

Blood Transfusion and Cervical Anastomotic Leakage in Esophageal Reconstructive Surgery

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Received date: November 28, 2015, Accepted date: January 7, 2016, Published date: January 14, 2016

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Abstract

Introduction: Esophageal reconstruction is associated with significant blood loss and blood transfusion rates. Blood transfusion is a quick method of correction of anemia and rapid restoration of intravascular volume. However, concerns exist about the side effects of blood transfusion on the anastomotic complications. This prospective study aimed to report the impact of intraoperative blood transfusion on cervical anastomotic leak rate in esophageal reconstructive surgery

Patients and methods: From 2006 to 2014, 85 the left isoperistaltic colon grafts based on the left colonic vessels were performed. There were 71 females and 14 males. The mean age of patients was 25 years.

The mean preoperative haemoglobin (Hb) was 11.24 ± 9.23 g/dl. Operative blood loss 500 ml was used as threshold for ABT. The oesophagocolique anastomotic integrity was assessed by barium study. Impact of intraoperative allogeneic blood transfusion on the cervical anastomosis rate was studied.

Statistical analyses were performed using Student's t-test or the chi-square test. The multivariate analysis was performed by SPSS 11.0 for Windows (SPSS, Chicago, IL, USA).

Results: The median operative duration was 3 hours. The median hospital stay was 14 days. The mortality rate was 2.4%. Graft necrosis occurred in two patients. Fifty patients received intra-operative allogeneic blood transfusion. Twenty seven patients were developed a cervical leak. There were 23 females and 4 males. Leak was occurred in 22 patients who received intraoperative ABT. The complete spontaneous healing of leak was obtained in all patients after a median delay of 7 days. The result of the univariate and multivariate analysis revealed that the intra-operative allogeneic blood transfusion was a predictive factor of cervical leak.

Conclusion: The correction of preoperative anemia, meticulous surgical dissection, good haemostasis and the respect of the guidelines of blood transfusion may reduce intraoperative blood transfusion and related surgical site infection.

Keywords: Esophageal reconstructive surgery; Caustic esophageal stricture; Blood transfusion; Cervical anastomotic leak

Introduction

Esophageal reconstruction is a major operation and complex surgical procedures are performed to establish the digestive continuity [1,2]. This reconstructive surgery is associated with significant blood loss and blood transfusion rates [3]. Anemia linked to poor nutritional status occurs in about 30% of patients candidate for this surgery [4,5].

The presence of anemia prior to operation is associated with increase complication rates and transfusion requirements [6]. Also anaemia can compound and delay recovery from such complex surgical procedure [6]. Blood transfusion is a quick method of correction of anemia and rapid restoration of intravascular volume. However, concerns have been raised about the side effects of transfusion. There is evidence that perioperative blood transfusion has immunomodulatory effect and adversely affects postoperative outcomes in patients undergoing esophageal complex procedures.

Concerns exist about the side effects of blood transfusion on the anastomotic complications [7]. This prospective study aimed to report the impact of intraoperative blood transfusion on cervical anastomotic leak rate in esophageal reconstructive surgery

Patients and Methods

During a continuous prospective study conducted from 2006 to 2014, 85 patients with esophageal caustic stricture were managed surgically. There were 71 females (83. 5%) and 14 males (16.4%). The mean age of patients was 25 years (ranging 16 to 50). Fifty five patients had undergone dilations prior to surgery. The surgical procedure of choice used was the left isoperistaltic colon graft based on the left colonic vessels and interposed by substernal approach. Nutritional disorders were corrected by nutritional supports before date of surgery.

The mean preoperative haemoglobin (Hb) was 11.24 ± 9.23 g/dl (ranging 6.5 to 14.8). Forty nine patient (57.6%) were anaemic (Hb <9 mg/dl) preoperatively. Preoperative anemia was corrected firstly by medical treatment (venofer) or allogeneic blood transfusion (ABT)

when necessary. The anaemic patients underwent operation only if the hemoglobin level reached 10 g/dl. Decisions concerning intraoperative allogeneic blood transfusion (ABT) were made by surgeon and/or anesthesiologist, depending on the blood loss, hemodynamic status, hemoglobin concentration, age, and comorbidity of the patient. Usually, operative blood loss [500 ml was used as threshold for ABT (i.e., 500-800 ml blood loss transfused with 2 units, 800-1000 ml transfused with 4 units, and 1,000 ml transfused with 5 units). All transfusions were performed using units (200-300 ml/unit) of allogeneic packed RBCs.

The oesophagocolique anastomotic integrity was assessed by barium study on 8th and 10th postoperative day. Impact of intra-operative allogeneic blood transfusion on the cervical anastomosis rate was studied.

Statistical Analysis

Statistical analyses were performed using Student's t-test or the chi-square test. The multivariate analysis was performed by SPSS 11.0 for Windows (SPSS, Chicago, IL, USA). A P value of less than 0.05 was considered significant

Results

The Median operative duration was 3 hours (ranging 2 h 30 to 6 hours). The median hospital stay was 14 days (ranging 12 to 27 days). There mortality rate was 2.4% (n=2). The causes of death were pulmonary emboli and multi-organ failure. Graft necrosis occurred in two patients (2.4%) which were diagnosed on first and second postoperative day. Fifty patients (58.8%) of our series received intra-operative allogeneic blood transfusion. Twenty seven patients (31.1%) were developed a cervical leak. There were 23 females (85.1%) and 4 males (14.8%) (Table 1).

Cervical leak	No. patients (%) N=27
Sex	
Females	23(85.1)
Males	4(14.8)
Intraoperative ABT	
Yes	22(81.4)
No	5 (18.5)

Table 1: Cervical leakage

Leak was occurred in 22 patients (81.4%) who received intraoperative ABT. the leak was clinically apparent and was occurred at median postoperative day 9 (ranging 7 to 12 days).

The cervical leakage was treated conservatively and the complete spontaneous healing was obtained in all patients after a median delay of 7 days (ranging 5 to 10 days).

The result of the univariate and multivariate analysis revealed that the intra-operative allogeneic blood transfusion was a predictive factor of cervical leak (Tables 2 and 3).

Intraoperative ABT	NB. Patients Leak(+)	P value Signification
No	35 (5)	
Yes	50 (22)	< 0.0137 S*
S*: significant		

Table 2: Results of univariate analysis

Intraoperative ABT	NB. Patients Leak(+)	Odd ratio	95 % CI	P value Signification
No	35 (5)			
Yes	50 (22)	2.14	1.19-3.83	0.010 S*
S*: significant				

Table 3: Results of multivariate analysis

Discussion

Esophageal reconstructive surgery utilizes complex surgical procedures to establish gut continuity. The presence of anemia prior to operation is associated with increased complication rates and transfusion requirements. Also anemia can compound and delay recovery from such surgical procedure [8]. The esophageal reconstructive surgery is associated with an increased blood loss, and necessity of transfusion which indicate more complicated or difficult operative procedures [9,10].

The results of this prospective study showed that the intra-operative blood transfusion was identified as independent factor of risk for cervical anastomotic leakage (OR: 2.14, CI 95%: 1.19-3.83 ,P: 0.010), thus the rate of cervical anastomotic complications in patients who received a perioperative blood transfusion was significantly higher. In colorectal surgery, the rate of anastomotic leakage was higher in transfused patients and the perioperative blood transfusion was identified to be an independent predictor of intestinal anastomotic leakage [11,12]. The risk of leak is highly correlated with the number of units transfused [13,14] and high rate of anastomotic leak is associated with high blood transfusion rate. In addition several reports have suggested that blood transfusion is a significant prognostic factor of outcomes in patients who underwent surgical resection of cancer by decreasing long-term survival and increasing tumor recurrence [15-19].

As the risks of infectious disease transmission in blood transfusion were increasingly lowered, the risks of non-infectious complications of transfusion have become more apparent and now account for most of the significant morbidity and mortality from blood transfusion [18,19]. Therefore an association between blood transfusion and postoperative infection have been noted particularly the surgical site infections (SSIs). Infection of surgical site increases morbidity, mortality and health care costs. As reported in literature, the intraoperative blood transfusion is an independent risk factor of anastomotic leakage in gastrointestinal surgery [18,19]. Patients receiving traditional allogeneic transfusions had dramatically higher rates of morbidity and mortality than similar patients did not receive transfusion [20].

The mechanism leading to transfusion-associated development of postoperative infectious complications is not yet known in details. That

indicated by some studies, immunosuppression might play a certain role [21,22]. The immunosuppressive effect of transfusion may increase susceptibility to infection, delay healing and increase the anastomotic incidence of sepsis [21,22]. Therefore Blood transfusion undermines lymphoblastogenesis and thus increases the risk of anastomotic leakage [21-23]. The life-saving effects of allogeneic blood transfusion (ABT) are well established, as well as the ability to recover more quickly from a major operation when anemia and low blood volumes are corrected. Due to the side effects of transfusion, more conservative approach has become the rule and the blood usage has declined in large part [24]. The indications for transfusion have been redefined in the last decade to ensure that blood products are considered and used as drugs in their own merit [22-25]. Decisions concerning the use of ABT are given by surgeons and/or anesthesiologist. Indeed the use of perioperative blood transfusion must be conditioned by some circumstances [25]. It is strongly recommended to correct preoperative anemia of patients undergoing esophageal reconstruction to limit perioperative blood usage. When possible, ABT should be avoided through careful surgical hemostasis and the use of autogenous blood. The surgical techniques should be improved to avoid over bleeding, high blood loss and intraoperative ABT. It also is very important to stick to the related-transfusion guidelines strictly to avoid unnecessary or over ABT.

Conclusion

The correction of preoperative anemia before surgery, decreasing blood loss and over bleeding by meticulous and careful surgical dissection, good haemostasis and the respect of the guidelines of blood transfusion are of fundamental rules, once respected may reduce intraoperative blood transfusion related complications particularly surgical site infection.

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