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Feasibility of elective surgery without blood transfusion

Dr. Arun V Dawle[1], Dr. Satyanarayan Ramling Mali[2]

[1]Associate Professor, [2]Lecturer,
Department of Surgery, SRTR Medical College, Ambejogai

Abstract: ***There is an evidence that preoperative blood transfusion increases the likelihood of infectious compilations after surgery. Transfusion in oncological surgery may increase the risk of recurrence and decrease long-term survival. Although most patients receive transfusion without any abvious detrimental effects, its safety cannot be guaranteed. Thus taken together, awareness of the risk of transfusion has sensitized the surgical community and forced a consideration of alternatives to transfusion, frequently invoking a 'transfusion avoidance strategy' to minimize risk exposure. In the present study an attempt is made to know how surgery can be quite safe in patient with a low haemoglobin level as long as the circulatory volume is normal. This study was done on 216 cases. As all are indoor cases, details of these cases are available in record section for noting the relevant findings separate proforma was prepared and used. All surgeries done in-patients with a preoperative haemoglobin level as low as 8 gm/dL. Out of 180 cases of benign pathology transfusion was required only in 35 cases, but in 36 cases of malignancy transfusion was required in 18 cases. Most of surgery (162) conducted without blood transfusion where blood loss was less is more than 500 ml and patients are intraoperatively stable. In 51 cases blood loss is more than 500 ml and patients have intraoperative complications like tachycardia, hypotension or both, where blood transfusion is required. In 75% cases surgery was conducted without transfusion and blood transfusion was given in 25% case. There was no mortality in cases operated without blood transfusion.***

Keywords: Feasibility, elective surgery, blood transfusion.

1. Introduction

Blood transfusion can result in number of serious complications including death (**Sazama K.,** 1990 [1] and **Linden J. V.,** 1992 [2]). Blood and blood products should be considerd potentially dangerous ‘drugs’. One should exercise judgment when prescribing the blood transfusion. It has been stated that, blood transfusion that is not clearly indicated is contraindicated.

The transfusion of incompatible red blood cells is potentially fatal but other significant concerns exist when a patient receices blood products, including infectious hazards and immunologic effects. A recent review by **Klein** (1995) [3] estimates that transfusion risk per unit minor allergic reaction 1/100, bacterial injection (platelet) 1/5000, heamolytic V reactions 1/6000, HTLV 1 and 2 infection 1/200000, human immunodeficiency virus 1/4200000, atut lung injury 1/500000, fetal haemolytic reaction 1/600000. In recent years transfusion theraoy has being linked to some aspects of immunosuppression with significant adverse consequences relative to postoperative infectious complicationsor tumour recurrence. Data from the 1980s indicated that as many as one out of ten patients transfused would show evidence of infection (**Aach R.D.,** 1981). [4]

Other risks include haemolytic disease of the newborn, in females of childbearing age who become pregnant after Rh-incompatible transfusion. Because a transfusion exposes the recipient to a complex mixture of donor cells and protein, it is in many a 'transplant'. Blood components also contain viable lymphocytes capable of mounting a graft-versus-host response in the severely immunocompromised recipient (**Samir M. Fakhry,** 1995). [5]

There is an evidence that preoperative blood transfusion increases the likelihood of infectious compilations after surgery. Transfusion in oncological surgery may increase the risk of recurrence and decrease long-term survival. The incidence of immunological issues such as transfusion related acute lung injury and transfusion associated graft-versus-host disease in unknown , though both are serious conditions with mortality rates of 5% and 70%, respectively (**Popovsky M. A.** et al, 1992). [6] Although most patients receive transfusion without any abvious detrimental effects, its safety cannot be guaranteed. Thus taken together, awareness of the risk of transfusion has sensitized the surgical community and forced a consideration of alternatives to transfusion, frequently invoking a 'transfusion avoidance strategy' to minimize risk exposure.

In the present study an attempt is made to know how surgery can be quite safe inpatient with a low haemoglobin level as long as the circulatory volume is normal. The laboratory and clinical data of this study refute the need for a minimum preoperative level of 8 gm/DL in all patients.

2. MATERIALS AND METHODS

This study was undertaken department of surgery Swami Ramanand Teerth Rural Medical College Ambajogai, during period of June 2000 to June 2002 Lt consists of total 216 cases. As all are indoor cases, details of these cases are available in record section for noting the relevant findings separate proforma was prepared and used.

Preliminary data related to name, age, sex, address, and registration number were noted before the admission all cases laboratory investigations like haemoglobin level, total and differential leukocyte count, peripheral smear opinion. Books group and Rh-typing, bleeding and clotting time, serum studies like liver function tests, kidney function test were done. Other investigations like electrocardiogrraphi (ECG), chest X-rays, ultra so no graph, mammography were done according to need for diagnosis and to award fitness of patient for surgery. If essential, histopathological examination of ml lesions was

carried out. thus on conical, laboratory, histological and radiological investigations patients were diagnosed and selected for elective surgery.

During operation an attempt was made to minimize the blood loss and this was. achieved by using careful techniques. Simultaneously we estimated intraoperative blood loss, by weighing the sponges and by calculating the amount of blood in suction bottle. Ongoing replacement of intraoperative volume loss was replaced predominantly by crystallized solutions for prevention of development of hypovolemia and hypotension. Patient is carefully monitored during operation and postoperative period for pulse rate, blood pressure, fluid intake, urine output. Any findings suggestive of constant increased pulse rate (tachycardia) or hypotension are noted carefully in intraoperative and preoperative period. All these findings details were recorded in charts and were used as indicators of intravascular volume status. If estimated blood loss is more than 500 ml and associated with intraoperative compilations like constant tachycardia and/or hypotension then blood transfusion was given according to need.

Patient who received blood transfusion were monitored for any transfusion reaction (immediate or delayed) and accordingly investigated if transfusion reaction occurred. Lastly the postoperative compilations like morbidity i.e. infection and mortality with their cause noted. All the relevant findings with present study were carefully noted.

3. Results:

There was preponderance of male cases (68.05%) in respect of female (31.95%). The cause of this preponderance of male is that maximum numbers of cases included in this study are cases of benign hyperplasia of prostate (BHP).

Maximum number of (48.14%) cases were found in age group of 51-70. It may be due to the fact that age is prone for malignant diseases and geriatric diseases. The next maximum number of cases seen in age group 31-40 yrs. Includes the cases of renal disease and gallbladder diseases.

Table 1: Haemoglobin percentage level in elective surgery cases.

Sr. no.	Hb gm%	No. of cases	%
1	8.0 – 9.0	17	7.87
2	9.2 – 10.0	103	47.68
3	10.2 – 11.0	76	35.18
4	11.2 – 12.0	19	8.79
5	12.2 – 13.0	01	0.46
Total		216	100

For all elective surgery cases in this study, the minimum haemoglobin level was 8 gm%. Among all cases in 179 (82.86%) patients surgery was conducted with Hb-level between 9.2-11.00 gm% level.

Table 2: Estimated amount of blood loss in elective surgery cases.

Sr. no.	Estimated amount of blood loss	No. of cases	%
1	150 – 250	48	22.22
2	251 – 500	116	53.70
3	501 – 750	10	4.62
4	751 – 1000	31	14.35
5	1001 – 1250	8	3.7
6	1251 – 1500	1	0.46
7	1501 – 1750	2	0.92
Total		216	100

From the above table it is clear that in maximum number of cases (116) blood loss was between 251-500 ml and estimated amount of blood loss was less than 500 in 75.92% cases. The estimated amount of blood loss more than 500 ml was seen in 24.07% cases.

Table 3: Number of cases with estimated amount of blood loss >500 ml with intraoperative compilations and number of cases with estimated amount of blood loss <500 ml and intraoperative stable cases.

Sr. no.	Intraoperative blood loss in ml with complication	Total	No. of cases operated without blood transfusion	No. of cases operated with blood transfusion
1	Cases operated with > 500 ml blood loss with intraoperative complications	52	1	51
2	Cases operated with < 500 ml blood loss without intraoperative complications	164	162	2

Above table shows that amongst the 52 cases, the blood loss was >500 ml and with intraoperative compilation. In 51 cases surgery was conducted with blood transfusion but there was only one case that we conducted without blood transfusion. In 163 cases intraoperative blood loss was <500 ml. In 2 cases blood was given because of intraoperative compilation though blood loss was <500 ml.

The above table also reveals that out of 216 cases of elective surgeries in 75.46% cases surgery was conducted without blood transfusion and in 24.53% cases surgery was conducted with blood transfusion.

Table 4: Elective surgery operations depending upon blood loss > and < 500 ml and cases operated with or without blood transfusion.

Sr. No.	Type of Surgery	Total	Number of cases with <500 ml blood loss			Number of cases with >500 ml blood loss		
			Total	Blood not given	Blood given	Total	Blood not given	Blood given
1.	Cholecystectomy	21	18	18	-	3	3	-
2.	Breast surgery	18	14	14	-	4	4	-
3.	Thyroid surgery	28	25	25	-	3	3	-
4.	Prostate surgery	90	73	73	-	17	17	-
5.	Renal surgery	41	30	28	2	11	11	-
6.	Colonic surgery	18	4	4	-	14	13	1
Total:-		216	164	162	2	52	51	1

From the above table it is clear that in gallbladder surgeries, breast surgeries, thyroid surgeries, when estimated blood loss was more than 500 ml with intraoperative compilations (tachycardia, hypotension) occurs then transfusion was given. In renal surgery, out of 41 cases, in 28 cases blood loss is less than 500 ml and patients were intraoperatively stable, transfusion was not given. But in 2 cases of renal surgeries blood loss were less than 500 ml even though transfused, because these cases were from paediatric age group. In colonic surgeries maximum number of cases required transfusion. There is a single case where blood loss is more than 500 ml, even though transfusion was not required.

Table 5: Morbidity and mortality with and without blood transfusion.

Sr. No.	Surgery	Total No. of cases	Morbidity (infection)	Martality and their cause
1.	With blood transfusion	52	19 (36.53%)	3 (2 cases infection and 1 case status – asthmaticus)
2.	Without blood transfusion	164	36(21.95%)	Nil

Out of 52 cases with blood transfusion, in 36.53% cases there was evidence of infection. Out of 164 cases operated without blood transfusion infection was seen in 36 cases (21.95%). Mortality was seen in surgery with blood transfusion in 3 cases. The cause of mortality was infection in two cases and status asthmaticus in one case.

4. Discussion

The study consists of total 216 cases. Surgeons frequently transfused blood to attempt a haemoglobin level of 10 gm/dL preoperatively even in absence of demonstrable physiological needs for better oxygen delivery or more red blood cells.

Questions about the influence of preoperative heamoglobin level on surgical outcome have been difficult to answer in clinical studies because of our understandable reluctance to operate on anaemic patient.

The decision to transfuse and the amount of transfusion depend on the clinical situation. The use of haematocrit of 30% or haemoglobin of 10 gm/dL as a transfusion-trigger is no longer acceptable without considering the clinical situation. Oxygen delivery is maintained by series of complex interactions and compensatory mechanism when red blood cell mass (as measured by haemoglobin or less precisely by heamatocrit) falls. This includes increase in cardiac output, increased extraction ratio, rightward shift of oxyhaemoglobin curve and volume expansion. Many chronically anaemic patients tolerate haemoglobin levels 7 to 8 gm/dL or less as has been demonstrated in patient with chronic renal failure and in Jehova's witnesses (**Finch C. A.** et al, 1972). [7] Such patients compensates for lower red blood cell mass by an increase in 2,3 diphoshoglycerate concentrations in red blood cell with a resulting shift of the tissue. The cardiac output in such patients does not increase until haemoglobin falls below approximately 7 gm/dL. Young healthy patients will tolerate acute anaemia to heamoglobin levels of 7 gm/dL or less provided they have a normal intravascular volume and higher arterial oxygen saturation. The response to lowered red blood cell mass and need for transfusion can be assessed by clinical criteria such as ongoing blood loss, increased heart rate, dizziness and oxugen delivery calculations and weighed against unwanted effects (**Welch H. G.** et al, 1992). [8]

There are also other clinical studies, which shows effect of haemoglobin level on surgical outcome. **Graves and Selen** (1970) [9] demonstrated that haematocrit in 82 anaemic patien had a little bearing on outcome following Anaesthesia and surgery.

In 215 anaemic patients of present study elective surgery was conducted without any major complications, suggested anaemia has no effect on outcome of surgery.

Thus the findings about preoperating haemoglobin level of present study co-ralates with the finding of **Graves and Selen** (1970). [9]

Czer and Shoemaker (1978) [10] studied trauma victims and patients undergoing emergency surgeries. They determined that the patients in whom compensatory mechanism to increase cardiac output and oxygen saturation were functioning should be able to tolerate haematocrit levels as low as 18%. No emergency surgery case was included in the present study.

Rawstorn (1970) [11] retresoectively studi ed 45 anaemic patients with laemoglobin levels between 5.6 and 10 gm/dL. In comparison of these patients with control group only some of who were anaemic, he conlcluded that neither degree nor type of anaemia were absolute contradiction for surgery.

In present study about 106 cases were with haemoglobin level between 8 to 10 gm% and operated without major complications. This findings co-relates with study of Rawstorn.

Slawson K.V. (1972) [12] concluded that the patients with renal failure with average haemoblobin levels 7 gm/dL tolerate both anaesthesia and surgery without major problem.

The review of **Kowalyshyn** et al (1972) [13] of more than 600 anaesthesia department showed that in 88% used 9 gm/dL level or higher as minimum acceptable level for anaesthesia.

In 215 anaemic patients with haemoglobin level more than 8 gm/dL, the elective surgery was conducted safely without complications. Thus the finding sugget that anaemia were not contradicated for surgery. So findings of present study are in accordance with **Kowalyshyn** (1972). [13]

In present study patient undergoing elective surgery are form haemoglobin level above 8 gm/dL. The maximum number of surgeries carried out in-patients having haemoglobin levels between 9 to 11 gm/dL. In our study, about 75% operated cases, blood transfusion was not required as decision of blood transfusion to be given or not given was taken byconsidering clinical situation. A consideration of clinical situation means patients were intraoperatively monitored by available clinical criteria such as by estimating intraoperative on going blood loss, increase heart rate, decreses blood pressure and if possible oxygen saturation. Thus our findings to operate are accordance with above studies.

It is clear that maximum number of cases (116) blood loss was between 251-500 ml and estimated amount of blood loss was less than 500 in 75.92% cases. The estimated amount of blood loss more than 500 ml was seen 24.07% cases.

Richard K. Spence et al (1990) [14] in their study **'Elective surgery without blood transfusion' concluded that elective surgery can be done safely when estimated amount of intraoperative blood loss is kept below 500 ml.**

The above findings of the present study about blood loss are co-relates with the findings of **Richard K. Spence** et al (1990). [14]

Out of 21 cases cholecystectomy 85.71% cases elective surgery was conducted without blood transfusion and only in 14.28% cases blood transfusion was required. In 77.77% cases of breast surgery blood transfusion was not required while in 14.23% cases are done with blood transfusion.

Homtrich J. et al (1991) [15] analyzed frequency of blood transfusion in elective surgery and concluded that the frequency of blood transfusion in breast surgery is about 16%.

The findings of present study about the transfusion in elective breast surgery are in accordance with findings of **Horntrich** (1991). [15]

In thyroid surgery transfusion was required in 10.72% cases and about 89.2% cases surgery was conducted without blood transfusion.

According to **Horntrich** (1991) [15] the average frequency of blood transfusion in thyroid surgery was is about 11%. The findings of present study is nearly equal to the figure of blood transfusion given thyroid surgeries.

In 81.97% cases of benign enlargement of prostate was conducted without blood transfusion abd only in 18.89% cases blood transfusion was required.

Renal elective surgeries an about 31.70% cases blood transfusion was given and in 68.29% cases blood transfusion was not required.

Maximum number of 13 (72.22%) cases of colonic elective surgeries transfusion was required while only in 27.77% cases blood transfusion was not required.

Amongst the 52 cases were the blood loss was >500 ml and intraoperative complications like tachycardia, hypotension or both, in 51 cases surgery was conducted with blood transfusion. But there was single case where we conducted surgery without blood transfusion. This may be due to the fact that patient was middle age healthy as he can tolerate the blood loss. Patients, where estimated intraoperative blood loss less than 500 ml was seen in 164 cases. Amongst them in cases blood was given because of intraoperative complication though blood loss was < 500ml. the cause of transfusion may be that

these cases are from the pediatric age group and the estimated blood loss may be more than 30% of total estimated blood volume.

Out of 246 cases of elective surgeries in 75.46% cases surgery was conducted without blood transfusion and in 24.53% cases surgery was conducted with blood transfusion.

From the findings of the present study we conclude that if intraoperative blood loss is kept below 500 ml, we can avoid transfusions.

In gallbladder surgeries, breast surgeries, thyroid surgeries, where estimated blood loss was more than 500 ml with intraoperative complications (tachycardia, hypotension), then transfusion was given. In renal surgery, out of 41 cases, in 28 cases blood loss is less than 500 ml and patients were intraoperatively stable, transfusion was not given. But in 2 cases of renal surgery blood loss was less than 500 ml even though transfused, because these cases were from pediatric age group.

In colonic surgery maximum (72.22%) number of cases required transfusion. This may be due to the fact that as these patients have accompanying pathology and nutritional deficiency.

Tatter P.I. (1988) [16] in his study concludes that out of 134 patients with transfusion, infection was developed in 33 (24.6%) patients and out of 209 patients without transfusion infection was developed in 9 (4.3%) patients. The findings of present study in elective surgeries with or without blood transfusion are nearly in accordance with the finding of **Tatter P.I.** (1988). [16]

Mortality was seen in surgery with blood transfusion in 3 cases, where death was not due to the blood transfusion but ot was due to infection in 2 cases and status asthmaticus in one case. In present study there in no single case where death occurred due to e=with or without transfusion strategy.

If we consider the known adverse effect of blood transfusion like transmission of disease like hepatitis, human immunodeficiency virus (HIV) infection, human T-cell lymphotrophic virus (HTLV) 1 and 2 infection, bacterial infection, haemolytic reactions, immunosuppressive effects, graft vs host disease etc. thus, we avoid such type of adverse effects of blood transfusion in 75% cases by avoiding blood transfusion.

5. CONCLUSION

The present study shows male preponderance and most commonly involve age group was 51 to 70 years. All surgeries done in-patients with a preoperative haemoglobin level as low as 8 gm/dL. Maximum (90) numbers of surgeries included in this study are prostate followed by renal (41), thyroid (28), gallbladder (21), breast (18) and colonic (18). Out of 180 cases of benign pathology transfusion was required only in 35 cases, but in 36 cases of malignancy transfusion was required in 18 cases. Most of surgery (162) conducted without blood transfusion where blood loss was less is more than 500 ml and patients are intraoperatively stable. In 51 cases blood loss is more than 500 ml and patients have intraoperative complications like tachycardia, hypotension or both, where blood transfusion is required. In 75% cases surgery was conducted without transfusion and blood transfusion was given in 25% case. There was no mortality in cases operated without blood transfusion.

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