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Blood transfusions in bimaxillary orthognathic surgery: Are they necessary?

Excessive blood loss is one of the major complications of orthognathic surgery. Numerous strategies, including hypotensive anesthetic techniques and blood transfusion, have been developed to deal with the blood loss. Blood for transfusions can be obtained from banked blood or from autologous donation. In this study, the authors looked at 2 groups of patients who had bimaxillary orthognathic surgery. One group included patients who had autodonated blood (group 1) and who were operated on between 1991 and 1993, and the other patients did not autodonate and were operated on between 1998 and 2000 (group 2). It was found that fewer than 50% of patients in group 1 were transfused, and none of the group 2 patients were. A protocol to lessen blood loss that should obviate the need for blood transfusion is proposed. It is concluded that blood transfusion should no longer be a consideration during routine bimaxillary orthognathic surgery. (Int J Adult Orthod Orthognath Surg 2002;17:314-317)

One of the major complications of orthognathic surgery is the potential for excessive blood loss. The literature has several reports of life-threatening hemorrhage following orthognathic surgery.¹⁻⁴ Various strategies have been adopted to minimize blood loss during routine orthognathic surgery.³⁻⁵ The most notable of these is the utilization of induced hypotensive anesthetic techniques to reduce the mean arterial pressure to between 55 and 60 mmHg.⁶⁻⁸ This has been achieved through the use of inhalational anesthetics in combination with other drugs such as beta blockers, nitroglycerin, and sodium nitroprusside.

Another method for dealing with blood loss following orthognathic surgery is the transfusion of blood obtained as an autologous transfusion or from banked blood. The use of banked blood has potential complications, such as errors in typing and cross-matching, administration, and transmission of diseases including hepatitis, malaria, acquired immunodeficiency syn-

drome, syphilis, and cytomegalovirus.^{9,10} Some of the disadvantages of banked blood are overcome with the use of predeposited autologous transfusions. This has been shown to be successful in the management of the orthognathic patient.^{11,12} This practice has become the standard of care for many surgeons around the world who perform orthognathic surgery.

The purpose of the present study was twofold: (1) to determine the transfusion practice in a group of orthognathic surgery patients who had autodonated their blood prior to surgery, and (2) to determine the need for transfusion in a group of orthognathic surgery patients who had not autodonated their blood.

Materials and methods

This was a retrospective study conducted at 2 different time periods. Patients were classified into 2 groups based on these time periods. Inclusion criteria were

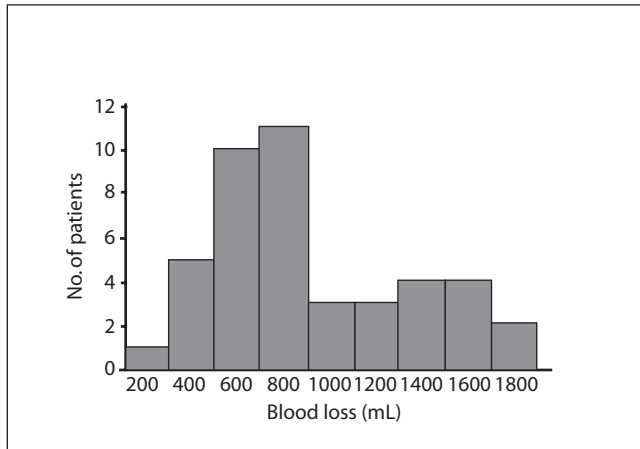


Fig 1 Volume (mL) of blood loss of patients in group 1 (n = 43; mean 898.5 mL, SD 418.67 mL).

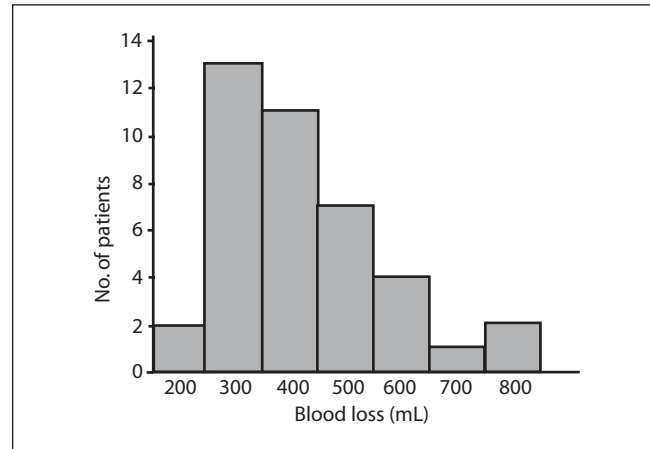


Fig 2 Volume (mL) of blood loss of patients in group 2 (n = 40; mean 402.5 mL, SD 139.57 mL).

that all patients had bimaxillary orthognathic surgery and were healthy (ASA I) individuals. Patients who had any medical conditions that would predispose them to excessive bleeding were excluded from this study. Group 1 consisted of patients operated on between January 1991 and December 1993, most of whom (34/43) had autodonated their blood prior to surgery, and group 2 patients were operated on between January 1998 and December 2000 and had not autodonated their blood prior to surgery.

Data was obtained by review of medical records and charts. Factors evaluated included: (1) estimated blood loss (EBL), (2) number of autodonated units of blood, and (3) blood/blood product replacement.

Results

There were a total of 83 patients enrolled in this study: 43 in group 1 and 40 in group 2. The average age of the patients was 20 years (range of 15 to 49 years). All patients had Le Fort I maxillary surgery and bilateral sagittal split ramus osteotomies in the mandible. Rigid fixation was used on all patients.

The amount of blood loss in group 1 patients is represented in Fig 1. The mean blood loss in group 1 was 899 mL, with a range of 200 to 1,800 mL. Thirty-four patients in this group had autodonated their blood. Twenty-one patients had auto-

donated 1 unit of blood, and 13 had donated 2 units. Sixteen patients were transfused; this represents 47% of those who had autodonated their blood and 37% of the total number of patients in group 1. Thirteen patients received 1 unit of blood and 3 received 2 units.

The amount of blood loss in the group 2 patients is shown in Fig 2. The mean blood loss in this group was 403 mL, with a range from 200 to 800 mL. None of the patients in this group autodonated their blood, and none was transfused.

Discussion

The evolution of contemporary orthognathic surgery began with the work of Trauner and Obwegeser in 1957.¹³ Since then, major advances have been made in the performance of these operations. These include modifications of the techniques of performing the procedures¹⁴⁻¹⁶ as well as the use of newer technology.^{17,18} Attempts were also made to improve perioperative care of the orthognathic surgery patient. A significant effort was made to manage the excessive blood loss that occurred during these procedures. Blood loss of between 500 and 2,000 mL for bimaxillary surgery has previously been reported.^{6,19} Blood replacement comprised banked blood or autologous transfusions. Due to the shortcomings of transfusing banked blood, Hegtvedt et al¹² studied the

use of autologous transfusions in the orthognathic surgery patient. They demonstrated that it was a very useful alternative to banked blood. In the present study, we have shown that fewer than 50% of the group 1 and none of the group 2 patients were transfused.

The reason for not transfusing all the patients in group 1 was the amount of blood loss and the cardiovascular response to the blood loss. If the blood loss was less than 500 mL, then transfusions were not typically considered. More significant, however, was the cardiovascular response to the blood loss. The adult human body is able to tolerate a blood loss of between 10% and 30% of blood volume without significant cardiovascular compromise.²⁰ This means blood losses of between 600 and 1,800 mL can be tolerated by the human body (assuming total blood volume of 6 liters). In most hospitals, transfusion practice is guided by the cardiovascular response to blood loss, with the anticipated responses to significant blood loss being tachycardia and hypotension.

In group 2, none of the patients were transfused. The blood loss in this group was significantly lower than group 1. This was achieved by adherence to a protocol to minimize the blood loss. The protocol includes some of the maneuvers described by Hegtvedt²¹ to reduce surgical blood loss. Our protocol includes the following.

1. A thorough workup of the patient to minimize errors in judgment when the surgery is performed. Accurate and precise model surgery is essential to meet this end. This can also help shorten the operation.
2. Hypotensive anesthetic techniques, when patients can tolerate this maneuver. Aside from reducing blood loss, this can also facilitate visibility during the operation by providing a fairly bloodless operating field.³
3. Skilled surgeons to perform the operation. Aside from shortening the operating time, this can also prevent surgical mishaps like cutting blood vessels. In a residency program, only the most senior residents, and only those with a clear understanding of the procedures, should be operating.
4. Administration of local anesthesia with vasoconstrictor at incision sites prior to surgery and allowing adequate time for vasoconstriction to occur. At the start of surgery, the local anesthesia can be administered on the jaw to be worked on first, prior to the surgeons' leaving the room to scrub. By the time the surgeons are ready to start the operation, sufficient vasoconstriction will have occurred.
5. Cocainization of the nasal mucosa prior to maxillary surgery. This minimizes the blood loss when the mucosa is reflected. Nu-gauze (Johnson & Johnson) is used for this application and can be left in until the surgery is completed.
6. Placement of the patient in a reverse Trendelenburg position.
7. Use of an electrocautery unit to make incisions. This can reduce blood loss at the incisions. Care must be taken not to use excessive heat on the tissue to prevent necrosis and excessive scarring.
8. Incisions that are made cleanly through the periosteum before tissue reflection is undertaken. This will prevent excessive oozing from macerated mucosa.
9. Packing of open surgical sites with gauze to minimize constant oozing of blood.

Adherence to a protocol such as the one we have used will significantly reduce operating room time and blood loss. This has been clearly demonstrated in group 2, where 40 patients undergoing bimaxillary orthognathic surgery did not autodonate any blood prior to surgery and did not require any transfusions postoperatively. It is our conclusion that autodonation is no longer required prior to performing bimaxillary surgery. The blood loss can be minimized by the protocol we have described, eliminating the need for any blood transfusions postoperatively. Autodonation or blood transfusion should only be a consideration when significant blood loss is anticipated due to the patient's medical history or when autogenous bone grafting is performed simultaneously. During routine bimaxillary orthognathic surgery on a healthy adult, blood transfusions should no longer be a consideration.

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