

# ANAEMIA AND SURGERY

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Traditionally, anaemia is believed to increase the risk of surgery, and it is common practice for non-urgent surgery to be postponed if a patient is anaemic. The level of circulating haemoglobin below which such an effect exists is, however, unknown. Nor is it known whether the risk is real. Clearly, the presence of anaemia increases the risk of depletion of available oxygen. Thus some anaesthesiologists have hitherto tended to set an arbitrary level of haemoglobin below which they regard the risks of elective surgical anaesthesia is unjustifiable. It may be, therefore, that either surgery is occasionally postponed unnecessarily because of anaemia or that surgery is occasionally undertaken in patients who should first have had treatment for anaemia.

The World Health Organisation defines anaemia as a haemoglobin (Hb) concentration of less than:

- 13g/dl in adult men.
- 12g/dl in adult women.
- 11g/dl in children aged 6 months to 6 years.
- 12g/dl in children aged 6-14 years.
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## PATHOPHYSIOLOGY:

The essential feature of all forms of anaemia is a decrease in the Hb content of the blood. As

$$\text{Arterial Oxygen Content} = \text{Arterial Oxygen Saturation} \times \text{Hb concentration.}$$

And

$$\text{Oxygen delivery} = \text{Arterial Oxygen Content} \times \text{Cardiac output.}$$

It follows that a decrease in Hb concentration will, in the absence of compensatory mechanism, be followed by decrease in oxygen supply to tissues.

## COMPENSATORY MECHANISMS:

In acute normovolemic anaemia in otherwise healthy individuals, two mechanisms compensate for the decrease in oxygen carrying capacity.

- An increase in cardiac output
- A decrease in blood viscosity

In chronic anaemia a third mechanism come in to play.

Increased 2-3 diphosphoglycerate in red cells which shift oxygen dissociation curve to the right and promotes the release of oxygen to the tissues.

## CLINICAL FEATURES:

This symptoms and signs include dyspnoea on exertion, palpitation, angina, increased arterial pulse pressure and capillary pulsation. In mild chronic anaemia which is well compensated

there may be no symptoms and signs. Anaemia is poorly tolerated by coronary artery disease or pre-existing myocardial dysfunction.

#### PREVALENCE:

- One-third to one-half of surgical patients may be anemic preoperatively because of conditions for which they require surgery.
- Postoperative anemia may occur in up to 90% of patients, probably due to intra operative blood loss or blunted erythropoietic response.
- 75% of hospitalized patients older than 65 yr old had anemia.
- Another study found 67% of cancer patients to be anemic,

**Anemia is an independent predictor of morbidity and mortality.**

#### PRE-OPERATIVE AND POST-OPERATIVE MANAGEMENT:

##### What pre-operative Hb is acceptable?

There is no Hb concentration that must be met by all patient in all circumstances. We cannot deny surgery for a patient with rupture ectopic pregnancy because of her Hb is less than 5g/dl. Although the value of 10g/dl was generally accepted for many years, it has been shown that acute normovolemic haemodilution to a Hb level of 5g/dl is well tolerated in healthy resting adult.

The degree of anaemic that is acceptable depends on the cardiac reserve of the patient.

Recent concept is - for elective cases with blood loss <100ml a Hb concentration of 8g/dl is acceptable.

- for elective cases with blood loss >100ml a Hb concentration of 10g/dl is acceptable.

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##### How the patient's Hb level be increased ?

In elective surgery patients Hb measurement should be done 30 days before surgical procedure to allow time for diagnosing and underlying co-morbidities.

- By treating causes of anaemia.
- By giving specific haematinics (Iron,Vit B12,Follic acid)  
Blind and blunder haematinics treatment is useless and expensive.
- Erythropoietin plus iron. ( reduces the need for transfusion)
- ANH – Acute Normovolemic Haemodilution.( Autologous blood donation)

ANH is a procedure where the patient's red cell mass is reduced by the controlled removal of whole blood and the simultaneous replacement with colloid, crystalloid, or both. ANH results in acute anemia,decreased blood viscosity, and preserved tissue perfusion. It avoids Allogenic blood transfusion.

### Guidelines for Blood Transfusion:

- Hb concentration >10g/dl – transfusion rarely indicated.
- Hb concentration <6g/dl – transfusion almost always indicated.
- Hb concentration 6-10g/dl – decision to transfuse is determined by patient's risk for complication of decreased tissue oxygenation. (patients with ischemic heart disease)

### Anaemia and Anaesthetic implications:

Effects of anaesthesia on the sympathetic nervous system and cardiovascular responses may blunt the usual increase in cardiac output associated with acute normovolemic anaemia results in aggravation of tissue hypoxia.

### Anaemia and surgery implications:

Decreased tissue oxygen perfusion results in

- Delayed wound healing
- Burst abdomen
- Intestinal adhesions
- Failure of bowel anastomosis
- Graft failure

### INTR-OPERATIVE MANAGEMENT:

- Minimally invasive surgical techniques.
- Newer techniques for hemostasis.
- Intraoperative cell salvage.
- Autologous blood transfusion
  
- Blood substitutes
  - Stroma free Haemoglobin.
  - Perfluorocarbons.
  - Newer – HBOCS – Haemoglobin Based Oxygen Carriers.  
Eg. Haemopure(Bovine Hgb)  
Oxyglobin.

Anemia is one of the factor for delirium during surgery and aggravation of dementia in elderly patients especially in ortho surgeries in the post-operative periods.

### POST-OPERATIVE PERIOD:

Pre-operative Erythropoietin treatment is continued post-operatively to avoid Allogenic blood transfusion. It accelerates post-operative erythropoiesis and enhance the Quality Of Life (QOL) in surgery patients.

So, it is not a dispute between Surgeons and Anaesthesiologist, the ultimate benefit should go to the patient.