# PEDIATRIC ORGAN TRANSPLANTATION

**ESSAY**

Submitted for the partial fulfilment
of Master Degree in **Pediatrics**

رسالة

By

***Omayma Ahmed Shaweky Harfoush***

M.B.,B.Ch. (Dec. 1986)



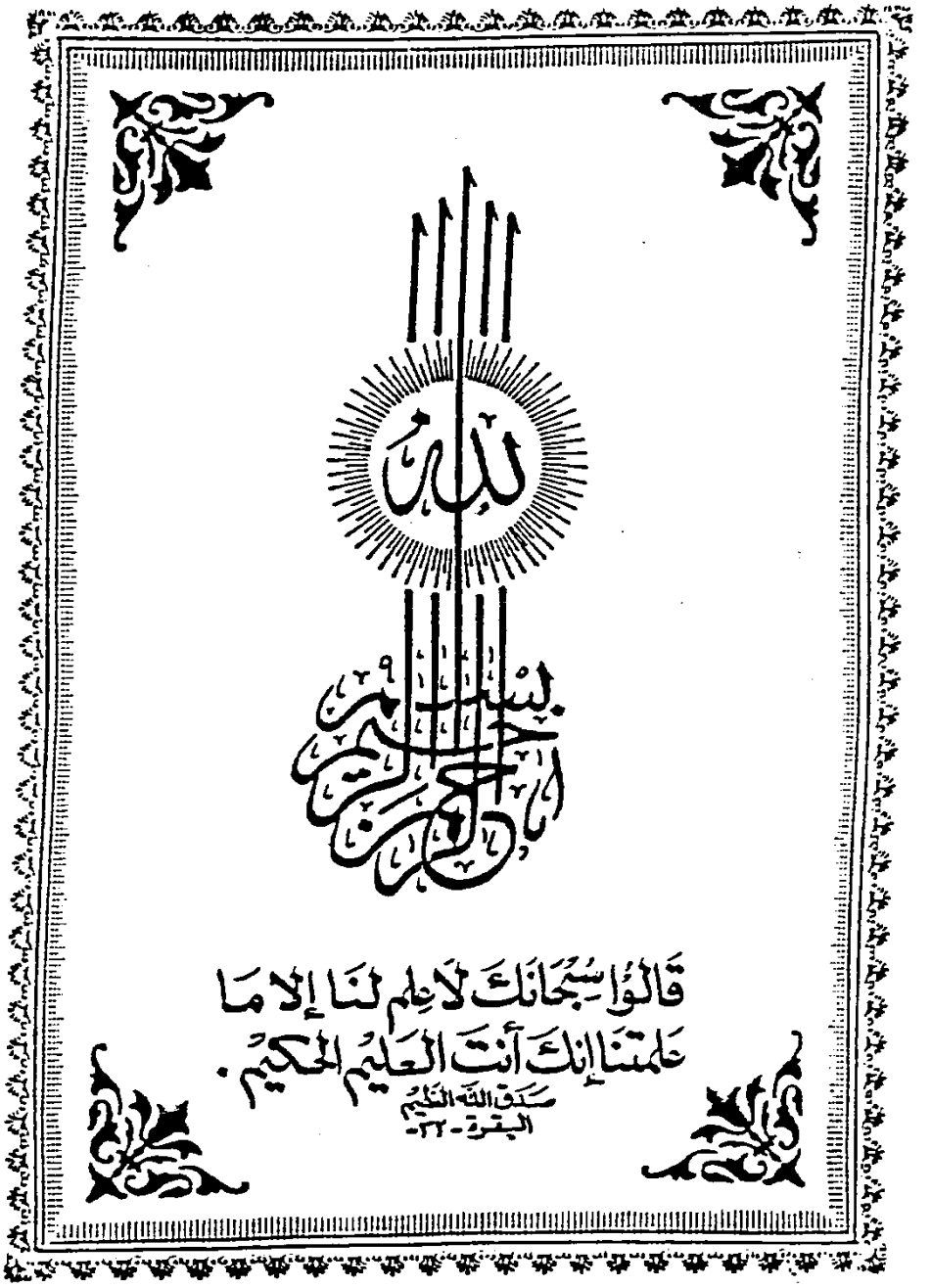
Under the supervision of:

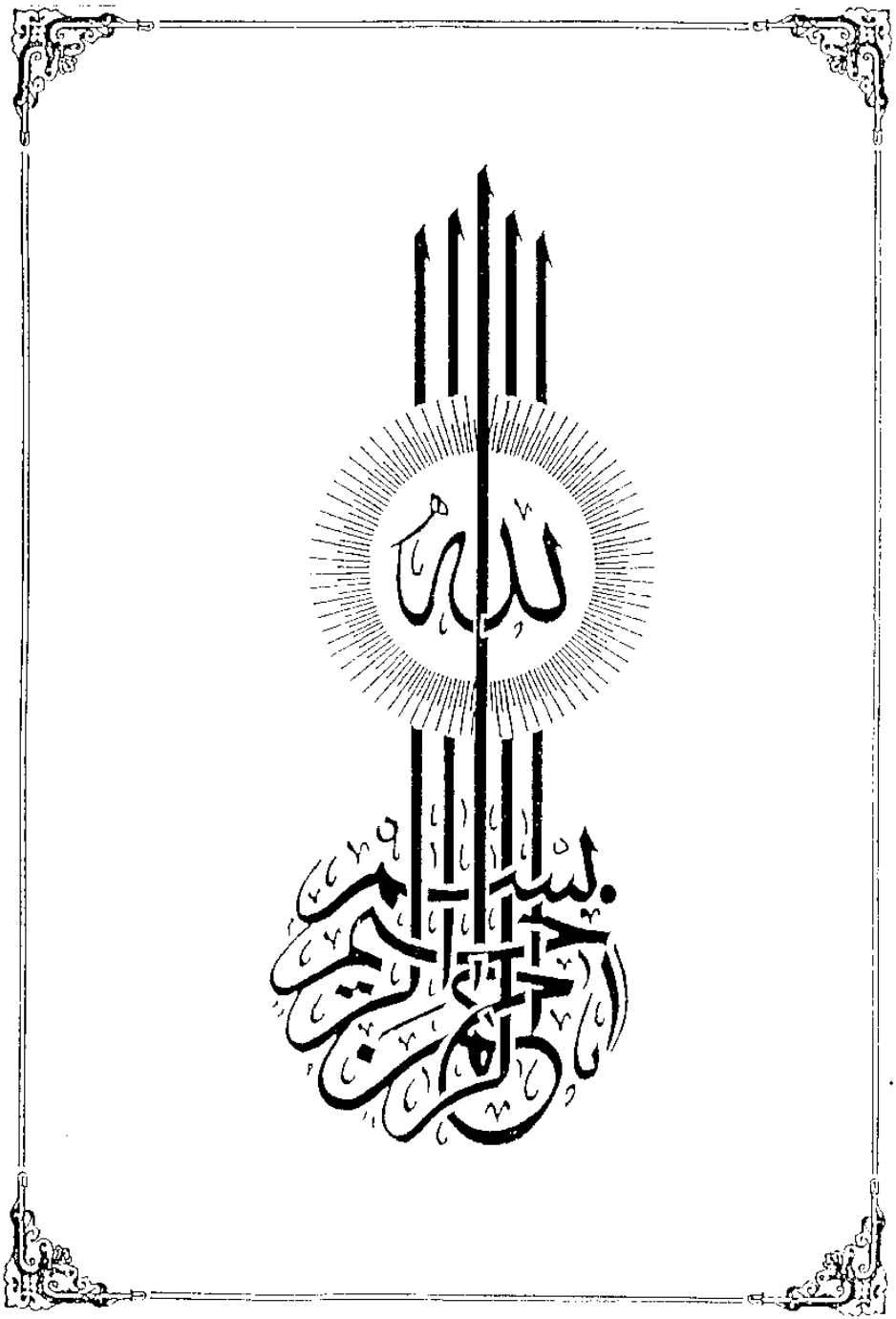
***Ass. Prof. Dr. Mona El-Samahi***

Ass. Prof. of Pediatrics
Faculty of Medicine
Ain Shams University

**Faculty of Medicine**
**AIN SHAMS UNIVERSITY**

**Cairo, 1992**





**Dedicated**

**To**

My Parents, And
My Husband with All Affection and
Respect

# Acknowledgment

*I wish to express my deep thanks and gratitude to* **Ass. Prof. Dr. Mona El-Samahi,** *Ass. Prof. of Pediatrics, Faculty of Medicine, Ain Shams University, for giving me the privilege of working under her supervision, for her encouragement, patience and unfailing guidance throughout the whole work.*

*To every one who participated in one way or another in making work come to its actual picture, I convey my many thanks and my gratitude.*

# Contents


| | |
|---|---|
| Introduction | 1 |
| Aim of Essay | 2 |
| Historical Review | 3 |
| Indications of bone marrow transplantation | 7 |
| Complications of bone marrow transplantation | 23 |
| Indications of renal transplantation | 33 |
| Complications of renal transplantation | 39 |
| Indications of liver transplantation | 50 |
| Complications of liver transplantation | 62 |
| Indications of heart transplantation | 72 |
| Complications of heart transplantation | 77 |
| Technique of organ transplantation | 82 |
| Psychiatric aspects of organ transplantation | 96 |
| Summary | 101 |
| References | 104 |
| Arabic Summary | --- |

# Abbreviations

| | |
|---|---|
| ABMT | : Autologous bone marrow transplantation |
| AGL | : Acute granulocytic leukemia |
| ALL | : Acute lymphoblastic leukemia |
| AML | : Acute myeloid leukemia |
| Ara-C | : Cytosine Arabinoside |
| AVNB | : Avascular necrosis of bone |
| BMT | : Bone marrow transplantation |
| BUN | : Blood urea nitrogen |
| CAPD | : Continuous ambulatory peritoneal dialysis |
| CML | : Chronic myeloid leukemia |
| CMV | : Cytomegalo virus |
| CNS | : Central nervous system |
| CR | : Complete remission |
| CT | : Computed tomography |
| Cy A | : Cyclosporine A. |
| DMSO | : Dimethylsulfoxide |
| DNR | : Daunorubicin |
| EB.V | : Epstein Bar virus |
| ECG | : Electro cardiogram |
| EFE | : Endocardial fibro-elastosis |
| GH | : Growth hormone |
| GSD | : Glycogen storage disease |
| GVHD | : Graft-versus-host-disease |
| HLA | : Human leucocytic antigen |
| HUS | : Hemolytic uremic syndrome |
| ICU | : Intensive care unit |
| ISC | : Intensive sequential chemotherapy |
| LE | : Lupus erythematosis |
| LPD | : Lymphoproliferative disease |
| MHC | : Major histocompatibility complex |
| OLT | : Orthotopic liver transplantation |
| OTC | : Ornithine transcarbamylase deficiency |
| P.carinii | : Pneumocystis carinii |

PCP : Pneumocystis carinii pneumonia
PEEP : Positive end expiratory pressure
PT : Prothrombin time
PTLD : Post transplantation lymphoproliferative disease
PTT : Partial thromboplastin time
SCID : Severe combined immunodeficiency
SD : Standard deviation
TBI : Total body irradiation
TSH : Thyroid stimulating hormone
U W solution: University of Wisconsin solution
VOD : Veno-occlusive disease

# Introduction And Aim Of Essay

# Introduction

Since the start of pediatric kidney transplant program 1970, many investigators advocate children transplantation to be performed in the pediatric surgery units. **(Carcassonne et al., 1989).**

Recent progress in immunosuppression with cyclosporin lead the surgeon to extend the program to liver transplantation, then heart and lung transplantation **(Carcassonne et al., 1989).**

Extreme scarcity of small pediatric donors makes a search necessary for technical variants to benefit infants and small children from the larger group of potential adolescent and adult donors **(Otte et al., 1990).**

# Aim of the Essay

Is to review the indications, technique, results, complications and psychologic aspects of organ transplantation in the pediatric age group.

# Historical Review

# Historical Review

Less than a decade ago, severe combined immunodeficiency disease (SCID) was incurable, and all children born with the disease died, usually in the first year of life **(Mortimer and Alfred, 1977).**

In 1968, two transplant teams reported correction of immuno-deficiency disease by successful engraftment of bone marrow from immunologically normal sibling donors **(Gatti et al., 1968).** Since then, transplantation of hematopoietic and lymphoid cells has been studied intensively as a treatment for SCID as well as for a large number of other diseases including acute leukemia and aplastic anemia **(Mortimer and Alfred, 1977).**

The history of liver transplantation dates back to the immediate post-World war II years when early experiments, which were performed primarily in dogs, showed the technical feasibility of transplanting a new functioning liver into a recipient, either heterotopically as an accessory organ or orthotopically, i.e., by complete replacement of the original organ. As might be expected, graft rejection was and still is a major problem. However, since the late 1970's, promising progress has been made in controlling this complication **(Rudi, 1984).**

The first human orthotopic liver transplantation was performed in 1963 by Starzl and his associates at the University of Colorado in Denver, but the first and several subsequent patients survived for only a short time. Although survival improved during the following years, the l-year survival reported by the Starzl team in the precyclosporin era, i.e., from 1963 to the late 1970's, ranged from only 24% in adults to 33% in children. Because of these relatively discouraging results, liver transplantation during the first decade was performed almost exclusively by the Denver Center, although in 1968 Calne at the University Hospital at Cambridge and Williams at the King's College Hospital in London had set up another center which to date has performed over 130 transplantations **(Rudi, 1984).**

In the late 1970's, several other centers were established, among which those in Hanover and Groningen have contributed the largest number of cases. Small series of technically successful liver transplantations also have been reported from other parts of the world and most recently from other institutions in the United States **(Rudi, 1984).**

Recently there is a specialized center for management of liver diseases in Egypt. This center is the liver Institute - Shebeen El-Koom - Monofia University **(Personal communication).**

The first case of pediatric liver transplantation has been performed by Dr. Nagi Habib, an Egyptian Surgeon. It has been performed at december 1991 in the Liver Institute. The Candidate was a child 6 years old. He was suffering from glycogen storage disease complicated by liver cirrhosis. The graft has been taken from the left lobe of his mother. The operation succeeded and both the mother and the child were in a good condition post-operatively. **(Personal communication).**

In 1960s, transplantation of the heart, liver or pancreas was principally a laboratory event. Renal transplantation gained clinical acceptance, backed by hemodialysis as alternative renal failure therapy **(Owen, 1989).**

Relatively poor results in transplantation of the liver and the heart led to surgical moratoria in the 1970s. Currently, about 75% of liver transplant recipients, 75% - 80% of heart transplant recipients, and over 90% of kidney transplant recipients are alive at 1 year. **(Schroeder and Hunt, 1987).** Full rehabilitation occurs in two-thirds to four-fifth of those whose grafts are functioning at 1 year, as reported by clinicians at active transplant centers **(Williams et al., 1987).**

In the past, 10% of patients with end-stage renal disease have been treated with transplantation, but Eggers found that