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FETO-MATERNAL TRANSFUSION
AND
USES OF THE KLEIHAUER TEST

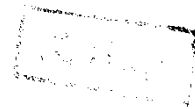
THESIS

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DEDICATION

To All My Professors In
Obstetrics And Gynecology
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III

TABLE OF CONTENTS

	Page
* INTRODUCTION.	1
* AIM OF THE WORK.	2
* REVIEW OF LITRATURE.	
1. HISTORICAL REVIEW.	3
2. TRANSPLACENTAL TRANSFUSION.	9
2.1. Feto-maternal Transfusion.	10
2.2. Materno-fetal Transfusion.	12
3. FETAL HAEMOGLOBIN AND ERYTHROCYTES.	
3.1. Fetal Haematopoiesis.	16
3.2. Fetal Haemoglobin.	17
3.3. Fetal Circulation.	19
4. AETIOLOGY AND PATHOGENESIS OF FETO-MATERNAL TRANSFUSION.	
4.1. Pathogenesis Of Feto-maternal Transfusion.	21

4.2. Aetiology Of Feto-maternal Transfusion.	22
5. DETECTION AND QUANTITATION OF FETO-MATERNAL TRANSFUSION.	
5.1. The Principle Of The Acid Elution Test Of Kleihauer.	33
5.2. The Technique Of The Acid Elution Procedure.	35
5.3. Advantages Of Kleihauer Test.	39
5.4. Other Methods.	42
6. FETO-MATERNAL TRANSFUSION IN NORMAL PREGNANCY.	43
6.1. Incidence Of Feto-maternal Transfusion.	44
6.2. Amount Of Feto-maternal Transfusion In Normal pregnancy.	51
7. NORMAL LABOUR AND FETO-MATERNAL TRANSFUSION.	55
7.1. Duration Of Labour And FMT.	57
7.2. The Effect Of Ecbolics On FMT.	58
7.3. FMT In The Third Stage Of Labour.	59
7.4. Manual Removal Of The Placenta And FMT.	63
7.5. Biological Factors And FMT.	64
7.6. FMT And ABO-incompatibility.	64

7.7. Incidence Of FMT Following Normal Labour.	65
7.8. Amount Of FMT Following Normal Labour.	69
8. MASSIVE FETO-MATERNAL TRANSFUSION.	70
8.1. Importance Of Massive FMT.	73
8.2. Causes Of Massive FMT.	74
8.3. Effects Of Massive FMT.	77
9. INDICATIONS OF THE ACID ELUTION TEST OF KLEIHAUER.	85
* SUBJECTS AND METHODS.	90
* RESULTS.	96
* DISCUSSION.	128
* APPENDIX.	140
* SUMMARY.	141
* REFERENCES.	147
* ARABIC SUMMARY.	

Introduction
And
Aim Of The Work

INTRODUCTION

In 1957, Kleihauer and Coworkers developed a differential staining technique to identify and quantitate fetal red blood cells in the maternal circulation. Beyond its immediate clinical applicability, this technique served to cement the phenomenon of transplacental feto-maternal passage of fetal erythrocytes and to study its effects.

12

AIM OF THE WORK

Review and study of the phenomenon of feto-maternal transfusion as described in up-date literatures.

Determination of the incidence and amount of FMT in cases of normal pregnancy and labour in the Obstetric and Gynaecology Department , Ain-Shams University Hospital.

Exploration of the clinical utility of such knowledge in predicting the prognosis or as a guide in the diagnosis of normal and abnormal pregnancy, by comparing the level of FMT in such abnormal conditions with that of normal pregnancy and labour.

Review Of Literature

1. HISTORICAL REVIEW

The research work in Rh - disease and the attempts to discover its aetiology were the starting point which led to the discovery of the phenomenon of feto-maternal haemorrhage.

Dienst (1905) was the first to challenge the concept of separate integrities of maternal and fetal circulations.

Darrow (1938) suggested that the pathogenesis of Rh-disease is due to formation of maternal antibodies against a component of fetal blood.

Levine and Stentson (1939) established the aetiology of Rh - disease, that, the antigenic factor is attached to the surface of the fetal red blood cells.

They were the first to suggest that a fetus in utero might - by means of a property inherited from its father - induce antibody formation in the mother's



serum, which when react with a donor's blood might cause haemolysis and thus a transfusion reaction occurs (Queenan, 1977).

Levine (1943) believed that the fetal erythrocytes can normally cross the placental barrier and as little as 0.01 C.C of packed fetal erythrocytes can produce Rh - immunization.

Naeslund and Nylin (1946) - in an attempt to prove that the erythrocytes can cross the placental barrier - injected red cells labelled with radioactive phosphorous (P^{32}) into the mother's blood 10-30 minutes before delivery. They demonstrated radioactivity found in the umbilical cord blood (fetal blood).

Alexander Wiener (1948) - in an attempt to explain the passage of the fetal R.B.Cs into the mother's blood - postulated his famous hypothesis which states that a defect (need not be large) in the fetal side of the placenta accounts for leakage of fetal blood into the mother's circulation. To further support Wiener's hypothesis of fetal bleeding into the maternal

circulation, Kline (1948) in an extensive study of placentas, demonstrated microscopic leaks of fetal capillaries into the maternal intervillous spaces with the fetal nucleated red, cells in the intervillous and these changes increased with the duration of spaces.

Based on the work of Von kober in (1866), and Von kruger in (1887), Singer et al., in (1951), used an alkaline medium (pH 12.7) to denature adult hemoglobin (Hb-A), thus differentiated between maternal and fetal erythrocytes in a blood sample obtained from maternal blood (Singer et al., 1951).

Wickster (1952) explained the occurrence of occult fetal transfusion into the maternal circulation (FMT), by a traumatic unusual break in the fetal capillaries with escape of fetal blood into the maternal intervillous spaces then to the mother's circulation.

The phenomenon of fetal-maternal transfusion was proved by Chown (1954) and confirmed by Gunson (1957), each used the anti-Rh to agglutinate the Rh-positive fetal red blood cells in a sample obtained from Rh-negative mother.

Hellman (1955) suggested that FMT is the result of occurrence of breaks in the chorionic villi. These breaks may be spontaneous (more frequent in late than in early pregnancy, or due to trauma or the escape of fetal blood occurs at the time of separation of placenta. He suggested that manual removal of placenta and curettage for incomplete abortion might favour the introduction of fetal blood into the maternal circulation. Creger and Steele (1957) proved the occurrence of FMT by agglutinating the mothers' erythrocytes by using anti-A and anti-B while the infant was group O.

Javert and Reiss, (1957) related, the blood interchange across the placenta, to alterations in the trophoblastic endothelial barrier by degeneration or traumatic rupture.

Kleihauer, Braun, Betke (1957) devised a simple, accurate technique by which differentiation between fetal and maternal erythrocytes can be determined also it can measure the amount of FMT (qualitative and quantitative measure).