Effect of Dialyzer Reprocessing on Leucocytic Count and Complement Activation in Chronic Renal Failure Patients Undergoing Maintenance Hemodialysis

Thesis
Submitted in partial fulfilment for
Master Degree in Internal Medicine

By

Mohammed Abd-El-Raouf Soliman

M.B. B.Ch.

Supervised by

Prof. Dr.

Badawi Labib Mahmoud

Professor of Internal Medicine

Faculty of Medicine, Ain Shams University

Dr.

Hany Ali Refaat

Assist. Professor of Internal Medicine

Faculty of Medicine, Ain Shams University

Dr.

Mohammed Ali Ibrahim

Lecturer of Internal medicine

Faculty of Medicine, Ain Shams University

FACULTY OF MEDICINE

AIN SHAMS UNIVERSITY

1994

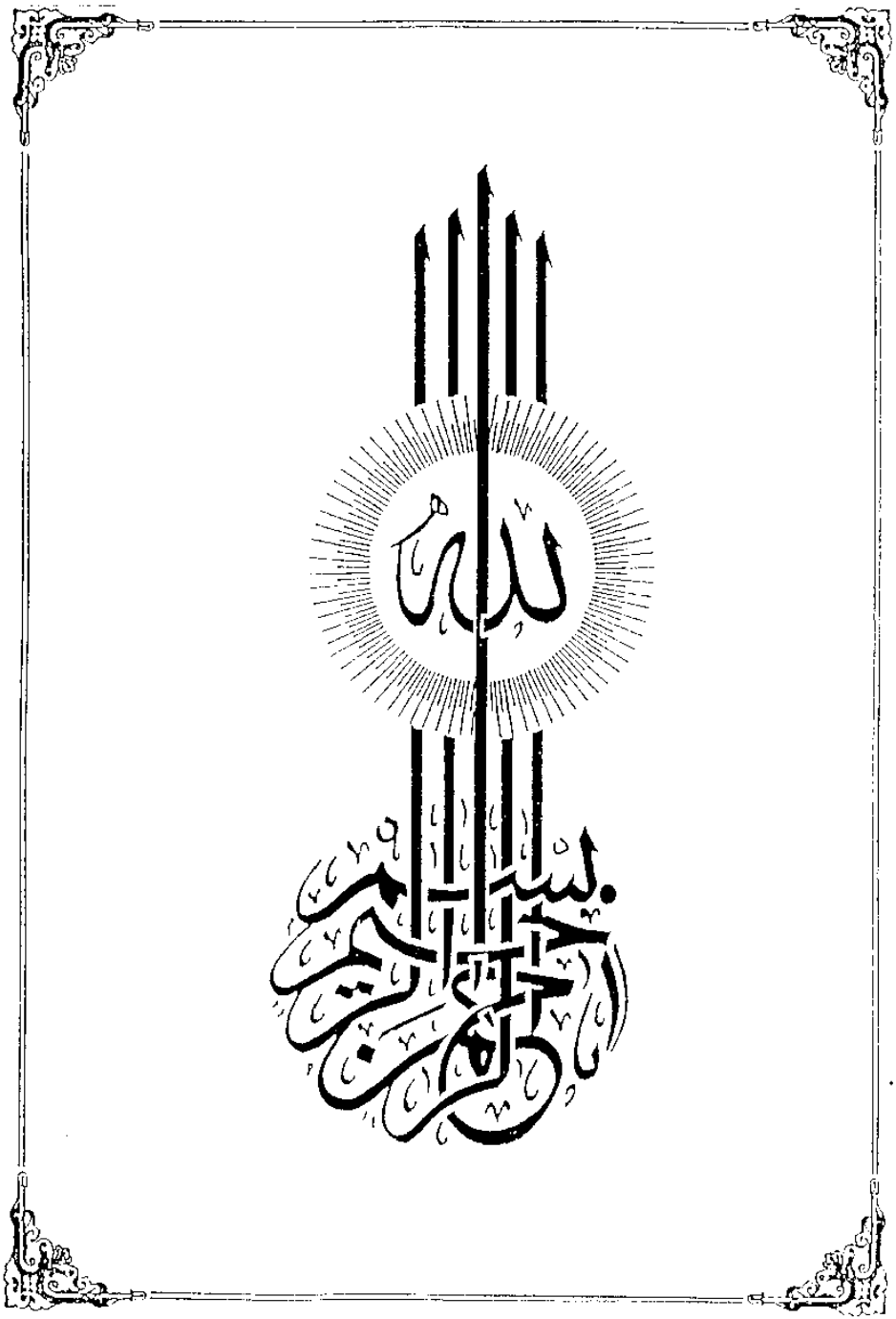
Acknowledgement

First and foremost, thanks are for God, the Most Beneficent, unlimited, and continuous blest on me.

I would like to express my grateful appreciation to Prof. Dr. Badawy Labieb, Professor of Medicine, Faculty of Medicine, Ain Shams University, for his continuous encouragement, support and great interest all through the preparation of this work.

I am greatly indebted to Dr. Hany Ali Refaat, Assist. Professor of Medicine, Ain Shams University, for his precious guidance, generous supervision, and his tolerance in affording me much of his time during the preparation of this work.

I am also greatly grateful to Dr. Mohammed Ali Ibrahim, Lecturer of Medicine, Ain Shams University, for his suggestions, supervision, generous help and his constructive encouragement that helped me in completing this study.



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In the early decades of hemodialysis, little interest was shown in the phenomenon of dialysis-induced leucopenia. in **1977, Craddock et al.** presented that leucopenia resulting form pulmonary sequestration of leucocytes was casually associated with the activation of the complement through the alternative pathway, there was a sudden upsurge in interest which has continued to date, The degree of activation of the complement is dependent on the biocompatibility of the membrane used, and the form may be responsible for the first use syndrome in dialysis patients, **[Cheung et al., 1989]**.

To improve the membrane biocompatibility, new dialysis membrane e.g. polycrylonitrate and dialysis reprocessing have been suggested.

Aim of the Work:

It is to investigate the effect of dialyzer reprocessing on the leucocytic count and complement activation.

REVIEW OF LITERATURE

DIALYZER REPROCESSING

1- History of Reuse.

2- Indications & Contraindications.

3- Advantages & Disadvantages.

4- Methods of Reprocessing:

A- Manual Method:

I- Rinsing.

II- Cleaning.

III- Sterilization:

- Terminology
- Physical Agents ---> Wet Heat / Dry Heat
- Gases ---> Ethylene Oxide
- Irradiation ---> rays
- Chemicals ---> Formaldehyde / Gluteraldehyde / RenNew-D / Renalin / Sod. Hypochlorite Hydrogen Peroxide

IV- Preparation of subsequent use.

B- Automated method.

5- Effect of reuse on dialyzer efficiency.

6- Effect of different sterilants on integrity of hemodialyzer membranes.

7- Effect of different sterilants and methods of reprocessing on mortality.

CHAPTER I

DIALYZER REPROCESSING

History of Reuse:

Repeated hemodialysis treatment for chronic failure was initiated by **Belding Scribner & Collegues in 1960**. They rinsed the blood and dialysate compartments with water and sterilized both compartment with formalin. The dialyzer remained filled with formalin until the time for dialysis when it is flushed with saline to remove the formalin. In **1964, Sheldon & Collegues** devised a method by which the coil with its contained blood was refrigerated at the end of dialysis. This was the first dialyzer reuse. The main problem was occasional development of pyrogenic reactions. The method became outmoded as coil and other dialyzers with smaller blood compartments became available.

In **1967, Pollard & Coworkers** described a technique for reusing the Kiil dialyzer which employed cleaning with sodium hypochlorite, rinsing & sterilization with formalin.

Since 1967, multiple use of dialyzers has continued and it is widely employed throughout the world, **Deane et al., 1989]**.

Indications:

1- If the patient has first use syndrome during dialysis with new dialyzers i.e. ---> chest pain or back pain or rarely, respiratory distress with of without wheezing and sometimes chills followed by fever or rarely anaphylactic shock.

2- The quality of and/or access to dialysis is maintained or enhanced beside the cost saving money will be achieved by reprocessing hemodialyzers. **[AAMI Recommended Practice, 1985]**

Contraindications:

Hemodialyzers should not be reprocessed if any of the following are present;

1- Hepatitis

2- Septicaemia

- Some authorities **[Willingmyre, 1979]** have expressed concern about the role of dialyzer reuse in such conditions as hepatitis and septicaemia.

3- Unexplained abnormal liver function tests indicative of hepatitis.

4- Sensitivity of the patients to materials used in hemodialyzer reprocessing, [AAMI Recommended Practice, 1985]

5- AIDS; AIDS virus, being a member of the family of human retroviruses appears to be susceptible to detergents and alcohol.

Instruments should be placed in Cidex [gluteraldehyde] while they are still wet and place for 30 minutes then should be washed and gas sterilized by Ethylene Oxide.

It is expected that this treatment will inactivate all known infectious agents recognized in AIDS, **[Safai, 1985]**.

Advantages:

1- Reduce symptom incidence during dialysis; Headache, hypotension, chest pain (11% new, 2.5% reused dialyzers), backache (much higher for new than reused dialyzers), dyspnea, fever, gastrointestinal symptoms. **[Kant et al., 1981; and Hakim, 1986]**

2- Reduced incidence of anaphylactic reactions (first use syndrome) mostly due to ETO. (Ethylene Oxide), **[Rockel et al., 1989]**

3- Decrease dialyzer biocompatibility due to protein coating of membrane (unless bleach is used in reprocessing), **[Nathan et al., 1989]**

4- Reduce dialyzer cost.

5- Rate of dialysis related hospitalization decreased by half when they are dialyzed with reused dialyzers, **[Hakim, 1989]**

6- After a month of dialysis with new caprophane membranes, predialysis neutrophils count decreased significantly and the functional determinants of these neutorphils such as chemotaxis and phagocytosis were adversely affected, but this is little with reuse, **[Hakim, 1986]**

7- Renal transplantation results in patients treated with reused dialyzers are not different from those in patients treated only with new dialyzers, **[Nathan et al., 1988]**