AIN SHAMS UNIVERSITY
FACULTY OF MEDICINE
1995

INFLUENCE OF ANAESTHETIC DRUGS ON THE FETUS

An Essay Submitted in Partial Fulfilment For
Master Degree in Anaesthesia

BY
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(M.B.B.CH.)

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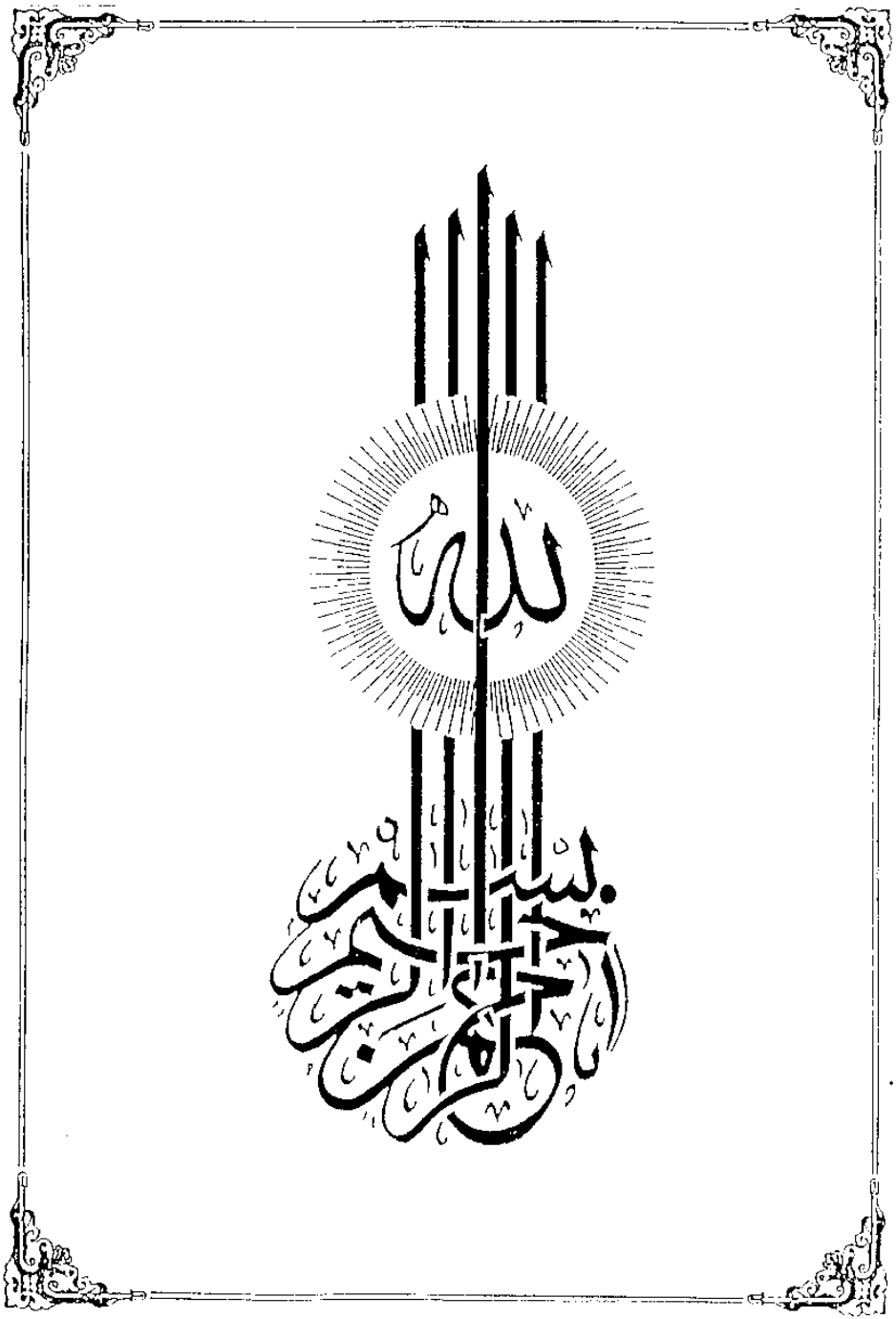

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بسم الله الرحمن الرحيم

TO

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First , thanks are all to **God** for blessing me this work until it reached its end , as a little part of his generous help throughout life .

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Finally , I sincerely hope this work achieve something in our work in anaesthesia .

Ahamed Aly Fawaz

INTRODUCTION

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It is estimated that between 0.5 % and 2.0 % of pregnant women will at some time during pregnancy undergo anaesthetic or surgical procedures for incidental medical illness ***(Brodsky et al , 1980)*** .

There are many practical difficulties in studying anaesthetic drugs and techniques to determine what may be best for both the mother and the fetus . Physiological changes of pregnancy may alter the pharmacokinetics and pharmacodynamics of anaesthetics and the fetal disposition of drugs is largely unknown . The normal fetus appears able to withstand a variety of anaesthetic techniques , but there is little information regarding the compromised fetus or premature neonate ***(Gin , 1993)*** .

The past few years have seen the development of major new diagnostic technology for examination of the fetus in utero . Ultrasonography and fetoscopy in particular can now provide detailed information about the fetal condition . However , investigation of the effects of anaesthesia on the fetus is difficult for a number of reasons . The fetus is relatively inaccessible in utero and invasive studies in human are difficult to justify on ethical grounds ***(Nandi et al. , 1990)*** .

The period of gestation is a time of multiple physiological changes , many of which may be disturbed by anaesthetic and surgical techniques ***(Delaney , 1983)*** . Maternally administered drugs may have drastic and far -reaching effects on the developing fetus . The fetus may be subject not only to the pharmacological effects of drug after it is transferred across the

placenta , but also to alterations in its inutero environment because of the physiological effects of the drug on the mother ***(Peter et al. , 1986)*** .

It is prudent to choose an anaesthetic technique which minimizes fetal exposure to the drugs and use agents which can be eliminated quickly by the neonate ***(Gin , 1993)*** .

MATERNAL-PLACENTAL -FETAL UNIT

MATERNAL -PLACENTAL- FETAL UNIT

Anatomy of the Maternal -Placental-Fetal Unit

The maternal-placental -fetal unit can be divided into three components :

1 - The maternal component .

2 - The placental component .

3 - The fetal component .

constant interaction between these components is required for fetal well-being .

The Maternal Component

Every maternal biologic system is dramatically altered during pregnancy The most important for perinatal pharmacology are the alterations in the maternal cardiovascular system and uterine anatomy .

Cardiovascular and hemodynamic changes :

1 - Increase in total blood volume (25 - 40 %) due to increased plasma volume (40 - 50 %) and increased red cell mass (20 %) .

2 - Increase in cardiac output (30 - 50 %) due to increased heart rate (12 to 15 beats/ min.) , increased stroke volume (30 %) and decreased systemic vascular resistance (15 %) .

3 - Increase in uterine blood flow and a redistribution of uterine perfusion ***(Osthiemer , 1992)*** .

In the nonpregnant uterus , blood flow averages 50 ml / min. , increasing with pregnancy to 500 - 700 ml / min. . This change represents at least a 10 - fold increase in blood flow . At term , 10 to 20 % of maternal cardiac output is allotted to utero-placental circulation . The placenta receives more than 80 % of uterine perfusion . Whereas the myometrium receives only 20 % .

The cardiovascular and hemodynamic changes of pregnancy influence the pharmacologic characteristics of maternally administered drugs ***(Osthiemer , 1992)*** .

Changes in uterine anatomy :

The gravid uterus is an enlarging abdomenal mass requiring an enlarging vascular supply . Arterial supply to the gravid uterus is provided by the uterine arteries , which arise from the hypogastric and ovarian arteries . The vessels in turn arise from the abdomenal aorta . Anastomoses occur between uterine and ovarian arteries along the lateral border of the gravid uterus in the broad ligament . Uterine vessels then penetrate the muscular layer of the uterus , known as myometrium ***(Osthiemer , 1992)*** .