HEMODYNAMIC CHANGES IN RENAL ARTERY BLOOD FLOW USING COLOR DOPPLER ULTRASONOGRAPHY IN NEONATES WITH PERINATAL ASPHYXIA

THESIS

Submitted for Partial Fulfillment of Master Degree in Pediatrics

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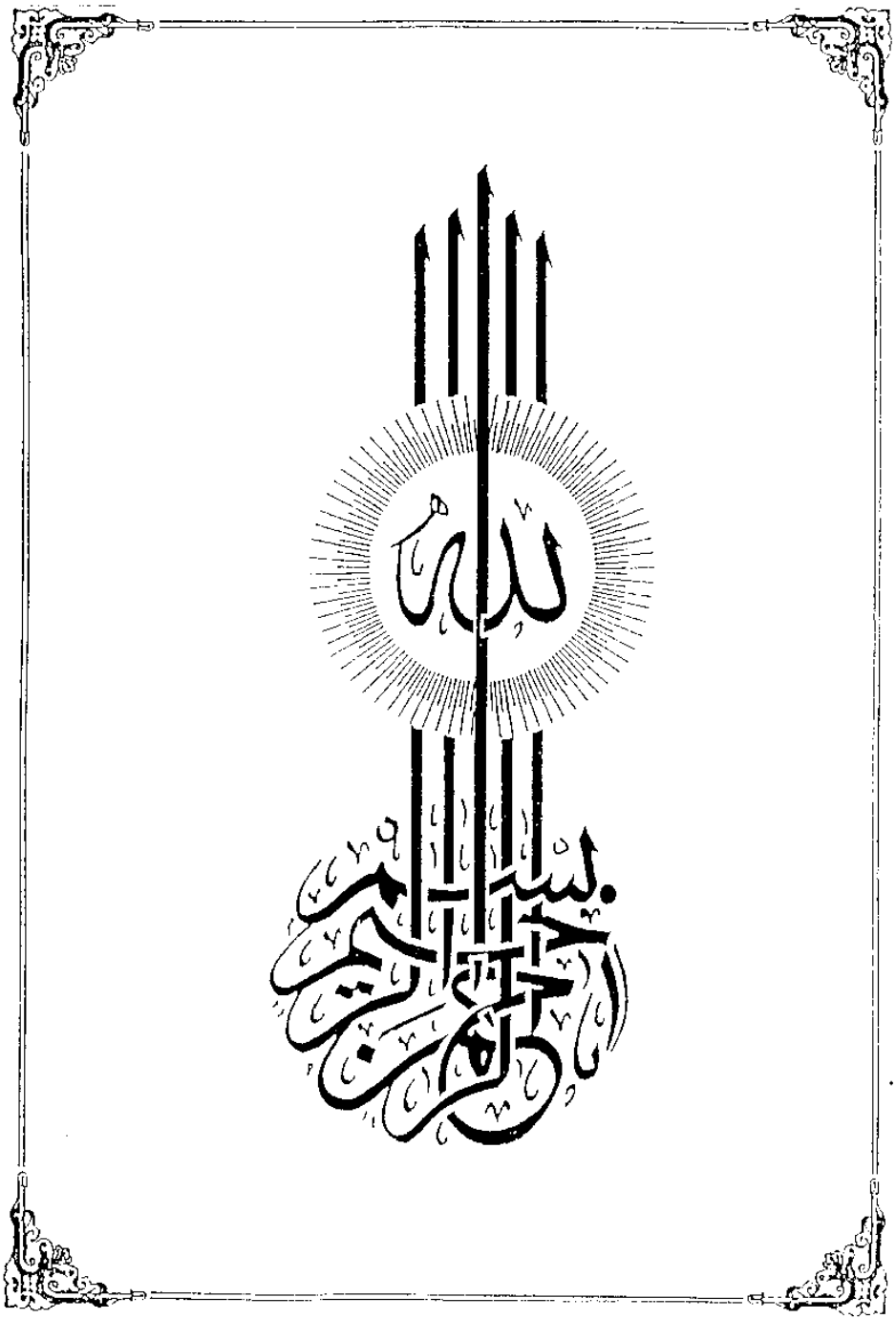

In the Name of God,
Most Merciful,
Most Compassionate

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May God reward them for all they did.

Maha A. Ragab

TABLE OF CONTENTS

LIST OF TABLES

Tables of Results

LIST OF FIGURES

Figures of Results:

INTRODUCTION

Newborn infants with asphyxia are believed to be at increased risk of having renal dysfunction because of hemodynamic disturbance in normal circulation as a result of perinatal hypoxaemia *(Kliegman et al., 1982, Nowicki et al., 1984, Akinbi et al., 1994)*.

Before the availability of specially designed and highly sensitive color duplex Doppler ultrasound probes, it was difficult to assess the degree of hemodynamic disturbance in the kidneys without restoring to more invasive means *(Visser et al., 1992)*.

Akinbi et al. (1994) studied the pulsed Doppler ultrasound renal blood flow velocity profiles and showed that this technique was more reliable for assessing haemodynamic disturbances than the blood flow volume measurements. Moreover, they observed a significant direct correlation between the reduction of peak velocity and increased resistance in the renal arteries to the severity of asphyxia. This was compatible with the frequent finding of elevated serum creatinine concentration and reduced urine output in neonates with birth asphyxia. The same authors suggested that the occurrence of this renal dysfunction affects parentral fluid and drug therapy.

Aim of the Work

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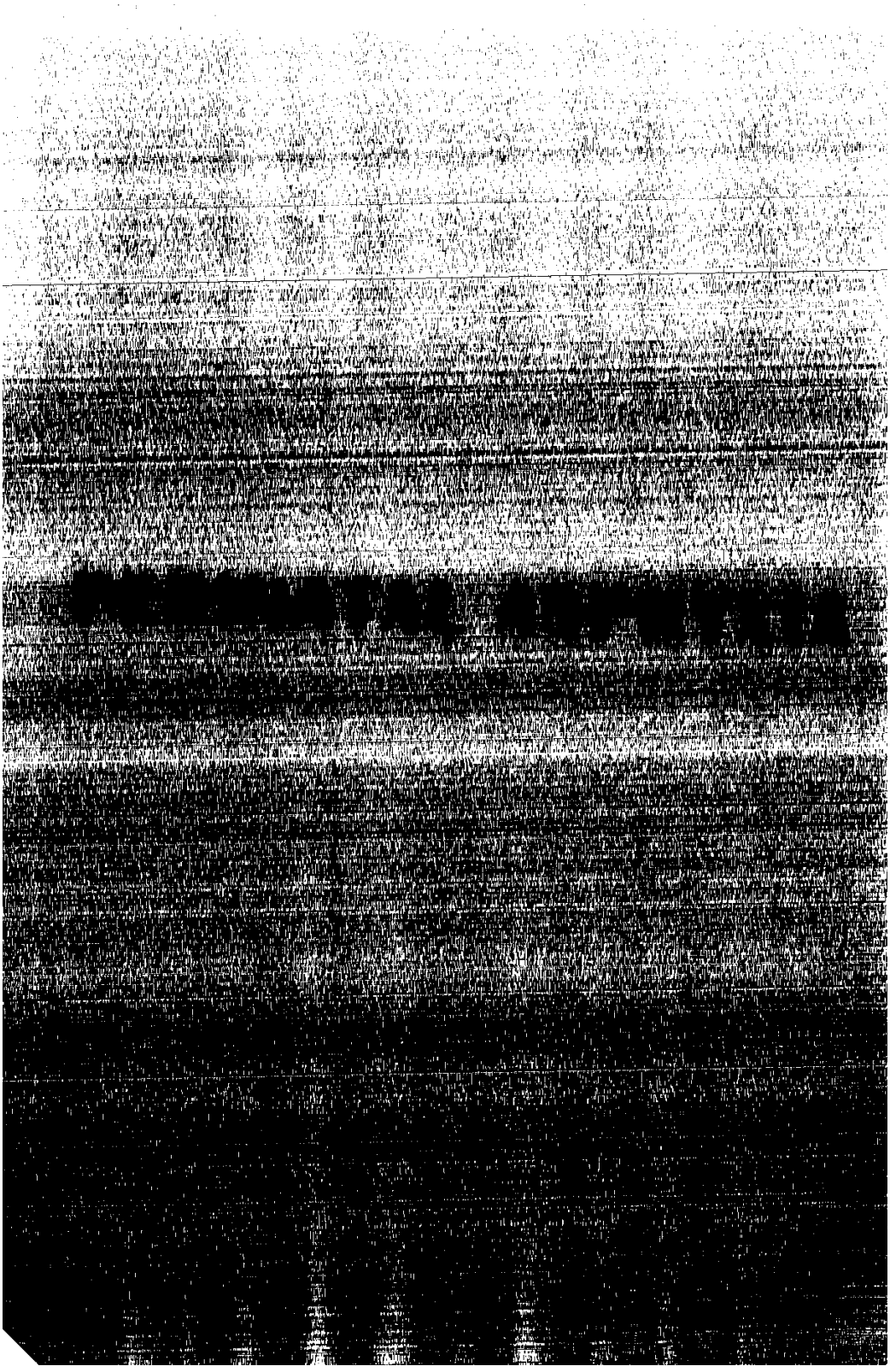
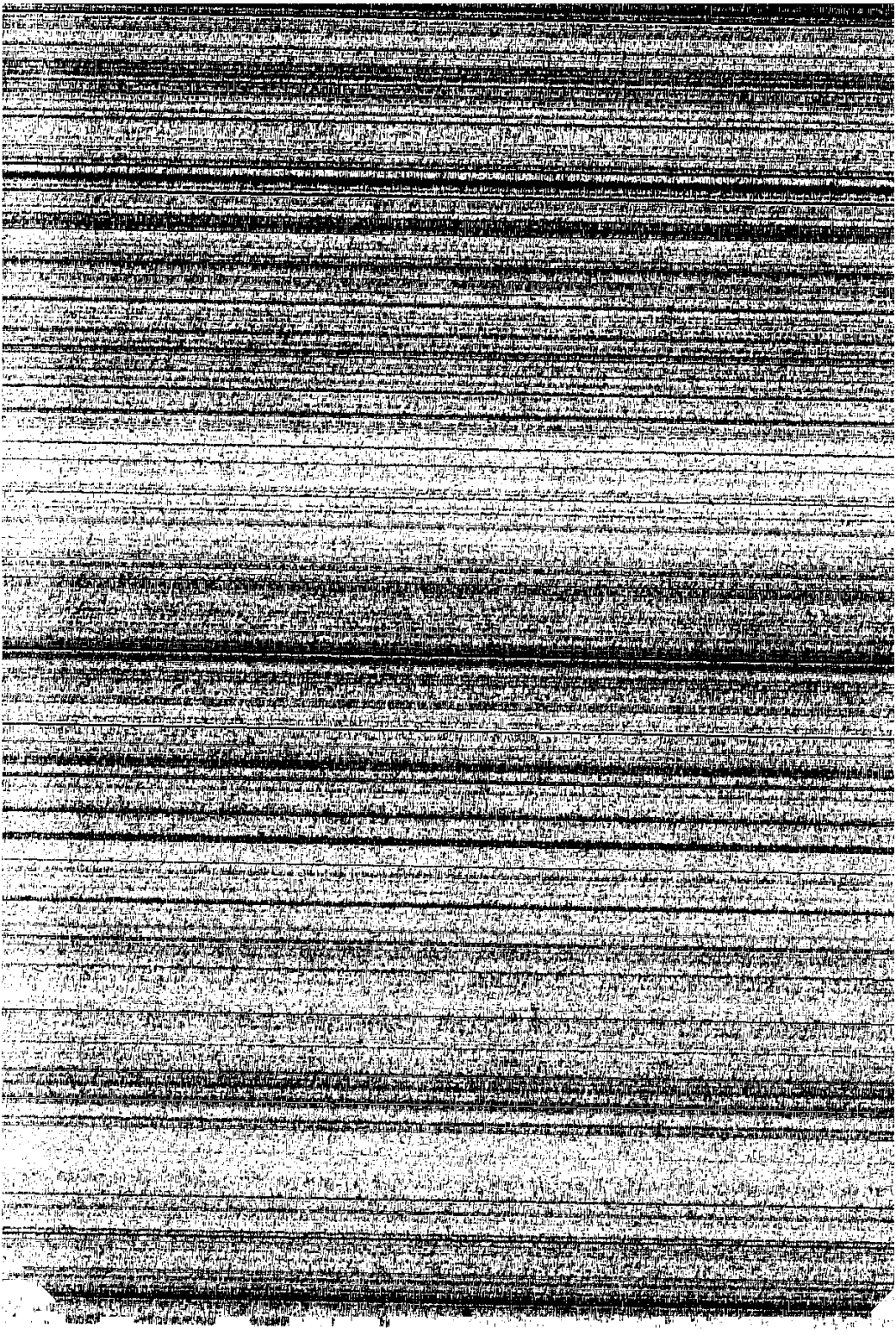
The aim of this work was directed towards assessment hemodynamic disturbances in blood circulation through the kidneys that are particularly vulnerable to hypoxic-ischemic injury by utilization of color flow image and pulsed Doppler ultrasonographic technique.





PERINATAL ASPHYXIA

Definition

Asphyxia is defined as suffocation leading to impairment in exchange of respiratory gases; Oxygen and Carbon dioxide, that result in hypoxia which refers to an arterial concentration of oxygen that is less than normal, and/or ischemia, which refers to blood flow to cells or organs that is insufficient to maintain their normal function ***(Kliegman, 1996)***.

American Academy of Pediatrics (AAP) and American College of Obstetricians and Gynecologists (ACOG) Committees on Maternal-Fetal Medicine and Fetus and Newborn in 1992 defined certain criteria that must be present for resultant neurologic deficits (Table 1). In cases in which such evidence is lacking, it cannot be concluded that perinatal Asphyxia exists.

Table (1)
Essential Criteria for Perinatal Asphyxia

1. Profound metabolic or mixed acidemia (pH <7.00) on an umbilical cord arterial blood sample.
2. Persistence of an Apgar score of 0 to 3>5 minutes.
3. Clinical neurologic sequelae in the immediate neonatal period (e.g. seizures, hypotonia, coma, or HIE).
4. Evidence of multiorgan system dysfunction in the immediate neonatal period

(American Academy of Pediatrics and American College of Obstetricians and Gynecologists, quoted from: Guidelines for Perinatal Care, 1992)

1- Acidemia:

Develops in hypoxemic infant as a result of use of anaerobic glycolysis to meet its energy needs. It is classified as respiratory where PCO_2 is high and HCO_3 is normal, metabolic where PCO_2 is normal and HCO_3 is low or mixed acidemia ***(Rivkin and Volpe, 1996).***