IMJ Official Journal of the Irish Medical Organisation

Ir Med J; November/December 2022; Vol 115; No. 10; P694

December 15th, 2022

Blood Ordering Requests in Mastectomies: The Need for a Routine Group and Hold

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Abstract

Aim

A group and hold (GH) forms part of the pre-transfusion compatibility testing and is requested in anticipation of a possible blood transfusion. GH in the context of a low transfusion probability, such as a mastectomy, are associated with significant costs. This study analyses the cost-benefit associated with the routine request for a preoperative GH in patients undergoing mastectomies.

Methods

100 patients undergoing mastectomies from the period of September 2019 to October 2020 were included. Data regarding blood order requests, units of blood transfused, perioperative haemoglobin and laterality of mastectomy were collected.

Results

All patients had a routine preoperative GH. The average age in this cohort was 60.3 years. Right-sided mastectomy was the commonest procedure (n=52). The mean(s.d.) preoperative haemoglobin was 13.0(1.4) g/dL. Only 15% of the cohort had a post-operative haemoglobin level checked. The mean (s.d) drop in haemoglobin was 2.3(1.5) g/dL. Two patients received post-operative blood transfusions. The transfusion probability in this cohort was 2%.

Conclusions

This review demonstrates the low prevalence of blood transfusions in patients undergoing mastectomies. The projected cost-savings associated with selective requests for GH are significant. Moving forward, large prospective studies are required to develop validated scoring systems for the implementation of a safe and targeted blood ordering approach.

Introduction

The need for a group and hold (GH) preoperatively is to facilitate a rapid response to an urgent intraoperative or postoperative blood transfusion request. When a sample from a patient is taken and processed for a GH, the blood transfusion laboratory has a record of the patients ABO blood group and rhesus status[1]. Additionally, a screen for atypical antibodies is also performed[2]. This allows the laboratory to issue type specific blood in the event of an emergency in a timely manner, reducing the risks of a type 1 hypersensitivity transfusion reaction secondary to mis-matched blood[1]. While this practice is justified in procedures known to pose a high rate of intraoperative blood loss[3], its routine use in HIGH bleeding risk breast procedures such as a mastectomy is questionable. Mastectomies account for 41% [4] of a breast cancer service's operative workload. While up to 6.6% [5] will develop a complication, current literature reports that 2.1% [6] will require transfusions due to excessive blood loss. The minimal morbidity and mortality caused by blood loss related complications favours a move away from these traditional surgical metrics, and instead has caused a paradigm shift towards improving healthcare utilisation and costs when addressing optimal operative key performance indicators.

Our hospital's blood transfusion laboratory provides a copy of the Maximum Surgical Blood Ordering Schedule (MSBOS) behind each blood order form. This serves as a guide for the pre-operative assessment unit with regards to the type of blood order request they should put in for each patient. The main aim behind the MSBOS is to rationalise the amount of blood products needed and to reduce wastage. The guide has a list of procedures categorised by surgical specialities and a corresponding blood order requirement. This guidance document is updated on a two-yearly basis based upon a feedback sheet circulated to the head of each surgical speciality. As of October 2020, the MSBOS states that all mastectomies, regardless of nodal management or reconstruction, should have a GH on the system that is valid for a period of 72 hours

Healthcare expenditure has increased exponentially over the last decade with inappropriate laboratory tests costing as much as 94,500 Euros per annum by a single department[7]. Recently, increased awareness of healthcare economics has seen a shift away from routine GH prior to an elective operative procedure, including breast surgery[8,9]. A key factor in ensuring the delivery of high-quality care has been the introduction of economic and costing assessments with the aim of removing waste and non-value adding processes.

In recognition of the economic burden inappropriate testing puts on the healthcare system and the improvement in haemostatic surgical techniques, the purpose of this retrospective review was to examine blood ordering practices in our breast unit for elective mastectomies to see if it was an area that could be targeted to improve upon the efficiency and quality of breast service provision. Secondly, if appropriate, we aimed to suggest measures to further rationalise the ordering of blood tests to reduce cost and waste.

Methods

A retrospective review of all mastectomies performed in our breast unit between September 2019 and October 2020 was performed. Patients were identified based on the breast department's operative theatre log. The inclusion and exclusion criteria for the review were established. A total of 100 patients who underwent mastectomies from the operating theatre logbook were identified. The type of mastectomy (right, left, or bilateral) was also recorded from the logbook. Using the local laboratory result reporting system, each patient's GH status prior to their surgery was recorded. The transfusion status of the patient peri-operatively was also obtained using the same system, as was preoperative and post-operative haemoglobin. The data was then tabulated, and cross checked by two authors, KYC and SK, and a database was created. Observed data collected was double entered into a database. All statistical calculations were performed using JASP software (version 0.11.1, University of Amsterdam, Netherlands). For all analysis a P value <0.05 was considered statistically significant.

Results

100 patients were reviewed retrospectively. All patients were female, with an average age of 60.5 years (Range 30-89, SD 15.4). The distribution of mastectomies is demonstrated in Figure 1, with right mastectomies being the commonest (52/100), and bilateral mastectomies the least common (13/100). All patients had a GH done pre-operatively and 98 patients (98%) had a pre-operative haemoglobin level performed. The mean pre-operative haemoglobin was 13.0g/dL (Range 8.8-16.0, Std 1.41) (Figure 2). However, only 15 patients (15%) had a post-operative check haemoglobin (Figure 3). The average reduction in haemoglobin for this cohort was 2.28 g/dL (Range 0.6-5.2, Std 1.53) (Figure 4). A total of two patients received blood transfusions post-operatively, with both receiving one unit each. No transfusions occurred preoperatively or intraoperatively. The prevalence of a blood transfusion in this cohort was 2%. A total of four patients were group and crossmatched. Additionally, a crossmatch for three units of blood were returned unused to the lab.

In total, 96 GH samples, costing 75 Euros per sample, were unnecessary. This translates into a cost of 7200 Euros over the course of the study period incurred by the lab. This is not representative of the total cost as consumables and time associated with retrieving the blood sample were not included.

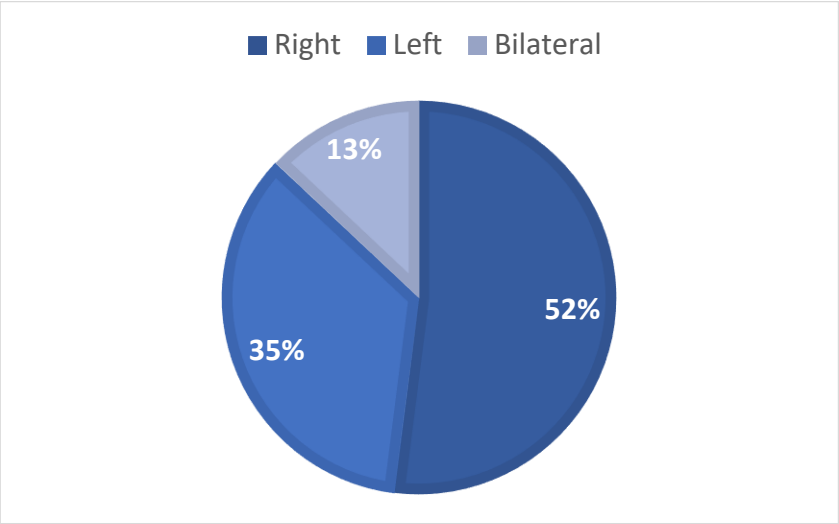

Figure 1: Laterality of Mastectomies.

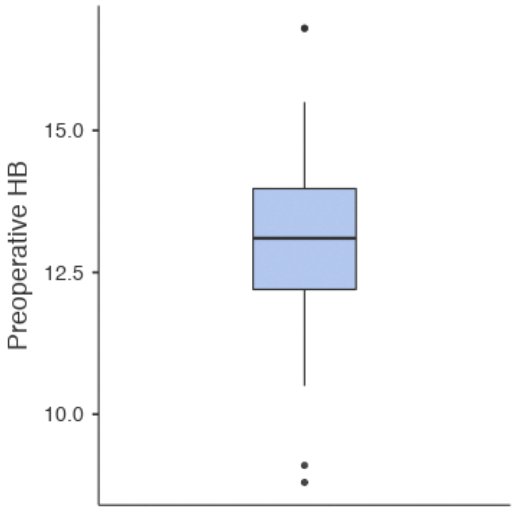

Figure 2: Preoperative haemoglobin levels g/dL.

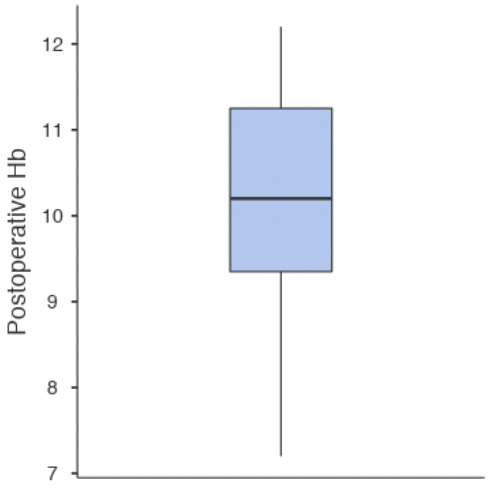

Figure 3: Postoperative haemoglobin levels g/dL

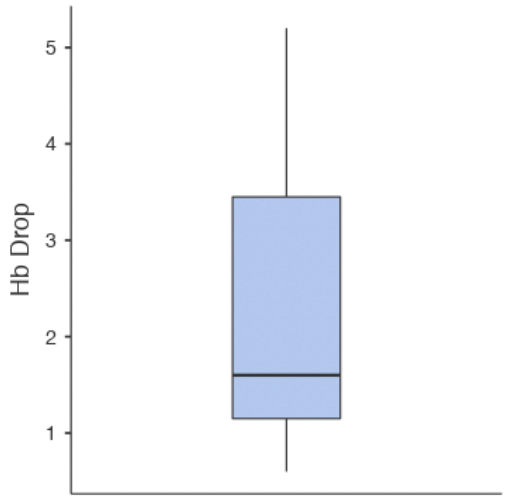

Figure 4: Drop in haemoglobin g/dL.

Discussion

Mastectomy is a complex operation requiring meticulous haemostatic techniques to allow for removal of a vascular organ to treat breast cancer. The rationale behind a GH prior to mastectomy surgery is to ensure that type specific blood is available for transfusion in the event of a massive intraoperative or peri-operative blood loss. Our results showed that no patients undergoing a mastectomy required an intraoperative transfusion.

Prichard et al[6] conducted a retrospective study in 2010 that examined the need for a GH in a similar cohort of patients undergoing oncological breast surgery. They concluded that a routine preoperative GH was unnecessary due to the low prevalence of transfusions in the intraoperative period. The results of our study corroborate the findings of the aforementioned study. Blood transfusion practice indices include crossmatch: transfusion index(C/T) and the transfusion probability(%T). Prichard et al [6] reported a C/T of 6:1 (utilising total procedures instead of crossmatches done as the numerator) and a %T of 1.8%. In our cohort of patients, our C/T was 2:1 and our %T was 2%. Our C/T is not reflective of transfusion practices as we only had a small number of crossmatches done in this cohort. Our %T however was consistent with that reported by Prichard et al [6]. Chambers et al [9] recently reported a %T of 0%, with no transfusions occurring in their cohort of 190 women emphasising the lack of requirement for preoperative type and screens in this cohort of patients. Increased evidence-based venous thromboembolism prophylaxis, improved intraoperative haemostatic techniques and peri-operative patient optimisation have all aided in a reduction in intraoperative and postoperative blood loss, further questioning the benefit that a preoperative GH brings to a mastectomy patient.

Blood transfusion is not without risks and its benefit has been questioned in patients with breast cancer. There has been a shift away from liberal transfusion practices in recent years considering that a restrictive transfusion threshold is no less inferior than a liberal threshold of 10g/dL[10].

Our review has found that the average haemoglobin of patients prior to surgery was 13.0g/dL, with a mean reduction of 2.3g/dL post operatively, theoretically resulting in a mean post op haemoglobin of 11.7, which is still significantly above the recommended transfusion threshold. Additionally, the influence of using blood products on breast cancer survival has been questioned. Pysz et al [11] has shown blood transfusion administration to shorten metastases-free survival of breast cancer patients especially when allogenic blood transfusions are given in the first 8 days after mastectomy. The questioned need and safety of transfusions support the restricted use of group and holds in a mastectomy cohort who may not need or benefit from receiving blood transfusions outside an emergent setting.

In terms of cost savings, a total of 96 GH samples were unnecessary. This translates into savings of 7200 Euros over the course of a year incurred by the lab. Consumables, overheads, and wages were not accounted for. The total cost incurred by the unnecessary tests will require further in-depth costing analysis using indices such as time-driven activity-based costing.

From a safety point of view, our lab processes urgent group and crossmatch requests and issues blood, with no prior GH, within 40 minutes from receiving the sample. The lab also has provisions for O-negative blood to be available immediately on request in the operating theatre. Regarding the risks associated with an emergency transfusion, the incidence of an acute haemolytic reaction to untyped O negative blood in an emergency setting is low [12,13].
It is also known that patients who have had a prior transfusion are more likely to develop atypical antibodies through alloimmunisation that may contribute to a haemolytic reaction during an emergency transfusion[14]. Future studies should aim to evaluate the strategy of blood ordering based upon prior history of transfusions, and its associated safety and cost savings.

Blood loss from surgery is multifactorial. There have been limited studies that have attempted to identify predictors of a major bleed in breast surgery which would necessitate transfusion. Patient risk factors identified through non-breast surgery include age, renal disease, gender, pre-existing anaemia and the use of antithrombotic agents[15]. Breast size has been the only notable predictor of a major bleed, with larger breasts cited as a higher risk of bleeding[16]. However, despite risk factors being present, the need for acute transfusions during a mastectomy due to blood loss induced hypovolemic shock is limited in the literature. Extrapolating from this, the clinical significance risk conferred to mastectomy patient by not preforming GH does not seem significant.

In conclusion, the probability of transfusion in our unit is low in patients undergoing mastectomy and is discordant with the costs and resources dedicated to ensuring provisions for emergency transfusions. The need to perform a routine type and screen is challenged by our study. Should transfusion be needed in mastectomy an acute requirement is unlikely and timely crossmatching will not confer increased risk to the patient.

Declaration Conflict of Interest:
The authors of this paper have no conflicts of interest to declare.

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