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Blood transfusion requirements in cleft lip surgery

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ABSTRACT

Objective: Cleft lip surgery is a common procedure performed by surgeons worldwide. The aim of the study was to determine blood transfusion requirements and factors influencing blood transfusion in cleft lip surgery.

Methods: Transfusion rate in 100 consecutive patients who had cleft lip surgery was prospectively evaluated at the Lagos University Teaching Hospital, Nigeria. Data collected included age and sex of patients, type of cleft defects, type of surgery done, preoperative haematocrit, duration of surgery, amount of blood loss during surgery, the number of units of blood cross-matched and those used. Cardiovascular parameters at the point of transfusion were also recorded. Each patient was made to donate a unit of homologous blood prior to surgery.

Results: Mean estimated blood loss during surgery was 26.5 ± 47.1 ml. Most patients (92%) lost between 2 and 50 ml of blood. Mean estimated blood loss in unilateral cleft lip surgery was not significantly differently from that of bilateral cleft lip surgery ($P = 0.46$). Only five patients (5%) required blood transfusion. The mean blood transfused was 50.0 ± 16.9 ml. All the patients transfused had a preoperative haematocrit of <30% (23–27%). The cross-match-to-transfusion ratio for cleft surgery was 20. The transfusion index was 0.05 and overall blood-ordering quotient was 20.

Conclusion: Cleft lip surgery is a low volume blood loss surgery. Homologous blood donation prior to cleft lip surgery in patients with preoperative haematocrit of 30% or more is not necessary. For patients with preoperative haematocrit of less than 30%, type and screen of donated blood should be adequate.

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1. Introduction

Surgical repair of cleft lip and palate deformities is a common procedure performed by oral and maxillofacial and plastic surgeons worldwide. The procedure is usually performed under general anaesthesia, although surgical repair of cleft lip in adults can be done under local anaesthesia and sedation [1]. Surgical repair of cleft palate involves raising of intraoral and pharyngeal flap and is usually associated with extensive soft tissue dissection and consequently loss of appreciable amount of blood. Cleft lip repair however, is associated with less extensive dissection, and less blood loss [2].

In our hospital, patients undergoing cleft lip surgery; and other maxillofacial surgical procedures have traditionally been required to look for a replacement donor to donate at least 1 unit of homologous blood before surgery. This is preoperatively cross-

matched and ready for surgery, in case perioperative blood loss is substantial and requires blood transfusion. Over-ordering of cross-matched blood to cover operation is costly and can result in blood shortages [3,4]. It is also associated with many blood transfusion-related risks [3–5].

There is a need to ascertain the need for blood transfusion in cleft lip surgery to guide clinical practice guideline regarding preoperative blood donation, as well as blood grouping and cross-matching in cleft lip surgery.

The aim of the study was to determine blood transfusion requirements and factors influencing blood transfusion in cleft lip surgery.

2. Materials and methods

A total of 100 consecutive patients who had cleft lip surgery done at the Lagos University Teaching Hospital between March 2007 and August 2010 were recruited into the study. Data collected included age, sex and weight of patients, type of cleft defects, type of surgery done, preoperative haematocrit, duration

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of surgery, amount of blood loss during surgery, and amount of blood transfused. Cardiovascular parameters at the point of transfusion were also recorded.

2.1. Anaesthetic technique

All cases except 10 adult patients were done under general anaesthesia. Prior to induction, electrocardiograph (ECG) leads, blood pressure cuff, pulse oximeter probe and precordial stethoscope were applied and pre-induction values obtained. Induction was either inhalational with incremental halothane or intravenous using thiopentone or propofol. When the depth of anaesthesia was judged to be adequate, the trachea was intubated with the appropriate sized south-polar endotracheal tube under deep inhalational anaesthesia or muscle relaxants using external laryngeal pressure if needed. Correct placement of the tracheal tube was confirmed by auscultation and capnography, the tube was securely fixed and the patient positioned for surgery.

Surgical site was infiltrated with adrenaline (1:200,000) before making incision. Maintenance of anaesthesia was with isoflurane and all patients were ventilated after administration of a muscle relaxant. Analgesia was provided with fentanyl, paracetamol, diclofenac or pethidine. Additional monitoring included capnography and temperature. At the end of surgery, patients were extubated when fully awake with protective airway reflexes.

Cleft lip surgery was performed in adult patients (15 years and above) under local anaesthesia with 2% lignocaine and adrenaline (1:200,000).

2.2. Surgical technique

Unilateral cleft lip was repaired using either Millard's rotation advancement technique or Tenison-Randall triangular technique. Bilateral cleft lip was repaired using Fork technique.

2.3. Blood donation, blood loss and transfusion

Each patient was made to look for a replacement donor to donate 1 unit of homologous blood prior to surgery. For all the patients, 1 unit of homologous blood was cross-matched for the surgery. Blood loss was calculated by weighing gauze, measuring suctioned blood, and adjusting for the volume of irrigation solution used during the operation. The decision to transfuse was made at the discretion of the anaesthetist. Afterward, cross-match-to-transfusion ratio (the index of efficiency of ordering and usage),

Table 1 Characteristics of patients.

Age	
Mean	52.5 ± 102.7 months
Range	3–420 months
Sex	
Male	52
Female	48
Weight	
Mean	7.7 ± 9.4 kg
Range	5–63 kg
Preoperative haematocrit	
Mean	30.4 ± 3.9%
Range	22–43%
Duration of surgery	
Mean	65.6 ± 27.4 min
Range	20–150 min
Amount of blood loss during surgery	
Mean	26.5 ± 47.1 ml
Range	2–300 ml
Amount of blood transfused	
Mean	50.0 ± 16.9 ml
Range	35–75 ml

Table 2 Type of cleft defects.

Type of cleft defect	Number (%)
Unilateral cleft lip	54 (54)
Bilateral cleft lip	10 (10)
Unilateral cleft lip and palate	29 (29)
Bilateral cleft lip and palate	7 (7)
Total	100 (100)
Type of cleft surgery	Number (%)
Unilateral cleft lip	83 (83)
Bilateral cleft lip	17 (17)
Total	100 (100)

transfusion index (average number of units transfused for a given procedure) and blood ordering quotient were calculated.

2.4. Data analysis

Data was analysed using the SPSS for Windows (version 12.0; SPSS Inc., Chicago, IL) statistical software package; and presented in descriptive and tabular forms. Test of significance was used as appropriate. P value was set at ≤0.05.

3. Results

There were 52 males and 48 females with a mean age of 52.5 ± 102.7 months (range, 3–420 months) (Table 1). The most common cleft defect was unilateral cleft lip (54%) followed by unilateral cleft lip and palate (29%) (Table 2). Unilateral cleft lip (UCL) repair was done in 83 patients and bilateral cleft lip (BCL) repair in 17 patients (Table 2). Ninety-two patients (unilateral = 83; bilateral = 9) presented with primary lip defects (unrepaired) while 8 patients (bilateral = 8) presented with secondary lip defects (previously repaired). Ninety patients underwent surgery under general anaesthesia, while only 10 patients (adults) had surgery done under local anaesthesia.

Table 1 shows the characteristics of the patients: weight, preoperative haematocrit, duration of surgery, amount of blood loss and amount of blood transfused. A significant positive correlation between duration of surgery and blood loss was established (P = 0.000). The duration of surgery in unilateral cleft lip surgery was significantly lower than that of bilateral cleft lip surgery (P = 0.018). For each operation, 1 unit of homologous blood was cross-matched. Mean preoperative PCV was 30.4 ± 3.9%. Sixty-one patients had preoperative PCV of 30% or more, while 39 patients had a preoperative PCV of less than 30%. Mean estimated blood loss during surgery was 26.5 ± 47.1 ml (Table 1). Most patients (92%) lost between 2 and 50 ml of blood. Mean estimated blood loss in unilateral cleft lip surgery was not significantly differently from that of bilateral cleft lip surgery (P = 0.46). Only five patients (5%) required blood transfusion. (UCL = 4; BCL = 1). The mean blood transfused was 50.0 ± 16.9 ml (Table 1). All the five cases recorded deranged cardiovascular parameters (increased heart rate and decreased blood pressure) prior to transfusion. Table 3 shows the characteristics of patients who had blood transfusion. All the patients transfused had a

Table 3 Characteristics of patients who were transfused.

S/N	Age (months)	Sex	Surgery	Preop PCV	Blood loss (ml)	Amount transfused (ml)
1.	4	F	UCL	25	30	40
2.	11	F	UCL	26	30	35
3.	16	M	BCL	23	40	40
4.	4	F	UCL	25	30	60
5.	3	F	UCL	27	10	75

Table 4
Transfusion indices.

	Value ^a
Cross-match: transfusion ratio	20
• UCL	20.75
• BCL	17
Transfusion index	0.05
• UCL	0.048
• BCL	0.06
Blood-ordering quotient	20

^a Values were calculated based on units of blood opened for transfusion.

preoperative haematocrit of <30% (23–27%). All cases except one (BCL) underwent primary cleft lip surgery. No significant difference was found in blood loss between primary and secondary surgical repair.

The cross-match-to-transfusion ratio was 20 for cleft lip surgery; 20.75 for unilateral cleft lip surgery and 17 for bilateral cleft lip surgery (Table 4). The transfusion index for cleft surgery overall was 0.05; 0.048 for unilateral cleft lip surgery and was 0.06 for bilateral cleft lip surgery (Table 4). Overall blood-ordering quotient was 20. No mortality was recorded during the study. No transfusion reaction was recorded in the 5 patients who had homologous blood transfusion.

4. Discussion

In the present study, most of the patients who underwent cleft lip surgery lost between 2 and 50 ml of blood during surgery; with an overall mean estimated blood loss during surgery of 26.5 ml. This shows that cleft lip surgery is a “small/low volume” blood loss surgery. Although, no significant difference was found in estimated blood loss between unilateral cleft lip surgery and that of bilateral cleft lip surgery, a significant positive correlation between duration of surgery and blood loss was established. Previous studies have established a strong correlation between operating time and intra-operative blood loss [6,7].

Orofacial region is a well vascularized region of the body; and the relatively small amount of blood loss during surgery may be partly due the local anaesthetic agent (lignocaine) containing 1:200,000 adrenaline that was routinely injected before surgical incisions were made. Vasoconstriction effect of adrenaline reduces amount of blood loss during surgery, as well as a clearer surgical field. The use of vasoconstrictor agent to reduce bleeding is a recommended approach to conservation of blood during surgery [7]. In the present case, the use of this agent was very effective in reducing blood loss during cleft lip surgery.

Only 5 of the 100 patients were transfused, with a transfusion rate of 5%. Transfusion rate in unilateral cleft lip and bilateral cleft lip was similar (UCL = 4.8%; BCL = 5.9%). All the five cases were characterized by preoperative haematocrit of less than 30%; and transfusion was triggered by deranged cardiovascular parameters. No patients with preoperative haematocrit of more than or equal to 30% was transfused. This implies that patients with preoperative haematocrit of less than 30% are more likely to need transfusion during cleft lip surgery than those with a higher haematocrit.

In the present study, overall cross-match: transfusion ratio (CTR) was 20; and 20.75 for UCL and 17 for BCL. The cross-match: transfusion ratio (CTR) is the number of units cross-matched for a procedure divided by the total number of units transfused, and is an index of the efficiency of ordering and use of blood, and it should be less than 2.5 [8]. In the present case, CTR was far more than recommended, with the implication that ordering of 1 unit of homologous blood prior to cleft lip surgery is not efficient.

The transfusion index (TI) is a measure of the amount of blood used for a given procedure. TI is an average number of units

transfused for a given procedure. A value of less than 0.5 suggests that cross-matched blood is unlikely to be required [8]. In the present study, overall TI for cleft lip surgery was 0.05, and 0.048 and 0.06 for UCL and BCL surgery respectively.

The blood-ordering quotient (BOQ) is the number of cross-matched units of blood per patient divided by the number of units transfused per patient [8,9]. A BOQ above 1.5 is considered unacceptable and it is advised that these procedures be grouped and saved. In the present study, overall BOQ for cleft surgery was 20.

It also recognized that based on blood volume loss alone, transfusion was inappropriate in all cases, as blood loss was far less than the recommended 20% of the blood volume of each patient. However, it is opined that low preoperative haematocrit of all the 5 patients transfused and deranged cardiovascular parameters must have influenced transfusion in all cases. Available evidence does not support the use of single criterion for transfusion such as haemoglobin concentration of <10 g/dl. No single measure can replace good clinical judgment and accurate monitoring in the peri-operative period. The decision to transfuse should take into consideration the expected level and duration of anaemia, the intravascular volume, the duration of operation and the probability of massive blood loss [2,8].

The findings in the present study shows that cleft lip surgery is a low volume blood loss surgery, and may not require blood donation or transfusion. Patients with preoperative haematocrit of less than 30% were more likely to need blood transfusion. Preoperative homologous blood donation for cleft lip surgery especially in children with haematocrit of $\geq 30\%$ may not be necessary. A group and save policy is recommended for cleft lip surgery in patients with preoperative haematocrit of less than 30%. A number of surgical procedures including orthognathic surgery, hysterectomy, colostomy, thyroidectomy and maxillofacial surgery have been shown to seldom require transfusion [7,8,10,11], and for such procedures, blood is not usually cross-matched and tied down. However, the policy of “type and screen” is usually adopted such that blood can be quickly made available if for any reason the surgical intervention eventually demands a blood transfusion [12].

5. Conclusions

Transfusion rate in cleft lip surgery was very low (5%). Patients with preoperative haematocrit of less than 30% were more likely to need homologous blood transfusion during cleft surgery. Preoperative homologous blood donation for cleft lip surgery especially in children with haematocrit of $\geq 30\%$ may not be necessary. A group and save policy may be necessary for cleft lip surgery in patients with preoperative haematocrit of less than 30%.

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