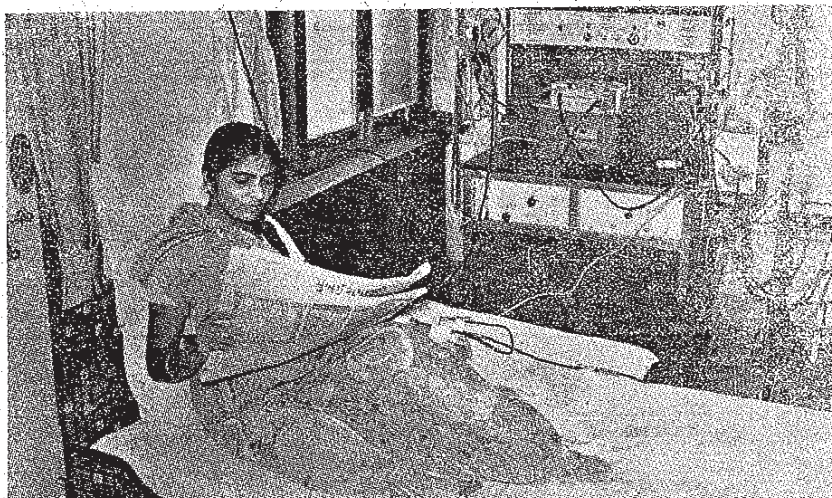


WONDERS OF HOME DIALYSIS

Coming Back to a Vigorous Life



A housewife undergoing Home Dialysis

"She was so close to death, and now she enjoys life with the fullest vigour". Sister USHA V. PATOLE's experience with Home-Dialysis was helpful in many ways. She writes :

THE aim of Home-Dialysis is to help the patient to deal with normal life. The objectives of this article are : (1) To teach the patient home-dialysis; (2) Mental Preparation; (3) Economical Adjustment; (4) Rehabilitation.

Before I could start writing about home-dialysis I would like to explain a few things about Haemodialysis and Artificial Kidney.

What is Haemodialysis : The normal human kidney is a highly complex organ which continuously regulates the amount of fluid in the body, balances the body content of certain chemicals and removes waste products from the body. The artificial kidney is a simpler device than normal human kidney. The function of it is filtration of blood and to allow to remove small molecular weight from the blood in a selec-

tive manner. This process of filtration is called *Haemodialysis*.

What is Artificial Kidney : The other name for artificial kidney is a *Dialyser*. At present, there are three designs in artificial kidneys: (1) Coil designs; (2) Parallel flow designs or *Kiil Kidney*; (3) Hollow Fibre Capillary designs.

I am going to describe parallel flow designs or *Kiil Kidney*. In 1950 Dr. Kiil and his colleagues developed a parallel flow design artificial kidney. It is commercially known as *Kiil*.

Kiil Dialyser is a very simple design to do it yourself. The kidney consists of three poly-propylene boards, with two sheets of cuprophane membranes between each board. The blood compartment is formed between two cuprophane sheets. The dialysate compartment is located outside (dialysate means dialysis fluid). The blood compartment is formed between the outside of the cuprophane sheet and the polypropylene boards. These cuprophane sheets are placed on plastic boards called *Blood Parts*. These blood parts are between two

cuprophane sheets. These provide access for the blood to the membranes. These parts must be assembled for each dialysis. The three polypropylene boards are fixed together with special clamps. Therefore, the blood and dialysate compartments remain constant.

The cuprophane membrane is secured by a rubber gasket, located only on one side of the membrane. This contains fine long grooves that permit the dialysis fluid to flow from one end of the *Kiil Board* to the other. These grooves also help to support the cuprophane membrane and increase the surface area of the membrane. Blood is introduced into blood compartment, so the blood part which is sandwiched between two cuprophane membranes, immediately after blood is introduced through blood part, and a manifold is formed because the layer is thin. A divider at the board which has no grooves prevents shunting of the blood. It is possible for blood and dialysate to flow in the same direction or in opposite directions. This counter current flow is somewhere more efficient since a layer gradient is maintained over the entire membrane. It is necessary that the blood layer and dialysate layer be as thin as possible to allow maximum exposure of blood and dialysate to the membrane surface. So this is an ideal outline of *Kiil Dialyser*.

INTRODUCTION AND PATIENT'S HISTORY

As I am a Private Nurse one morning I got a case of *Chr. Renal Failure with Renal Hypertension*. A female patient, aged 38, with long black hair, fair skin, named Mrs. G, who has two sons and two daughters. Husband, Mr. R, is a businessman and is well to do. Mrs. G. is SSC passed but not much fluent in English. No other member is in touch with medicine.

Medical History No history of Renal Failure in family. I found Mrs. G was suffering from cough, vomiting, breathlessness, restlessness, severe bodyache (pain in legs specially), itching, swelling all over the body and face. And she was irritated. No appetite, no output. She never got any relief with the drugs, which were prescribed by the doctor, and it was found that she was badly in need of Haemodialysis. Very next day she was taken to the hospital, where she had done arterio-venous anastomosis on left hand. It is a very small operation under L. A. joining two prominent blood vessels, for advantage of good blood flow. She was taken for the Haemodialysis programme on the decision: either Home Dialysis or kidney transplantation. But as she failed in getting a kidney donor, her family doctor decided to train her for Home Dialysis programme. Mrs. G started her first lesson on June 20, 1974. It was an absolutely new surrounding for her. As soon as she entered the dialysis department, she was nervous and irritable. It took quite long time to make her understand the importance of dialysis. Inj Calmose 2cc was given I.V. to prevent convulsions as she was not on Tab. Dilantin. I too was new for the Haemodialysis training. I found that seven patients were dialysing daily in the department and it was the best opportunity to me to learn things fast. After the dialysis she was discharged from the hospital and asked to come from home for hospital dialysis treatment 30 hrs. in a week (10 hrs. per sitting). Mrs. G. showed her best changes, physical and mental, with Haemodialysis treatment and started taking interest in her surroundings. Mrs. G, Mr. R and myself took training within 4 to 6 weeks but as her machine was to come from abroad, she had hospital dialysis for a few weeks. As soon as her machine came, within 10-15 days we learnt the machine and she was permitted Home-Dialysis.

CLINICAL NOTES ON HOSPITAL DIALYSIS

A. Laboratory Investigations : Every month her blood chemistry was done, pre- and post-dialysis.

B. Radiology Findings : Every month X-ray chest, X-ray hands,

FIRST MONTH

Blood Test	Patient's Range		Normal Range
1. Urea Nitrogen	Pre-dialysis	Post-dialysis	
2. Uric Acid	104.0 mgm%	33.0 mgm%	10-20 mgm%
	11.3 mgm%	5.0 mgm%	Male 2.1-7.8 mgm
			Female 20.-6.4 mgm
3. Sodium	135.0 MEG/L	139.0 MEG/L	135-145 MEG/L
4. Potassium	4.3 MEG/L	3.95 MEG/L	3.5-5.0 MEG/L
5. Calcium	9.5 mgm%	10.7 mgm%	8.5-10.5 mgm%
6. Haemoglobin	6.5 gms%	6.7 gms%	Male 13.0-18.0 gms%
			Female 11.5-16.5 gms%

Last month it was done only pre-dialysis as it was considerably in control.

LAST MONTH

Blood Test	Patient's Range		Normal Range
1. Urea Nitrogen	52.2 mgm%		10-20 mgm%
2. Uric Acid	6.8 mgm%		Male 2.1-7.8 mgm%
			Female 2.0-6.4 mgm%
3. Sodium	138 MEG/L		135-145 MEG/L
4. Potassium	4.5 MEG/L		3.5-5.0 MEG/L
5. Calcium	9.4 mgm%		8.5-10.5 mgm%
6. Haemoglobin	7.4 gms%		Male 13.0-18.0 gms%
			Female 11.5-16.5 gms%

X-ray pelvis was taken; Mrs. G. showed satisfactory results.

C. Nerve Conduction Study : Every month nerve conduction study was done; result was satisfactory.

D. Intake : When Mrs. G. was on hospital dialysis programme she was on a strict salt-free diet, after

few dialyses her B.P. and weight were in control. She was put on 1 gm salt o.d., low potassium, low protein, normal fluid 700 ccs.

E. Output : Her daily output was 150-200 ccs.

F. Medicine : Mrs. G. was getting the following :

Medicine	Dose	Time
1. Tab. Aldomet	125 mg	B.d
2. " Folic Acid	15 mg	Post-dialysis
3. Cap. Becasule	i A/d	P.C.
4. Sanatogen Powder	2TSF	T.d.s.
5. Sterogyl drops	1/2 cc	
	(10,000 units)	
6. Inj. Infeon	2 cc	o.d.
	(200 mg)	twice a week
7. Tab. Novalgin	I	S.O.S.
8. Tab. Foristal	I	S.O.S.

As Mrs. G. was allowed Home Dialysis, Mr. R. arranged for a Home Dialysis set-up.

Home Dialysis Set-Up

1. **Site :** Good ventilated bright lighted bedroom was chosen, sanitary and water arrangement was done, the main water tank was fixed on terrace, which has been giving continuous water supply for 10 hrs. (pressure 20 lbs/square inch) and as Mr. R. is well to do, air conditioner was planned, artificial kidney and machine was placed at a convenient site.

2. **Emergency drugs :** Following emergency drugs were kept ready :

Drugs	Quantity	Drugs	Quantity
1) Inj. Xylocain	2 vials	Tab Calmpose	ten Tabs
2) " Novalgin	1 vial	" Stemetil	10 "
3) " Adrenaline	5 Amps	" Novalgin	10 "
4) " Calmpose	5 Amps	" Foristal	10 "
5) " Serpasil	5 "		
6) " Stemetil	5 "		
7) " Protamin Sulphate	5 Amps		
8) " Coramine	2 Amps		
9) " Coramine	2 Amps		
10) " Antestine	2 "		

3. Nursing Equipments :

Equipments	Qty	Equipments	Quantity
1. Small sterilizer	1	B.P. Apparatus	1
2. Steel Kidney trays	2	Stethoscope	1
3. Steel small bowls.	3	I.V. sets	4
4. Steel artery forceps	8	Blood sets	2
5. Steel paired surgical scissors	2	Waste paper baskets	1
6. Steel Cheatle's forceps	1	Plastic buckets	2
7. Syringe tray	1	Mackintoshes	2
Tray to keep sterile scissors	1	Glass syringes	20 cc 4
8. Dressing scissors.	1	" "	10 cc 4
		" "	5 cc 4
		" "	2 cc 4
Needles—from No. '20' to '24' all '12'		Dettol	
Adhesive plaster		Sulpha Powder	
Spirit		Clean Towels	All equipment
Tr Iodine		Soap solution	for artificial
Tr Benzoin-Co		Milton lotion	kindey, we got
Gauze, cotton		Formalin	alongwith ma-
		Normal Saline	chine itself.

After setting everything, she was permitted to do Home Dialysis. And as it was convenient to bring dialysis fluid from hospital laboratory, we did not make an attempt to make dialysis fluid at home. Previous evenings we kept haemodialysis set ready. (I have been sterilizing

gauze, cotton in pressure cooker and other things in sterilizer). It was a hrillinge xperience to me for home-dialysis.

HOME DIALYSIS

1st Dialysis: Before starting dialysis, we rinsed the kidney with normal saline (as it was filled with formaline lotion) with the help of kidney machine, which works on electric supply. I kept dialysis set ready, machine and fluid checked, standing and lying BP was taken; standing BP 170/100, lying BP 180/110. Pre-dialysis weight was taken,

This was because Mr R was hesitant to put canula. I adjusted it properly and Mrs G had good blood flow. The second problem was after connecting venous canula Mrs G had slight venous spasms. Hot water bag was applied, she got relieved, we were very much particular about sterilisation, so there were no chances of pyrogenic infection. I checked pulse BP hrly. There was no need to check temp. I hrly.

2. **Mechanical Problems :** I kept a continuous watch on the machine, and I found that Inj. Heparine pump was defective (Pump was not pushing Inj. Heparine properly), so I had to push Inj. Heparine 1 cc I hrly; dose was 1,500 units 1 hrly. Otherwise there were no problems.

3. **Diet:** By this time Mrs G was permitted full diet with 3 gm salt o-d and normal fluid 1,000 ccs (1 litre). And as her potassium level was in control she was allowed to take one fruit and salad. I made her sit in the bed and gave her food.

4. **Medicine:** I gave her the same medicines which she was getting in the hospital. Tab Aldomet was omitted after 5 months. Water soluble vitamins were given to her; they were dialysed out during dialysis.

5. **Output:** Her daily output was 120-150 ccs.

6. **Termination of the Dialysis:** Mrs G had dialysis for 10 hrs. After 10 hrs, I terminated her dialysis, tourniquet applied. Post-dialysis weight, standing, lying B. P. was taken. Weight 44.0 Kgs, standing B.P. 140/100, lying BP 160/100. Post-dialysis medicines were given. No post-dialysis complaint except weakness; usually the patient feels weak and fatigued after dialysis.

2nd and 3rd Dialyses: These two dialyses started at the same time. The same procedure was carried out before dialysis. It went on smoothly. Inj. Heparine pump was repaired so there was no problem. After 10 hrs I terminated her dialysis, and gave some routine nursing care; no post-dialysis complaint.

this is to see the difference, weight 45.0 Kgs. Mental assurance was given, R.N.C. carried out and dialysis started at 8 AM. First day I had to face some problems.

1. **Medical Problems :** The first main problem was poor blood flow.

4th Dialysis: Mrs G had routine pre-dialysis nursing care and dialysis started at the usual time, but 2 hrs after starting dialysis Mrs G had temp 100° F. I gave her Tab. Novalgin 1 stat; temp came down upto 99° F. She had itching throughout the dialysis. Tab Foristal 1 Mg. given; Mrs G got relief but it was temporary. She had routine nursing care during dialysis. After 10 hrs, I terminated her dialysis. Post-dialysis procedure carried out, Mrs G had complaint of weakness.

5th Dialysis: Dialysis started at the same time, but on 5th day also Mrs G had temp. round about 100° F. It came down with Tab Novalgin. And it was suspected that it must be due to water being pyrogenic.

6th Dialysis: Pre-dialysis procedure carried out and dialysis started at the usual time. It was going on smoothly but after 5 hrs Mrs G had a sudden fall of BP, 90/50. I made her rest, lying down. Negative pressure brought down upto '0'. Blood pump speed decreased to '25'. *(Artificial kidney runs by kidney machine with electric supply. This machine has been arranged with all meters. With blood pump, water pressure meter is known as Negative Pressure).* I gave her 5% I. V. normal saline 50 ccs, some salty food to eat. After giving treatment BP came upto 120/80, Mrs G felt better, again after some time she had her usual diet, and the dialysis continued. After 10 hrs I terminated dialysis and gave routine post-dialysis care. Mrs G complained of weakness after termination.

7th Dialysis: After giving routine pre-dialysis nursing care I put her on at usual time. But after 4 hrs I found Mrs G was developing some blood clots around the blood tubings. I took her clotting time, it was less than normal. So I increased the quantity of Inj-Heparine (*Blood clotting time 4 hrs after starting dialysis should be 30-70 minutes*). For the next dialysis with permission from the doctor, Inj Heparine dose was increased to 1,000 units per hour. There were no more clots and dialysis went on smoothly. I terminated dialysis after 10 hrs and gave routine post-dialysis care.

Usually, she put on weight upto 1 Kg. during the interval of the

dialyses, and at the same time she lost almost 1 Kg.

8th Dialysis: As usual the dialysis started and as she had fall of BP on previous dialysis, we kept her on 'O' negative pressure. So she did not lose her weight much. On the 8th dialysis, I found that she developed Oedema on ankles and face, as per doctor's permission we tried to lose her weight during dialysis, (her pre-dialysis weight was 50 Kgs). Dialysis went on smoothly but at the end of the dialysis Mrs G had cramps in legs and fingers. This was due to more fluid being taken out of the body. As soon as I returned the blood back, cramps subsided on their own. Mrs G had routine post-dialysis nursing care. Her post-dialysis weight was 48.0 Kgs. Mrs G was feeling weak and fatigued.

9th Dialysis: Dialysis started at the usual time. Usual pre-dialysis procedure was carried out. There were no medical problems, but after one hour the temperature indicator got defective, and all of a sudden the machine temperature went upto 45°C (normal temp 38°C). With the help of Mr. R it was repaired; temperature came down to normal, and the dialysis went on. After 10 hrs I terminated her dialysis. Post-dialysis nursing care was carried out.

10th Dialysis: Pre-dialysis routine procedure carried out. Dialysis started at the usual time, but on commencement the machine gave blood leak alarm and I found that blood was getting mixed in dialysis fluid. At once I put negative pressure at '50', blood pump speed on '25' and terminated the dialysis, kept canulas in Inj. Heparine 2000 units through canulas (1,000 units each canula) with the help of Mr. R, I rebuilt the kidney and restarted the dialysis. Two hours after starting the dialysis Mrs G had chill. I covered her with blanket, applied hot water bag case, hot coffee and Tab. Novalgine T stat was given. After 1 hr, she felt better. Dialysis went on smoothly. After 10 hrs. I terminated her dialysis, and the post-dialysis procedure was carried out.

REHABILITATION

In the beginning she used to feel the dialysis procedure itself was like undergoing major surgery.

She used to lie down in the bed day and night like an operation patient. She never used to allow to touch her fistula side hand. I made her understand that the dialysis procedure was as easy as going and voiding in the toilet. In the beginning she used to lie down in the bed on the dialysis day. Now she sits in the chair during dialysis, reads, cracks jokes, tackles household activities. She moves around the machine, and with her other hand she helps to put on her dialysis and terminates the dialysis. Now she takes active part as a housewife, as she was before sickness.

CONCLUSION

On the whole, I achieved my goal, to learn about home dialysis, and teach about home dialysis. And that is just because of the best co-operation from Mr. R and Mrs. G. My patient has been asked by many people: "What about transplant?" Her answer has always been No. Not yet until the rejection problem is conquered. It is every dialysis patient's dream to be free of the burden of dialysis. However, she has done very well on dialysis, and she is thankful to God for the precious gift of life. She was so close to death and now she enjoys life in its fullest vigour. There is so much to do, to see, to live for everyday, to help one's fellowmen; that is her philosophy.

And I shall be always obliged to the doctor incharge of the department and to my professional colleagues throughout my life, who helped me in the dialysis training. My sincere thanks to them.

Executive and Council Meetings

Please note that the meeting of the Executive Committee, TNAI, prior to the House of Delegates, will be held at Lisie Hospital, Ernakulam on September 10, 1978 at 10 A.M. The meetings of the Council will be held on September 11-12 at 8.00 A.M. at the same place.

Secretary, TNAI