STUDY OF EFFECTS OF HAEMODIALYSIS ON INTRAOCULAR PRESSURE

Thesis

Submitted for Partial Fulfilment of

Master Degree in

GENERAL MEDICINE

By

Al-Hussaini Hassan Mohammed Orabi

(M B B Ch, Alex)

SUPERVISORS:

Prof Dr Badawy L. Mahmoud,

PROFESSOR OF MEDICINE AND NEPHROLOGY

AIN SHAMS UNIVERSITY

Dr Shaker A. Khedr,

ASS. PROFESSOR OF OPHTHALMOLOGY

AIN SHAMS UNIVERSITY

CO-SUPERVISORS:

Dr Essam M. Khedr,

LECTURER OF MEDICINE AND NEPHROLOGY

AIN SHAMS UNIVERSITY

Dr Zeinab M. Tawfik,

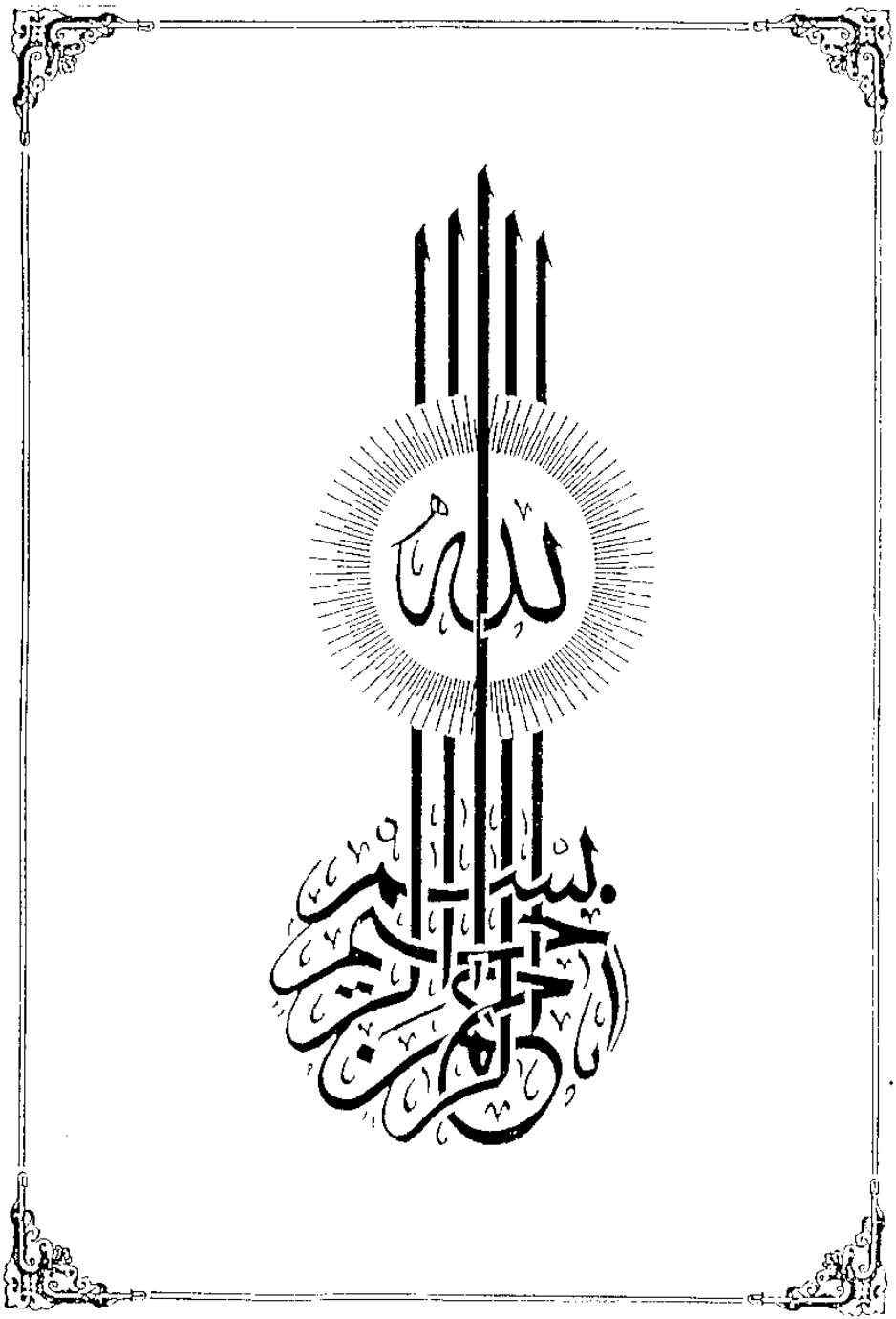
LECTURER OF CLINICAL PATHOLOGY

AIN SHAMS UNIVERSITY

AIN SHAMS UNVERSITY

1987

To
my late father
and
To
my mother



"وعلمك ما لم تكن تعلم وكان
فضل الله عليك عظيما"

"صدق الله العظيم"

ACKNOWLEDGEMENT

I wish to express my gratitude and appreciation to Prof. Dr. Badawy L. Mahmoud, Prof. of Medicine and Nephrology, Faculty of Medicine, Ain Shams University who suggested and followed up this work, for his consistent supervision and valuable suggestion. Without his kind help and encouragement, it would have been difficult to accomplish this work.

Sincere thanks are also due to Assist. Prof. Dr. Shaker A. Khedr, Assist. Prof. of Ophthalmology, Faculty of Medicine, Ain Shams University for his endless support and his keen follow-up of this work.

I would like to offer a special gratitude to Dr. Essam M. Khedr, Lecturer of Medicine and Nephrology, Faculty of Medicine, Ain Shams University for his useful advice and for the facilities given to this work. I am so gratful to sincerity in effort and time afforded by him.

I wish to express my appreciation for the kind help I received constantly from Dr. Zeinab M. Taufik, Lecturer of Clinical Pathology, Faculty of Medicine, Ain Shams University.

I wish to express my appreciation to all the staff of the " Dialysis Unit " in Ain Shams University Specialized Hospital, I wish to give my gratitude personally for each.

Last but not least, I would like to express my obligation to all the patients who participated in this work for showing utmost cooperation.

C O N T E N T S

CHAPTER I

INTRODUCTION

INTRODUCTION

The effect of haemodialysis on IOP (intraocular pressure) was previously studied by many researchers. Sitprija et al (1964) found an average increase in IOP of 5.9 mm Hg (by Schioetz tonometer) in the majority of uraemic patients during dialysis. Watson and Greenwood (1966) reported an average rise of 8.1 mm Hg in patients during dialysis. Appelmans et al (1967) demonestrated an increase in IOP up to 10 mm Hg in 80% of patients undergoing renal dialysis.

Ramsell et al (1971) did not find a significant rise in IOP following 5-hour dialysis sessions, although, IOP changed significantly between the second and third hour of dialysis, but Burn (1973) found that a rise in IOP occured in at least one-third of cases undergoing dialysis.

Wizemann et al (1980) found an increase in IOP after one hour treatment (haemodialysis), and in individuals complaining of headaches during dialysis, they found a marked increase in IOP indicating disequilibrium syndrome.

Awad (1981) examined 40 patients with chronic renal failure and maintained on regular dialysis. She found that all patients experienced a rise in IOP during the dialysis process.

Sitprija et al (1964), Ramsell et al (1971), Burn (1973) and Awad (1981) suggested a correlation between the decrease in plasma osmolality and the increase in IOP.

Watson and Greenwood (1966) suggested and proved that the rise in IOP is due to lag of clearance of urea from the aqueous as compared with its rapid clearance from the blood.

Recently, Rever et al (1983) found that IOP did not change significantly in any patient following a 4-dialysis session with either acetate or bicarbonate in the dialysate.

Gutman et al (1984) noted an insignificant decrease in IOP during the first 2 hours of dialysis, and this was followed by a slight rise above the baseline by the end of dialysis, and they reported that the postdialysis value was not significantly different from the predialysis value.

Gafter et al (1985) reported that haemodialysis did not increase IOP significantly, and stated also that the risk of severe IOP rise following haemodialysis in uraemic patients on chronic treatment is only a remote possibility.

Cecchin, et al (1986) confirmed in part the findings of Gafter, et al (1985). They identified also three groups of patients as follow:
Group 1, in which IOP did not change significantly ,
Group 2, (18% of all patients) in which there was a significant increase in IOP,
Group 3, in which IOP significantly decreased during haemodialysis. Gonioscopy revealed in group 2 patients a narrow angle between the pupil and lateral cornea, this angle appeared normal in patients of group 1 and 3.

Wizemann, et al (1980) and Gafter, et al (1985) found that there was no statistical correlation between the behavior of serum osmolality and IOP.

Sitprija, et al (1964) and Ramsell, et al (1971) observed marked decreases in IOP paralleling weight loss during haemodialysis.

Wizemann, et al (1980) and Gafter, et al (1985) reported that IOP changes did not correlate with body weight or mean arterial blood pressure reduction.

The aim of our study here is to study the IOP changes during and after haemodialysis in patients with chronic renal failure on long-standing haemodialysis therapy.

CHAPTER II

REVIEW OF LITERATURE

THE AQUEOUS HUMOUR

The aqueous humour is a term applied to that part of intraocular fluid in the anterior and posterior chambers of the eye (Duke-Elder, 1968).

The aqueous is produced by the ciliary body. Apparently, three mechanisms contribute in varying degrees to the production of aqueous.
One is a simple process of ultrafiltration of fluid from the capillaries in the ciliary processes.
A second mechanism is a flow of certain ions along an electrochemical gradient.
Third, an active pump mechanism is present in the epithelium of the ciliary processes.

This pump mechanism is responsible for the high concentration of certain constituents of the aqueous, such as ascorbate, which has a concentration some 50 times higher in the aqueous than in plasma. After it is produced, the aqueous flows through the posterior chamber between the lens and the iris, through the pupil, and out into the anterior chamber. In the peripheral anterior chamber it eventually comes to the angle formed by the juncture of the iris and the cornea. The so-called trabecular meshwork is located here. This meshwork is composed

of a multilayered, seive-like structure with pores of decreasing size.

Eventually, after the aqueous has filtered through this structure, it enters an endothelium-lined tube knowing as the canal of Schlemm. From the canal of Schlemm the aqueous passes through collector channels into the episcleral veins, where it mixes with the blood (Wilensky, 1980).

In addition there is a second accessory exit (the uveo-scleral outflow) through the ciliary body into the choroid and suprachoroid and hence into the episcleral tissue; although a minor means of exit, this pathway may sometimes be of importance (Miller, 1984).

It is obvious that in a closed system such as the eye anything that interfere with the outflow of the aqueous from the eye that does not simultaneously decrease its production by the ciliary body will result in an increase in pressure that is transmitted throughout the whole eye (Wilensky, 1980).

Osmotic pressure:

The osmotic pressure of the intraocular fluid has excited great interest because of its importants

in relation to theories of the formation of the aqueous humour and the maintenance of the intraocular pressure (IOP). Various methods have been employed for measuring the osmotic pressure of the aqueous humour. Of these, the direct measurement, the method of plasmolysis, the cryoscopic method and the thermoelecrical method of estimating osmotic pressure by the measurement of vabour pressure by thermocouples, developed by Hill (1930) and Baldes (1933).
Bearing in mind the possible sources of error, it can be concluded that the balance of evidence favours the view that the aqueous humour is slightly hypertonic to plasma (Duke-Elder, 1968).

Reaction:

Baurmann (1927) obtained a value of 7•268 for the pH of normal human aqueous, the range being 7•20 to 7•35; the reaction of the fluid from eyes affected by keratitis, iridocyclitis and complicated cataract averaged 7•32, and thus did not differ significantly from that found in health. Sakanoue (1962) reported that in an eye affected by senile cataract the pH of the aqueous humour was 7•26 as compared with 7•42 in the blood.
Thus, the aqueous was found to be more acid than the plasma in the cataractous patients (Duke-Elder, 1968).