NEONATAL GYANOSIS

ESSAY

SUBMITTED FOR THE PARTIAL FULFILMENT

OF THE MASTER DEGREE IN

(PEDIATRICS)

BY

Wafaa Abd El Raouf Aly

SUPERVISED BY

Prof. Dr. Sawsan El Sokkary

Faculty of Medicine

Ain Shams University

Dr. Hussein Abd El-Aziz

Lec. of Pediatrics

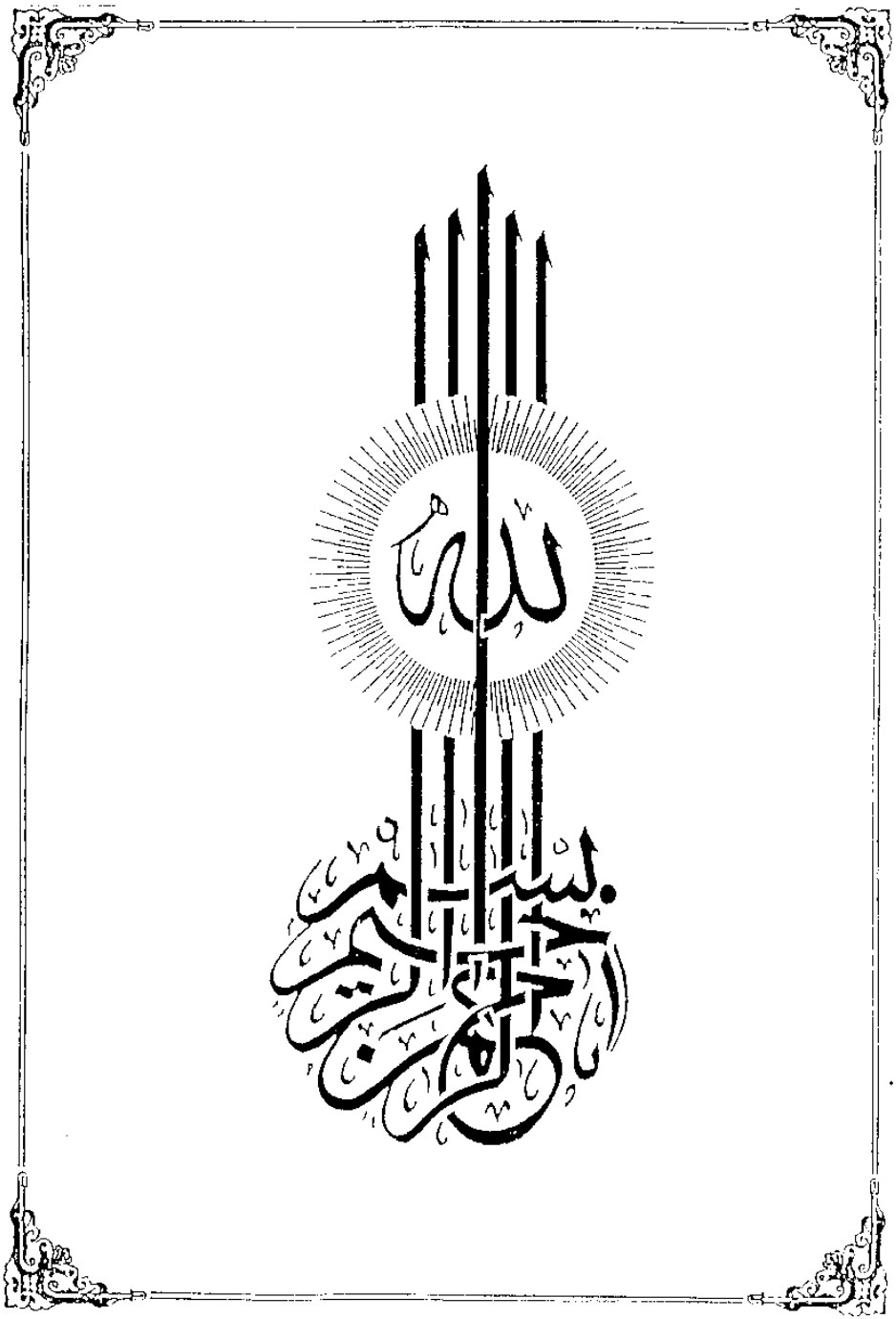
Ain Shams University

1987

ACKNOWLEDGEMENT

I wisth to express my deepest gratitude to Prof. Dr. SAWSAN EL-SOKKARY Professor of Pediatrics, Ain-Shams UNiversity , for her continuous guidance, inestimable help and her great honour to work under her supervision.

The Candidate



CONTENTS

INTRODUCTION

Neonatal cyanosis is not uncomon in the neonatal period. It is not a single disease entity but a sign of either cardiovascular, respiratory, hematologic or central nervous system disturbances.

Cyanosis in the newborn is a significant guide to its state of oxygenation, it is one of the most dramatic cardiorespiratory symptoms in neonates, and it may reflect a serious abnormality of oxyten transport (Moller and Neal,1981).

The diagnosis of the aetiology is extremely important during this period at which many of the physiologic adjustments required for extrauterine existence are completed andduring which there is rapid rate of brain growth (Behrman,1979).

So insults ocurring in this period will have a more severe and irreversible effect than the same insults at a later age (Brown,1978).

Cyanosis may be central, peripheral or differential. Central cyanosis due to an abnormally low O_2 saturation of arterial blood.Peripheral cyanosis is defined as bluish discoloration or duskiness confined to the skin of the extremities (Levin,1981).

AIM OF THE ESSAY

Neonatal cyanosis might present a medical emergency that necessitates urgent medical and surgical intervention.

Thus, the aim of this essay is to review thoroughly the subject of neonatal cyanosis regarding various aetiologcial factors, physiology, pathophysiology, clinical presentation, early diagnosis, differential diagnosis and scheme for emergency management and new hopes for cyanotic newborn.

CHAPTER (1)

C Y A N O S I S

1. Definition
2. Physiology.
3. Pathophysiology.
4. Aetiology

DEFINTION OF CYANOSIS

Cyanosis (Greak, cyanosis = blue) is defined as the blue colour of the skin and/or the mucous membranes caused by the presence of blood in minute vesssels (capillary blood) which contain more than 5 gm/per 100 ml of hemoglobin in reduced or altered form (Samson et al.-,1984).

Some authors consider that the clinical signs of cyanosis do not appear until there are slightly more than 3 gm of reduced hemoglobin in central arterial blood. With normal blood this corresponds to 70 percent saturation and PaO_2 of 40 mmHg. (Moss et al.,1983).

Cyanosis is colormetric determination in which the observer's eye act as a spectrophotometer for the colour of the blood (Brobeck,1973).

At least 5 grams of reduced hemoglobin must be present for the infant to manifest cyanosis, if anemia is also present and is particularly marked cyanosis may not be so apparent, for example, if an infant has 10 grams of hemoglobin, at least half of this must be in a reduced form for noticeable cyanosis to be present. On the other hand, when the neonate is plethoric with

a high hemoglobin mass, cyanosis can occur easily, since relatively less of a reduced hemglobin content needs to be present (Pierog and Gerrara,1976).

Cyanosis of the skin and mucous membranes is a significant guide to the newborn's state of oxygenation. The degree of visible cyanosis depends upon the arterial oxygen saturation, the hematocrite, the pH, the peripheral circulation and the temperature of the infant.

The average physician does not perceive cyanosis with certainty until the arterial oxygen saturation is reduced to 85% . Since the oxygen tension decreases abruptly before significant unsaturation occurs, it is important to obtain the arterial oxygen tension as soon as cyanosis is noted. (Harper & Yoon,1979).

PHYSIOLOGY OF CYANOSIS

Reduced hemoglobin has a dark colour, and a dusky bluish discoloration of the tissues called cyanosis appears when the reduced hemoglobin concentration of the blood in the capillaries is more than 5 gm/dl.

Cyanosis is most easily seen in the nail beds and mucous membranes and in the ear lobes, lips, and fingers, where the skin is thin. Its occurrence depends upon the total amunt of hemoglobin in the blood, the degree of hemoglobin unsaturation, and the state of the capillary circulation.

One might think that cyansosis would be more marked when the cutaneous vessels were dialted. However, when there is cutaneous arteriolar and venous constriction, blood flow through the capillaries is very slow and more O_2 is removed from the hemoglobin.

This is why moderate cold causes cyanosis in exposed areas even in normal individuals. In very cold weather cyanosis does not develop because the drop in skin temperature inhibits the dissociation of oxyhemoglobin and the O_2 consumption of the cold tissues is descreased.

Cyanosis does not occur in anemic hypoxia when the total hemoglobin content is low, in carbon monoxide poisoning, becasue the colour of reduced hemoglobin is obscured by the cherry red colour of carbonmonoxy hemoglobin nor in histotoxic hypoxia, because the blood gas content is normal.

A discloration of the skin and mucous membranes similar to cyanosis is produced by high circulting levels of methemoglobin (Ganong,1971).

The mean capillary oxygen unsaturation (C) is roughly intermediate between the arterial (A) and venous (V) values for unsaturation. This can be expressed mathematically as:

$$C = \frac{A + V}{2}$$

There are four primary factors which affect A and V and which serve as the basis for a working classification of cyanosis:

1. The amount of hemoglobin passing in reduced form through aerated portions of the lung.
2. The amount of hemoglobin passing in reduced form through unaerated, veno-arterial shunts from the right

heart to the arterial blood.

3. The amount of hemoglobin converted to the reduced form in the capillaries, i.e. the extent of deoxygenation in the capillaires.

4. The total amount of hemoglobin. (Green and Richmond,-1955).