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## RESEARCH ARTICLE

### THE RELATION BETWEEN PREOPERATIVE HAEMOGLOBIN LEVEL AND PERIOPERATIVE MORBIDITY: A PROSPECTIVE STUDY

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#### ABSTRACT

This is prospective study conducted on 100 consecutive patients who underwent various surgical procedures for cleft lip and palate deformity. The patients were divided into two groups i.e Group A preoperative haemoglobin between 8-10g/dl and Group B Hb more than 10g/dl. The haemodynamic parameter such as oxygen saturation heart rate, blood pressure, blood loss were compared between the two groups. Statistical evaluation of the results showed that there were no significant differences in the haemodynamic parameters perioperatively.

#### INTRODUCTION

It is an established practice to operate elective cases of any nature with preoperative haemoglobin (Hb) level above 10g/dl<sup>1</sup>. However in chronic anemia, elective surgical procedures which do not result in significant blood loss, may be carried out safely at Hb levels between 8 and 10g/dl<sup>2</sup>. The aim of this study is to compare perioperative morbidity if any, between two groups of patients i.e Hb level 8-10g/dl and above 10g/dl undergoing surgeries for cleft lip and palate deformities. In other words, this study tests the hypothesis that it is safe to carry out elective surgical procedures in patients with Hb levels above 8gm%, in procedures with insignificant blood loss, not requiring any transfusions perioperatively.

Objectives of this study is to compare the following parameters between the two study groups perioperatively

- Levels of oxygen saturation
- Levels of heart rate
- Blood pressure
- To evaluate amount of blood loss and compare pre and postoperative haemoglobin levels

#### MATERIALS AND METHODS

A prospective study was conducted on 100 consecutive patients who underwent various surgical procedures for cleft lip and palate deformity. This study was carried out at Mahaveer Jain Hospital, during the period of July to September 2009. Patients of all age groups whose preoperative haemoglobin was more than 8g/dl and more than 5kgs were included in the study. All the patients were operated with general anesthesia. The patients were divided into two groups i.e. Group A-preoperative Hb between 8-10 g/dl and Group B-Hb more than 10g/dl. The haemodynamic parameters such as Heart Rate, Blood pressure and Oxygen Saturation were recorded during the intraoperative period at an interval of 15 mins. Blood loss was determined in all the cases. Fresh gauze before surgery and soaked gauze after surgery was weighed and the difference was calculated. Content of suction was measured and added to this. Postoperative haemoglobin was checked after 24hrs. A comparison of all the parameters was done between the two groups to see if there were any significant variations between the two groups.

#### RESULTS

**Study Design:** A Prospective comparative study of 100 patients undergoing various procedures for cleft lip and palate deformity to study the relationship between preoperative haemoglobin level with Perioperative Morbidity.

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**Table 1. Blood loss and postoperative haemoglobin levels**

	All patients	Group A	Group B	P value
Blood loss	16.50±17.07	11.53±11.23	18.43±18.58	0.070+
Post-op hemoglobin	10.44±1.76	8.91±0.83	11.08±1.61	<0.001**
Difference in Pre and post-op hb	0.49	0.33	0.62	

**Table 2. Comparison of SPO2 in patients of two groups**

Spo2	All patients	Group A	Group B	P value
Baseline	99.68±0.78	99.75±0.59	99.65±0.84	0.814
15 min	99.00±2.37	98.61±2.82	99.15±2.18	0.343
30 min	99.18±2.67	98.93±2.12	99.28±2.86	0.549
45 min	99.22±2.2	99.26±1.77	99.2±2.36	0.512
60 min	99.42±2.04	99.42±0.9	99.42±2.32	0.317

**Table 3. Comparison of Heart rate in patients of two groups**

Heart rate	All patients	Group A	Group B	P value
Baseline	110.98±24.77	119.11±20.42	107.82±25.71	0.040*
15 min	134.43±35.96	147.57±32.78	129.32±36.06	0.022*
30 min	131.65±33.69	148.29±26.95	125.18±33.98	0.002**
45 min	127.78±34.85	142.48±30.61	122.03±34.91	0.009**
60 min	128.14±37.49	140.85±37.16	123.25±36.81	0.074+

**Table 4. Comparison of Systolic BP in patients of two groups**

SBP (mm Hg)	All patients	Group A	Group B	P value
Baseline	105.7±13.06	101.71±10.95	107.25±13.55	0.057+
15 min	106.67±21.00	101.25±23.66	108.8±19.63	0.107
30 min	105.38±17.36	101.21±18.10	107.03±16.91	0.134
45 min	100.93±16.70	95.44±18.21	103.1±15.68	0.043*
60 min	103.93±20.92	102.05±26.04	104.67±18.78	0.639

**Table 5. Comparison of Diastolic BP in patients of two groups**

DBP (mm Hg)	All patients	Group A	Group B	P value
Baseline	70.1±12.63	67.68±13.37	71.04±12.29	0.234
15 min	54.01±17.38	49.75±15.37	55.67±17.93	0.127
30 min	55.13±14.19	51.39±12.05	56.58±14.76	0.101
45 min	52.73±14.29	50.33±13.62	53.67±14.53	0.307
60 min	54.34±15.59	51.95±16.8	55.27±15.16	0.423

**Table 6. No of patients less than 1 year and more than 1 year in each group**

	Group A	Group B	Total
Patients under 1 yr of age	17	25	43
Patients above 1 yr of age	11	46	57

**Table 7. Blood loss and postoperative haemoglobin levels in age <1 years**

	Group A	Group B	P value
Blood loss	11.82±13.69	11.56±10.31	0.944
Post-op hemoglobin	8.72±0.55	10.21±0.92	<0.001**

**Table 8. Comparison of SPO2 in patients of two groups in age <1 years**

Spo2	Group A	Group B	P value
Baseline	99.59±0.71	99.72±0.68	0.548
15 min	98.18±3.52	98.79±1.98	0.480
30 min	98.59±2.67	99.44±0.77	0.138
45 min	98.94±2.21	99.5±0.78	0.256
60 min	99.11±1.05	99.84±0.37	0.011*

**Table 9. Comparison of Heart rate in patients of two groups in age <1 years**

Heart rate	Group A	Group B	P value
Baseline	125.06±20.99	126.76±24.32	0.816
15 min	156.59±21.81	160.84±17.26	0.486
30 min	156.41±15.6	156±19.84	0.943
45 min	152.81±20.12	152.67±20.35	0.982
60 min	150.00±28.38	151.78±20.31	0.849

**Table 10. Comparison of Systolic BP in patients of two groups in age <1 year**

SBP (mm Hg)	Group A	Group B	P value
Baseline	100.47±10.95	99.52±7.52	0.740
15 min	99.18±21.87	98.32±16.96	0.887
30 min	102.18±16.43	100.08±17.64	0.700
45 min	92.5±18.69	96.46±16.94	0.492
60 min	99.9±26.89	101.06±22.69	0.905

**Table 11. Comparison of Diastolic BP in patients of two groups in age <1 year**

DBP (mm Hg)	Group A	Group B	P value
Baseline	67.35±15.53	69.08±14.04	0.710
15 min	49.65±17.08	46.6±20.65	0.618
30 min	50.18±13.39	50.12±15.87	0.990
45 min	47.5±13.42	47.54±15.03	0.993
60 min	52.5±16.26	52.83±20.67	0.965

**Group A** (Hemoglobin level: 8-10 gm/dl)

**Group B:** (haemoglobin level : >10 mg/d)

This table shows the average blood loss is 11.5ml in group A and 18.4ml in group B. The average postoperative haemoglobin in group A is 8.9g/dl and in group B is 11.8g/dl. The average difference in pre and postoperative haemoglobin levels is 0.33 in group A and 0.62 in group B. This table shows the comparison of SPO<sub>2</sub> at different time intervals between two groups. This table shows the comparison of Heart rate at different time intervals between two groups. This table shows the comparison of Systolic BP at different time intervals between two groups. This table shows the comparison of Diastolic at different time intervals between two groups. This group of 100 patients belong to a wide range of age i.e. 3mon to 60yrs. In order to compare results in a homogenous group, a further comparison was done for both groups (ie Hb 8-10gm% and Hb above 10gm%) with patients upto 1 year of age and the results are presented below. The above table shows the no of patients less than 1 year and more than 1 year in each group

This table shows the average blood loss is 11.8ml in group A and 11.5ml in group B. The average postoperative haemoglobin in group A is 8.7 and in group B is 10.2. This table shows the comparison of SPO<sub>2</sub> at different time intervals between two groups. This table shows the comparison of Heart rate at different time intervals between two groups. This table shows the comparison of Systolic BP at different time intervals between two groups. This table shows the comparison of Diastolic BP at different time intervals between two groups

## STATISTICAL METHODS

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean  $\pm$  SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups. Mann Whitney U test a non-parametric test has been used to find the significance of Spo<sub>2</sub> (%) between two groups. Chi-square/Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more group.

## DISCUSSION

It is a conventional established practice to carry out elective surgical procedures only if Hb is 10g/dl or above. Anesthesiologists and surgeons world over are reluctant to carry out routine elective surgical procedures when Hb levels are less than 10g/dl. Often the practice is to transfuse blood preoperatively to increase the level above 10g/dl<sup>3</sup>. However the hypothesis in this case is that in routine elective surgical procedures where blood lost is insignificant so as not to require any blood transfusion, procedures can be safely carryout at Hb levels less than 8g/dl. This is already been validated by Gunawardana et al in their study Anesthesia and Surgery in Pediatric Patients with low Haemoglobin Values. In chronic anemia there are various physiological compensatory mechanisms which maintain the oxygen delivery at normal levels and therefore the fear of inducing hypoxia intraoperatively may not be true when blood losses are minimal<sup>4</sup>.

The practice of transfusing blood pre-operatively is not without its drawbacks and is not a practice to be recommended. This study with different perioperative haemodynamic parameter like oxygen saturation, heart rate and blood pressure clearly shows that there is no significant difference in these vital parameters between two groups of patients (Group A– Hb between 8-10g/dl, Group B – Hb more than 10g/dl) undergoing elective surgical procedures with significant blood loss. This is true over a wide range of age groups varying from 3 months to 60 years (Chart 1) and a wide variety of procedures (Chart 5). The only statistically significant parameter in this study is the difference between pre and postoperative Hb levels between the two groups. This is to be expected because of the obvious preoperative difference in Hb levels between in two groups. This study similar to the one conducted by R.H. Gunawardana et al conclusively proves that it is safe to carryout elective surgical procedure with minimal blood loss, which do not require blood transfusion and with Hb levels between 8-10g/dl across all age groups.

## Conclusion

This study conclusively proves that it is safe to carryout elective surgical procedures with minimal blood loss, which do not require blood transfusion and with Hb levels between 8-10g/dl across all age groups.

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