

INDICATIONS FOR OXYGEN THERAPY



Same as adults:

Name/List the indications

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DEFINITION OF HYPOXEMIA

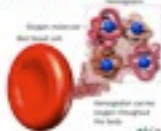
$\text{PaO}_2 < 50 \text{ mmHg}$ In premature newborns

$\text{PaO}_2 < 60 \text{ mmHg}$ In term newborns

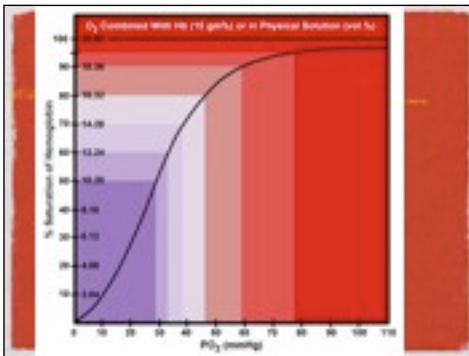
$\text{SaO}_2 < 85\%$

$\text{PaO}_2 < 60 \text{ mmHg}$ In infants and children

$\text{SaO}_2 < 90\%$



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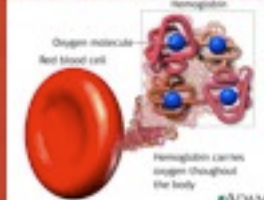


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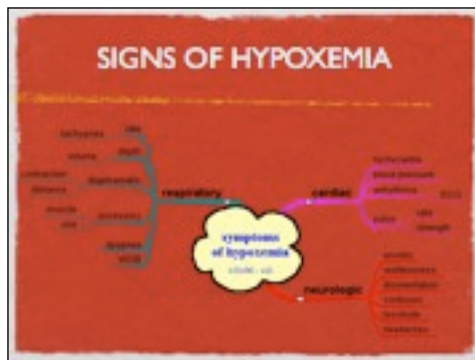
SIGNS OF HYPOXEMIA

Indications that hypoxemia may be present:

- ❖ Tachypnea
- ❖ Tachycardia
- ❖ Retractions
- ❖ Grunting
- ❖ Cyanosis



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SEVERE HYPOXEMIA

- Decrease in ventilation
- Apnea
- Bradycardia
- Lethargy

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HYPOXEMIA IN THE OLDER CHILD

- Irritability/Restlessness
- Parents are the best judge of infant behavior
- Questions to parents:
 - Is he/she acting like he/she usually does?
 - Is he/she looking at you or comforted by you or parent?

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CENTRAL VERSUS PERIPHERAL CYANOSIS

- Peripheral: Poor indicator of oxygenation. Peripheral color is dependent on perfusion. Influences: Cold stress, vasoconstriction.
- all causes of central cyanosis cause peripheral cyanosis
- low cardiac output e.g. heart failure
- vasoconstriction e.g. due to low ambient temperature, Raynaud's phenomenon
- arterial obstruction e.g. atheroma
- venous obstruction

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CENTRAL VERSUS PERIPHERAL CYANOSIS

• **Central:** Occurs in warm, well-perfused areas of the body. Better indicator, but may still be unreliable.

the oxygen saturation of arterial blood is less than 85%.

Causes include:

• decreased PO₂ of inspired air - high altitude

• hypovolemia

• parenchymal lung disease - massive pulmonary embolism, chronic airflow limitation with cor pulmonale

• right to left cardiac shunt - congenital cyanotic heart disease

• may be simulated by methemoglobinemia and spherocytosis. Also, with polycythemia may present with central cyanosis.



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CYANOSIS IN THE NEWBORN

• 4-6 g/dl reduced hemoglobin before cyanosis.



• Adult/Older child: SaO₂ 85-90%

PaO₂ 50-60 mmHg

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CYANOSIS IN THE NEWBORN



• Fetal Hgb:

Causes an increased affinity for O₂

Cyanosis may not occur in the presence of fetal hemoglobin until the PaO₂ is as low as 30-40 mmHg.

Congenital Heart Diseases

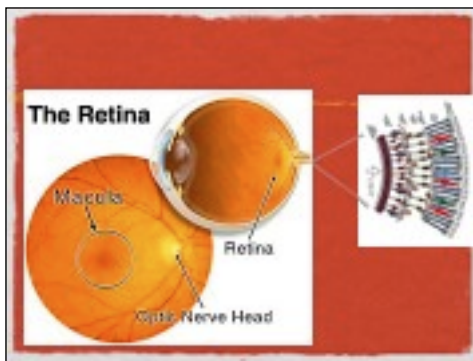
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RETINOPATHY OF PREMATURITY (ROP)

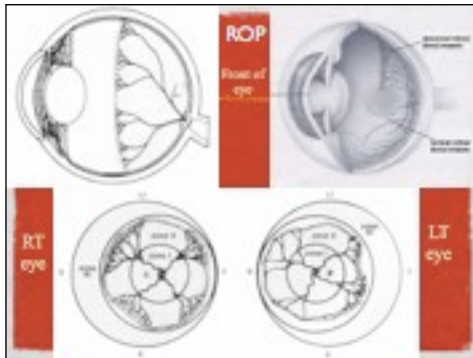


• Babies who are born prematurely still have a growing retina. The retina usually finishes growing a few weeks to a month after birth in full term babies. During the course of this growth, the blood vessels that bring blood to the retina can begin to develop abnormally. This abnormal growth is called retinopathy of prematurity. Many factors interact to cause retinopathy of prematurity. We do not understand all of the causes at present.

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RETINOPATHY OF PREMATURITY (ROP)



- Any babies weighing less than 1250 grams (2 pounds, 12 ounces) or born at less than 30 weeks of gestation are at greater risk of developing ROP. It is also thought that babies who are very sick at birth and who require oxygen might be at risk of developing ROP even if they weigh more than the above-mentioned limits and if they are older than noted above. These babies are also examined for ROP.

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RETINOPATHY OF PREMATURITY



- Retinopathy of Prematurity (ROP) is a disease of the retina, the light sensitive membrane covering the inside of the eye. It affects small prematurely born babies. It consists of abnormal retinal vessels that grow mostly in an area where normal vessels have not yet grown in the retina.

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RETINOPATHY OF PREMATURITY



- ROP is divided into stages 1 to 5. Stages 1 and 2 do not usually require treatment. Some babies who have developed stage 3 ROP require treatment. The treatment is usually performed either by laser or cryotherapy (freezing).

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RETINOPATHY OF PREMATURITY

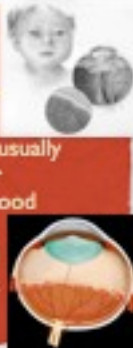
- The area of the retina affected by ROP is divided into three zones. Zone 1 is most centrally located, and ROP develops in this zone in eyes whose retina is most underdeveloped. Disease in zone 1 is more severe compared with disease limited to zones 2 or 3.



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RETINOPATHY OF PREMATURITY

- The rapidly progressing ROP is called *Rush disease*, and it is usually associated with very extensive or aggressive growth of abnormal blood vessels. Abnormal dilatation of retinal veins with florid abnormal new vessels is called *Plus disease*.

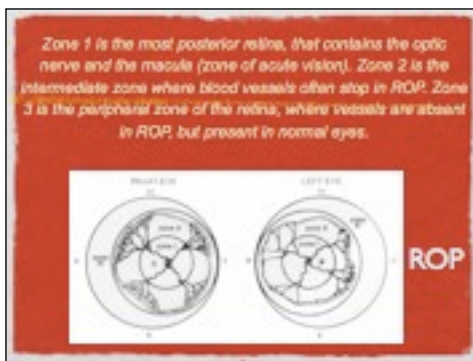


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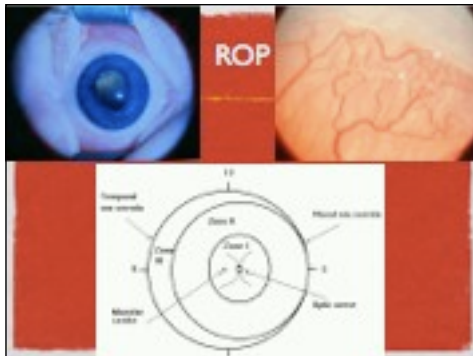
- Stage 1 ROP. Retinal blood vessels fail to reach the retinal periphery and multiply abnormally where they end. After a normal birth, the retinal blood vessels fill the anterior white space.



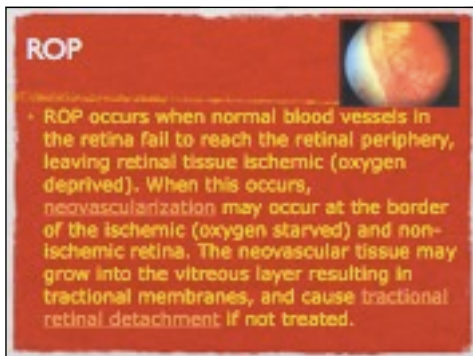
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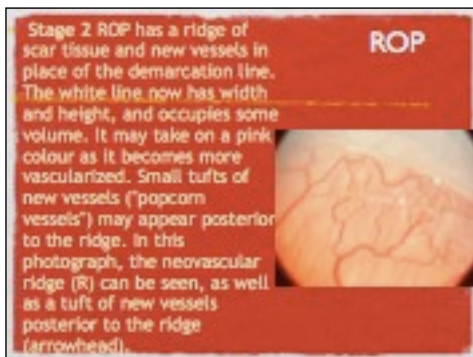
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ROP



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HAZARDS AND COMPLICATIONS OF OXYGEN THERAPY

- Oxygen toxicity
- Others,

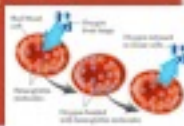


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PRINCIPLES OF OXYGEN ADMINISTRATION FOR THE INFANT

- Maintain the PaO_2 between 50 and 80 mmHg.
- Maintains adequate tissue oxygenation
- Decreased risk of toxicity

Exceptions.....



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PRINCIPLES OF OXYGEN ADMINISTRATION FOR THE INFANT

Exceptions to PaO_2 ranges in the Newborn:



- PPHN PaO_2 as high as 100 mmHg.
- Extremely premature as low as 45 mmHg.
- Congenital Heart Disease.

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METHODS OF OXYGEN ADMINISTRATION

* Nasal cannula

Advantages/considerations

Good for long term care (chronic diseases)

Usually well tolerated

Uninterrupted oxygen delivery during mother-infant interactions, i.e.

feeding, postural drainage, talking.



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METHODS OF OXYGEN ADMINISTRATION NASAL CANNULA CONSIDERATIONS



1. Designed to provide low oxygen concentrations.

2. Small infants with low inspiratory flow rates can receive higher FI_{O_2} 's (80% at 1l/m)

3. Use flowmeters with .125 to 1l/m calibration.

4. Combining blenders with low flows. (?)

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NASAL CANNULA

* Disadvantages



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SIMPLE OXYGEN MASKS

* Advantages

* Considerations

* Disadvantages



Best situations:



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AIR-ENTRAINMENT OR VENTURI TYPE MASKS


- Considerations
- Advantages
- Disadvantages



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OXYGEN TENT


- Advantages
- Considerations
- Disadvantages



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OXYGEN HOODS/ OXYHOODS(MOST COMMON IN NEONATES)

- Advantages
- Considerations
- Disadvantages




Heat Loss

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MONITORING OF OXYGENATION


- Invasive
 - ABG
 - CBG's
 - Technically difficult
 - Crying, breast-holding, agitation common and will affect values
- Noninvasive
 - Advantages
 - Disadvantages



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MONITORING OF OXYGENATION

- Noninvasive
- Transcutaneous
- Pulse-oximetry




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MONITORING OF OXYGENATION

Hazards

- Hypoventilation
- ROP
- BPD



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ASSIGNMENT:

for your mid-term and final you will be responsible for the objectives from this handout

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