Original Article

Frequency of Acute Complications during Haemodialysis

Rashid Ahmed Shaikh, Shamsuddin Solangi, Suresh Kumar Rathi, Qurban Hussain Shaikh

ABSTRACT

OBJECT: to find out frequency of various acute complications during haemodialysis.
STUDY DESIGN: Prospective study.
PLACE & DURATION: The haemodialysis unit of Isra University Hospital, Hyderabad, over period of 27 months, November 2010 to January 2013.
METHODOLOGY: The Patients of end stage renal disease and advance acute renal failure provided dialysis and observed for any acute complication during haemodialysis.
RESULT: In total 176 patients, male were 166 (66%) and female were 60 (34%). A total of 2171 haemodialysis session were performed. Hypotension was observed during 12 (5.84%) dialysis session, Hypertension in 77 (3.54%) session. Vomiting in 70 (3.22%), muscles cramps in 67 (3.08%), fever in 33 (1.52%), Headache in 20 (0.9%) and chest pain 21 (0.96%) dialysis sessions.
CONCLUSION: Haemodialysis is a life saving treatment procedure but it is not without complications and frequent complication are hypotension, Hypertension, Muscle cramps and vomiting.

KEY WORDS: Haemodialysis, end stage renal disease (ESRD), complications, acute renal failure (A.R.F).

INTRODUCTION

The renal failure is common problem all over the world. It may be acute or chronic. The chronic kidney disease defined as decrease in the GFR less than 60 ml/min/1.72m^2 [(1)]. Chronic kidney disease affect up to 20 million American and most are asymptomatic [(2)]. In Indo-Asian population approximately 15-20 percent of persons 40 years of age or older have reduced estimated GFR[3]. End stage renal disease where damage is irreversible to such an extent that patient cannot sustain life without Dialysis or transplant [(4)]. The incidence of ESRD in United State is 268/million population / year [(5)]. While in our country is 140/million/year [(6)]. There are 195 Dialysis center all over the country in Pakistan to dialyze these patients [(7)]. The number of patients kept alive dialysis increasing in United State 7% per year [(8)]. In haemodialysis blood taken from patients and passed through a dialyze which removes uremic toxins and after that blood is returned back to the patient. In 1943, William Knoff introduced the first dialyze suitable for haemodialysis at Groningen University Hospital in Holland [(9)]. With the wide spread available of dialysis, the lives of many millions patients with renal failure have been prolonged.

Although Haemodialysis life saving and safe treatment procedure with less complications acute or chronic; no local study has been conducted on this procedure in our population. These complications can occur during dialysis or in between dialysis. This is aimed is to observe frequency of various acute complications during haemodialysis.

PATIENTS AND METHODS

This prospective study was performed at haemodialysis unit of nephrology department at Isra University Hospital, Hyderabad over period of 27 months, November 2010 to January 2013. The patients of A.R.F and E.S.R.D required dialysis (table 1), after taking consent and explanation of procedure were included in this study. Those patients who were not willing for haemodialysis, or not fit for haemodialysis as patients with severe hypotension despite giving ionotropic support. The patients of high risk like severe hypertension, massive pulmonary edema, severe metabolic acidosis, coma and convulsion were not included in this study although dialysis was performed. Before dialysis Anti HCV and HbsAg and HIV were screened in each patient. Initially for few weeks dialysis was started through double lumen subclavian catheter (12-15cm) and then through Arterio - venous fistula particularly in ESRD patients. The X-ray chest was done in every patient after passing the catheter to see the position, which ideally needs to be at the junction of superior venacava and right atrium. Where we were unable to pass the catheter in right jugular or subclavian vein, then it was passed either left subclavian vein or femoral vein of either side. The dialysis was performed on ultra filtration controlled Tory 321 dialy-

sis machine. The haemodialyzers were of type polysulfone membrane (Fressineus). The dialyzer was used 1-4 times under reused program. The dialysate used was standard Bicarbonate solution.

Pre and post dialysis weight was noted for each patient to achieve "weight" means patients is neither over hydrated nor dehydrated and also pre and post dialysis blood pressure and blood urea, serum creatinin and serum electrolytes were done in each patients.

The haemodialysis was performed for 2-4 hours depending subject to subject. During dialysis, pulse, B.P were regularly monitored. During procedure each patient was monitored for possible acute complication like Hypotension, muscles cramps, vomiting, headache, chest pain, fever and itching. Any sort of technical problems were also monitored. Hypotension during haemodialysis labeled, when systolic B.P drops 20 mmHg of baseline or more or when systolic blood pressure is less than 88 mmHg with weak and rapid pulse cold, clammy skin and dizziness. Echocardiogram for left ventricular dysfunction was done in those patients having two or more episodes of hypotension. The hypertension during dialysis procedure was labeled when systolic B.P is increased by 20 mmHg or more of baseline, or diastolic B.P increased by 10 mmHg or more with or without symptoms like headache, vomiting and difficulty in breathing or chest pain.

***Indicators for Dialysis**:*

1. Moderate to severe Metabolic Acidosis (PH < 7.2) due to renal failure.
2. Fluid over load not giving response to diuretics.
3. Pulmonary edema (uremic)
4. Moderate to severe Hyperkalemia (K > 6 mmol/l).
5. Uremic syndrome (Nausea, vomiting, Anorexia, Loss of weight etc.)
6. Uremic Encephalopathy (altered behavior, convulsion, drowsiness, coma)
7. Uremic Pericardits.
8. Uremic Neuropathy
9. Serum creatinin more than 6 mg/dl in Diabetic and more than 8 mg/dl in non diabetic patients.

Data analysis:

The data were evaluated in SPSS version 11.0 Simple frequencies with percentage were calculated for qualitative variables and were presented as n(%).

RESULTS

A total 2171 dialysis sessions were performed in 176 patients over a period of 27 months and observed for complications. Male patients were 116 (66%) and female 60 (34%) **(Figure I)**.

Age ranges form 10-77 years with mean 39.6. Out of total 176 patients the patients of ARF who required dialysis were 11 (6.25%) and their causes are shown in **(Table I)**. the patients of ESRD were 165 (93.75%) and their causes shown in **(Table II)**.

The double lumen catheter was used in 369 (17%) and A-V fistula was used in 1801 (83%) of dialysis sessions. On an average each patient received two dialysis sessions per week and each session was of 2 -4 hours of duration. The mean blood flow, dialysate flow and ultra filtration rates were 210 ml/minute, 500L/minute and 500ml/hour respectively.

The haemodialysis procedure was carefully monitored for any possible acute complication. The most frequent complications were related to Blood Pressure, either Hypotension or hypertension. Hypotension was seen during 127 (5.84%) dialysis sessions whereas Hypertension was seen during 77(3.54%). Other observed complications were muscle cramps during 67 dialysis sessions and vomiting during 70 sessions **(Table III)**.

FIGURE I: GENDER DISTRIBUTION (n=176)

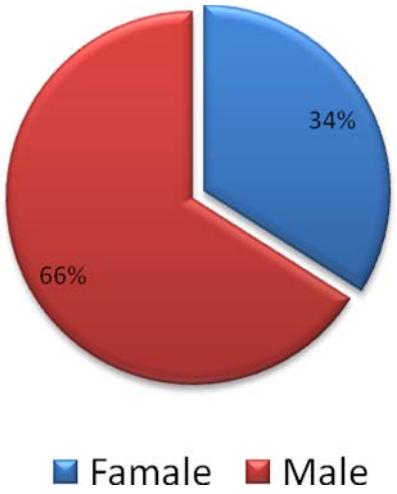

TABLE I: CAUSES OF A.R.F. (n = 11)

Cause	n%
ATN (Ischemic)	8(72.7)
Lupus Nephritis	1(9.0)
Snake bite	1(9.0)
Rhabadomyolysis	1(9.0)

TABLE II: CAUSES OF ESRD (n=165)

Cause	No. of Patients	Percentage%
Diabetic Nephropathy	62	37.58%
Hypertensive Nephropathy	51	30.91%
Chronic G.N	27	16.37%
Renal Stone Disease	11	6.67%
Cause not known	10	6.067%
BPH causing obstructive Nephropathy	02	1.22%
Multiple myeloma	01	0.61%
Adult polycystic	01	0.61%

TABLE III: ACUTE COMPLICATIONS DURING HAEMODIALYSIS (n = 2171)

Complication	No. of Sessions	Percentage
Hypotension	127	5.84
Hypertension	77	3.54
Vomiting	70	3.22
Muscle Cramps	67	3.08
Fever	33	1.52
Chest Pain	21	0.96
Headache	20	0.9

DISCUSSION

Although haemodialysis is a life saving and relatively safe, several complications may still arise. Some are inherent side effects of the normal extra corporeal circuit; some results from technical errors, and yet others are due to abnormal reactions of patients to the procedure [12]. In last decade, there has been better understanding of dialysis, significant improvement and monitoring of equipments by dialysis personnel, due to which complication during haemodialysis has been decreased, for example episodes of Hypotension due to change of Dialysate solution from Acetate to Bicarbonate solution. Acute complications can be mild and transient to sever even fatal like chest pain due to Myocardial infarction, dyspnea and arrhythmias [10, 11, 21]

Hypotension is a frequent complication during haemodialysis [12, 13] as in our study; it is most common of all complications (5.84%) (Table III). The possible causes of Hypotension during haemodialysis [14] are excessive ultra-filtration rate, increase in interdialytic weight gain, impaired sympathetic activity, vasodilatation in response to warm dialysate as well as splanchnic pooling of blood while eating during dialysis. In one local study Hypotension was found in 3.48% of dialysis session in comparison to our study 5.84 %[15].In other local study on children hypotension was found in 13% of dialysis session [16]. Some of these factors may be avoided to prevent hypotension during dialysis i.e. use of the Bicarbonate dialysis solution can reduce chances of hypotension, and headache is negligible [17, 19, 20]. Hypertension is another complication, was seen in 3.54%of dialysis session in our study in comparison to one local study on children, it was observed in 40-46% of dialysis session [16].

Moreover 75% patients with ESRD, have hypertension [18] and the BP control may worsen during haemodialysis. At the time that regular dialysis is begun 50-80% patients have Left Ventricular Hypertrophy[4].

Hypertension develop or worsen during haemodialysis may be due to sympathetic over activities, Inconsistency in measuring BP, because presence of functioning access in on extremity so restrict blood pressure measurement, no consensus in regard to optimal timing of BP measurement during haemodialysis[18]. The vomiting (3.22%) and muscle cramps (3.08%) may be due to electrolytes imbalance like hponatremia, hypotension, and changes in serum osmolality during haemodialysis [14]. Other rare complications observed in our study were, fever (1.52%), chest pain (0.96%) & headache (0.9%).

CONCLUSION

Haemodialysis is a life-saving treatment modality, but is not without risk of complications. These complications are not uncommon and fortunately these are not life threatening. With recent advances in understanding of dialysis, hemodialyzer, and change of acetate dialysis solution to bicarbonate, these complications have been reduced.

Hypotension, hypertension vomiting and muscle cramps were the frequent complications in our study. Better control of pre-existing hypotension, hypertension, proper estimation of dry weight, vigilant observation by well-trained dialysis staff can minimize the risk of these complications and so risk to life.

REFERENCES

1. Jafar TH. The growing Burden of chronic kidney disease in Pakistan. N Eng. J. Med: March 2006;354: 995-7.
2. Stephen J. Mc PHEE, MAXINE A. Chronic kidney disease. Current med: Diagn and treat; 51ed: 2012; 874-911.
3. Jafar TH, Hactcher J, chaturvedi N, Levey As. Prevalence of reduced estimated GF in Indo

Asian population. Am sex: Nephrol 2005; 16: 223.
4. Gabriel M. Donovitch. Opptions for patients with end stage Renal Disease. Hand book of kidney transplantation, 4thed: 2005; 1: 1-16.
5. Incidence and prevalence of ESRD: U.S renal data system Am. J Kidney Data System 1998 (2 supp 1.1) 32. 38-49.
6. Nasir H, Kumar, H, hussain R, Naqvi SAJ, Jamil B. pericardial effusion as a cause of morbidity and patients on maintenance haemodialysis is preventable: Pak Med: Assoc 2001; 52: 146-8.
7. Naqvi SAJ, Jamal B. Dialysis Registry of Pakistan. The Kidney foundation, Dialysis facility 3rded: 2006; 32.
8. Haman WE, Jab KL. Haemodialysis In. Bratt T.M AnveredHamon WE, (ed:) Pediatric Nephrology. Baltimore: Lippie cottWillian and Wikns 1999: 1267-87.
9. Kolf WJ, dekunstmatigeNier (The Artificial kidney) unpublished MS thesis. The Netherlands: University Gronougen 1946.
10. Kapa S. Qian Q. 84 - year old woman with Hemodialysis - associated shortness of breath. Mayo clinProc 2009..
11. Weiner, DE, Nisholls, AJ, Sarnak, MJ. Cardiovascular disease. In: Handbook of Dialysis, Daugirdas, Blake, PG, Ing, TS (Eds), Lippincott Williams & Wilkins, Philadelphia 2007. p. 626
12. Cheung A.K. Haemodialysis and Haemofiltration. Primer on kidney disease. National kidney foundation, 2005; 4th edition 60: 464-76.
13. Dumler F, StallaK; Mohni R. Acute complications during haemodialysis. Am J kidney Dis 1992 Jan; 19 (1): 49-56.
14. Daujirdas J, Black P, Ing T. Complication during haemodialysis Hand book of Dialysis 3rded; 2001;11:115-142
15. Hafeez F. Acute complications of haemodialysis in Paediatric age group. J Coll Physicians Surg Pak May; 2005; 15 (5) 280-3.
16. Hamid H, Ahmed I, Ali A.S. Acute complication of haemodialysis in children. Pak Paed J Sep 2003; 27 (3): 108-12.
17. Man NK, Fournier G, thirteen P. Effect of bicarbonate containing dialysate on chronic haemodialysis patients with persistent: a comparative study Artif. Organs 1982; 6: 421-8.
18. Wilederkehv M, Toto R, Fenves. Hypertension and the Kidney. Seminar in Nephrology July 2005 vol 25. No. 4, 436-43.
19. Milinkovic M, Zidverc-Trajkovic J, Sternic N, et al. Hemodialysis headache. ClinNephrol 2009; 71:158.
20. Van Brussel MS, Koppius PW, Schut NH. Headache during hemodialysis- an uncommon cause for a common problem. ClinNephrol 2008; 69:219.
21. Voroneanu L, Covic A. Arrhythmias in haemodialysis patients. J Nephrol 2009; 22:716.

AUTHOR AFFILIATION:

Prof. Rashid Ahmed Shaikh *(Corresponding Author)*
Department of Nephrology
Isra University Hospital, Hyderabad, Sindh-Pakistan.
Email: prof.shaikh@yahoo.com

Dr. Shamsuddin Solangi
Assistant Professor , Department of Medicine
Isra University Hospital, Hyderabad, Sindh-Pakistan.

Dr. Suresh Kumar Rathi
Associate Professor, Department of Medicine
Isra University Hospital, Hyderabad, Sindh-Pakistan.

Dr. Qurban Hussain Shaikh
Registrar, Medicine Department
Jinnah Postgraduate Medical Centre, Karachi, Sindh-Pakistan.