood transfusion, consequently, is a procedure mostly taken in any enforcement actions, one of which is during heart

surgery. Transfusion before surgery should be avoided by addressing the condition of anemia in advance (if it happens) to stop anti-thrombocyte drug delivery as well as to consider various strategies for autologous transfusion.^{3–5}

Moreover, blood ordering for elective surgical preparation is often performed without considering the amount of blood transfused during surgery, as a result, more blood used are cancelled or refunded. The

blood is returned and not reusable. Consequently, this can increase the cost of blood bank activities, such as the costs of storage, filtering and cross matching. Since there is still no record of blood ordering proposal yet until recently, the amount of blood ordered during preparation for surgery is based solely on clinical habits or experience.⁵⁻⁷

Data from the blood bank of Dr. Wahidin Sudirohusodo Hospital in Makassar showed that in 2010, the percentage of blood cancelled was 38% and the percentage of blood returned was 58%. In 2011, the percentage of blood cancelled was 31% and the percentage of blood returned was 36%. The percentage of blood cancelled was 32% and the percentage of blood returned was 40.9% in 2012. The high percentages of blood cancelled and returned indicates that the use of donor blood is still not quite appropriate.⁸

Blood service at Dr. Wahidin Sudirohusodo Hospital in Makassar is carried out by the Hospital Blood Bank (BDRS). The Hospital Blood Bank provides blood services regularly and quickly (*cito*). Pre-transfusion examination conducted in BDRs includes filtering blood type with *slide* and *tube* method as well as performing compatibility test with tube method. Turn Around Time (TAT) for fast cases is ≤ 1 hour and for regular cases between 1–2 hours. The Hospital Blood Bank as a dealer only receives blood from the Regional Technical Implementation Unit of Blood Transfusion (UPTD-T) in South Sulawesi province, so the availability of blood in the Hospital Blood Bank is highly dependent on blood supply in UPTD-T. A research conducted by Rachmawati in 2013 showed that the availability of blood in Dr. Wahidin Sudirohusodo Hospital in 2010 was 6,248 (48%); in 2011 was 7,658 (42.8%) and in 2012 was 6,592 (36.6%). The results indicated that the blood supply from UPTD-T was still not enough to meet the blood needs at Dr. Wahidin Sudirohusodo Hospital in Makassar.⁸

Open heart surgery, furthermore, is one of the great surgeries causing a great amount of blood loss. Surgery in heart defects is usually associated with Congenital Heart Disease (CHD), heart valve abnormalities, as well as coronary heart disease. Types of open heart surgery usually performed, for instance, are *Coronary Artery Bypass Graft* (CABG) for coronary heart disease, *Atrial Septal Closure* or ventricle septal closure for congenital heart disease and *Mitral Valve Replacement* for heart valve disorders.³

Unfortunately, a research on the estimated loss of blood transfusions for the preparation of open heart surgery conducted by Vaislic *et al*³ showed that the need for blood during surgery was not as large as the amount of blood ordering.³ Similarly, a research conducted by Kajja *et al*⁹ explained that the amount

of blood loss in surgery can be assessed by calculating the impairment of hemoglobin (Hb loss) during the surgery.⁹ The research on estimated loss of blood transfusion in open heart surgery, however, still has not been conducted in Indonesia.

Finally, this research aimed to know determining the estimated blood loss in open heart surgery patients, so the use of donor blood in preparation for surgery can be appropriate. Therefore, the significances of this research expected are to increase the scientific explanation of the estimated blood loss in open heart surgery and to improve the demand of blood ordering in the preparation for open heart surgery as well as the use of donor blood.

METHODS

This research was a retrospective observational carried out by taking medical records in the medical record installation of Dr. Wahidin Sudirohusodo Hospital in Makassar from January 2009 to Desember 2012. The number of samples that met the participation criteria was thirty-two patients aged between 15–67 years old having open heart surgery (via thoracotomy) with complete medical record data as well as with examined preoperative and postoperative Hb.

Estimated blood loss is an estimate of the amount of blood lost due to open heart surgery. The amount of blood loss in surgery can be derived from calculating each hemoglobin prior to the surgery (g/dL), examined in the previous 24 hour post-surgery. Hb is hemoglobin in g/dL examined up to 72 hours after the surgery using a hematology analyzer of Sysmex XT -2000i. Blood Unit (BU) is the hemoglobin in g/dL transfused during surgery (one unit of blood is equal to/equivalent to 1 g/dL). Therefore, the estimated blood loss can be calculated using the following formula:

$$\text{Estimated blood loss} = \text{Hb}_{\text{pre-op}} - \text{Hb}_{\text{post-op}} + \text{BU}$$

Next, a statistical correlation test, Spearman test, was conducted using SPSS version 19 and then the results were tabulated.

RESULTS AND DISCUSSION

Based on the data of those forty-five samples having open heart surgery taken from the Medical Record Installation of Dr. Wahidin Sudirohusodo Hospital in Makassar from January 2009 to Desember 2012, there were thirty-two samples with a lifespan of between 15–67 years. Table 1 showed the general characteristics of the samples having open heart surgery, consisting of 22 males (68.75%) and 10 females (31.25%).

Table 1. The general characteristics of patients and types of open heart surgery

Variables	n (%)
Sex	
Males	22(68.75)
Females	10(31.25)
Types of open heart surgery	
CABG	12(37.5)
MVR	20(62.5)

Source: primary data

Table 2. The estimated blood loss in open heart surgery

Open heart surgery	N	Median	r*	p*
Blood ordering	32	4.00	0.261	0.149
Estimated blood loss	32	2.80		

* Spearman correlation test

Based on the obtained data, among thirty-two samples having open heart surgery, the mean of the ordering for blood units used for the preparation of open heart surgery was 4.00 units of complete blood. Based on the formula, the mean of the estimated blood loss in open heart surgery was 2.80 units of complete blood. Table 2 showed that the ratio of the blood ordering and the estimated blood loss in open heart surgery indicated a mismatch statistically ($p=0.149$) with a weak correlation value ($r=0.261$).

Table 2 showed that the correlation of the blood ordering and the estimated blood loss in open heart surgery patients was weak. It also showed a discrepancy between the blood ordered for the preparation of the surgery and the estimated blood loss in the open heart surgery.

The average weight of Indonesian people is between 50–60 kg, so to raise Hb 1 g/dL, 6 mL/kg of whole blood is required, equal to as much as 350 mL of blood. The mean of the estimated blood loss in open heart surgery was as much as 2.80 bags (980 mL), while the mean of blood ordering was as much as 4.00 bags (1400mL). The discrepancy between the blood ordering for the preparation of surgery and the estimated blood loss indicated that the utilization of donor blood still had not been appropriate, so there was still plenty of blood which were cancelled or returned in BDRs of Dr. Wahidin Sudirohusodo Hospital in Makassar. In addition, the administration of certain fluids to replace blood loss in open heart surgery, such as crystalloid or colloid fluid is considered to be useful for reducing

the amount of blood transfusion required during surgery.

Similar results found by Vaislic *et al*³ about the estimated loss of blood transfusions for the preparation of open heart surgery in patients with heart defects also shows that the need for blood during the surgery was not as large as the blood ordered. However, this research still has limitations regarding the small number of open heart surgeries in Dr. Wahidin Sudirohusodo Hospital and the incomplete medical records; as a result, the number of samples obtained was small since some of the samples had to be removed due to the lack of medical records.

CONCLUSION AND SUGGESTION

In conclusion, the estimated blood loss in open heart surgery has never matched the ordering of surgical blood. The mean of the estimated blood loss in open heart surgery found in this research was 2.80 bags, equivalent to 980 mL of complete blood. Therefore, further researches based on the blood used and returned/cancelled are suggested to be conducted with more larger number of samples.

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