

PATENT DUCTUS ARTERIOSUS
IN
PREMATURE AND FULL TERM INFANTS

ESSAY

Submitted in partial fulfillment of
MASTER DEGREE IN PEDIATRICS

BY

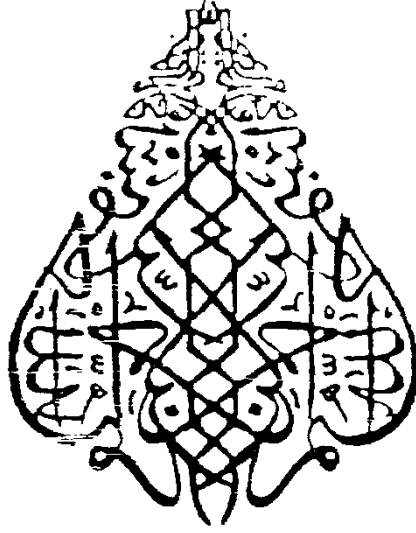
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INTRODUCTION

Introduction

Ductus arteriosus is normal structure present in fetal life . It acts as a conduit between the pulmonary artery and the aorta , for blood coming from the upper body to be delivered to the placenta for reoxygenation . Persistent patency of the ductus arteriosus may occur in the neonate . Postnatal closure occurs in two stages , initially contraction of the media of the wall of the ductus and shortening with formation of intimal cushions , resulting in functional closure . This generally takes place within 15 hours . The second stage is effected by connective tissue formation with fibrosis and permanent sealing of the lumen to produce the ligamentum arteriosus . This is usually completed within three weeks of infant's life (Gittenberger - DeGroot et al . , 1981) .

Factors which may be responsible for the occurrence of patent ductus arteriosus are variable and may act individually or in combinations . Of greatest importance are increased arterial oxygen pressure and gestational age . Other factors may influence the closure and include the release of vasoactive substances (e.g acetylcholine , bradykinin or endogenous catecholamines) . The role of prostaglandins in the physiology of the ductus arteriosus is another important factor (Clyman & Heymann 1981) .

Other factors may include chest infection in prematures, presence of other congenital heart diseases (e.g.

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coarctation of the aorta and ventricular septal defect) , Rubella virus infection of the mother in the first trimester , thalidomide , alcohol , high altitudes and others . The effects of the patent ductus arteriosus on the infant will depend on various factors . The pathophysiologic aspects are going to be discussed and include the effects of the volume overload , the size of the communication , the relationship between pulmonary and systemic vascular resistances and the ability of the myocardium to handle the extra volume load . These determinants act whether occur in the term or preterm infant . Pulmonary vascular immaturity is a major determinant in the premature infant . Still the above mentioned criteria are the determinants as regards the natural history of the disease or the recommended therapeutic planes (Goldberg et al , 1977) .

The presence of patent ductus arteriosus has two serious implications ; the first as regards the magnitude of shunt , documentation of its presence before therapy and documentation of its disappearance in the evaluation of different therapeutic planes . The cost - benefit value of different techniques and their limitations should be seriously considered . The simultaneous use of Doppler pulse wave and echocardiography allowed a non-invasive , direct measure and acceptably accurate for the magnitude of shunting .

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It has its fallacies but definitely it has its value as compared to the more invasive techniques like thoracic aorta catheterization via umbilical artery (Silverman et al 1975) & (Allen et al 1978) .

This is in contrast to the older indirect measures like degree of enlargement of the left atrium and ratio of left atrial size to aortic size . This point is going to be reviewed in detail in the chapter on diagnosis . The second implication is as regards decision making and timing for surgical intervention and earlier assignment of patients for this treatment modality based on hemodynamic assessment and measures . This point is going to be discussed in the chapter on management .

AIM OF THE ESSAY

Aim of the essay

The aim of this essay is to study the various aspects of patent ductus arteriosus as regards etiology , incidence , anatomy in the fetus , pathophysiology , diagnosis and management .

REVIEW OF THE LITERATURE

OCCURRENCE AND INCIDENCE

Occurrence and incidence

PDA is the second most common congenital heart defect and is seen in 12% - 15% of all patients with congenital heart diseases (Anthony & Arnon , 1983) .

The incidence of isolated patent ductus arteriosus in full term infants is about 1 in 2000 live births , accounting for about 5% to 10% of all types of congenital heart disease (Mitchell et al 1971) .

Unlike the ductus arteriosus in premature infants in whom failure of closure is likely related to developmental retardation , the ductus arteriosus in full-term infants is abnormal and failure to constrict is probably related to a significant structural abnormality (Stoermer et al , 1989) , (Clyman et al , 1983) . Exposure to rubella during the first trimester of pregnancy is associated with a high frequency of multiple congenital abnormalities and the cardiovascular system is involved in about 60% of these infants . Rubella virus interferes with the normal formation of arterial elastic tissue , and in particular derivatives of the sixth aortic arch are involved . Patency of the ductus arteriosus is generally present , often associated with peripheral pulmonic stenosis (Stoermer et al , 1989) . Patency of the ductus arteriosus may occur in more than one member of the family , suggesting possible genetic factors in certain instances ; it has been produced by genetic