

# Postoperative Hypotension as a Complication of General Anaesthesia After Dialysis - A Retrospective Study

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## ABSTRACT

**Introduction:** In present medical scenario relating to the renal failure patients in order to enhance the quality of life of such individuals the best modality is the dialysis. This procedure itself involves lot of risk & can complicate the medical condition. The patients experiencing renal collapse are at more risk for increased metabolic & heart related issues though they are on treatment of dialysis. Dialysis itself can lead to the condition where other systems are compromised. Study aimed to find out the haemodialysis-to-general-anaesthesia time interval and post-operative complications in haemodialysis patients in order to better define a more optimal pre-anaesthetic waiting period.

**Material and Methods:** A retrospective study was carried on patients with end-stage renal disease managed by chronic haemodialysis. The time gap between the haemodialysis end & the introduction of general anaesthesia was calibrated from the records available from the inpatient & outpatient files. The side effect after the end of anaesthesia post operatively was recorded in our databank. based on the available information from the records document between the haemodialysis & general anaesthesia, the subjects were divided into three groups: Group 1 interval >24 hours; Group 2 interval from 7-23.9 hours; or Group 3 interval < 7 hours.

**Results:** Demographic and illness scores were not different between groups. The only difference in complications was postoperative hypotension, which was more common in Group 3 than either Group 1 or 2.

**Conclusion:** The present study results suggest that it is prudent to put a time lag the elective & urgent induction of general anaesthesia for major surgeries for about 7 hours subsequent to haemodialysis in order to minimize hypotension.

**Keywords:** Dialysis, Delirium, General Anaesthesia, Hypotension, Hypertension

## INTRODUCTION

Dialysis is the medical procedure where the unwanted material & excess water is moved out the body in order to maintain the healthy condition of the body. It represents a contrived of kidney functioning, especially in the cases where there is renal failure. End-stage renal disease (ESRD) requiring dialysis is a growing problem worldwide. Dialysis cannot carry out the entire function what the kidney do but to a greater extent manages to do the diffusion & ultrafiltration functions. This dialysis is usually advised or performed in patients who has chronic renal failure (CRF) where the glomerular filtration rate is below 15 ml/min/1.73m<sup>2</sup>. The procedure of dialysis can be accompanied by moderate (hypotension, muscle cramps, anaphylactic reactions) to intense cardiovascular consequences.<sup>1-4</sup>

A literature evidence show that cases undergoing haemodialysis is associated with 50% chances of hypotension events. So it is more likely that haemolysis & induction of general anaesthesia in quick intervals could lead to increased in hypotension as well. The body needs to clear off the fluids & excess material through a specialised process call ultra filtration. During this fine procedure hydrostatic pressure across the dialysis membrane is increased to push the solvents from blood it on the dialysate. There are chances that during this some solute could be carried with it. The end result is a relatively hypovolemic blood compartment with lower oncotic pressure leading to further decreased in the intravascular volume.<sup>5,6</sup>

The problem with this method is that serum sodium levels regulate thirst & cause patients to drink excessively & gain fluid in the interdialytic period. Therefore, patients are not routinely given with sodium to maintain the oncotic pressure. This lead to a good amount of fluid moving from the intravascular space to the extra vascular (intracellular) space. Simultaneous transfer of heat from dialysate to patient also tends to decrease blood pressure through vasodilation.<sup>7,8</sup> We carried this study to find out the haemodialysis-to-general-anaesthesia time interval and post-operative complications in haemodialysis patients in order to better define a more optimal pre-anaesthetic waiting period.

## MATERIAL AND METHODS

After obtaining institutional ethics committee approval and written informed consent from all the subjects, this study was carried on patients with end-stage renal disease managed by chronic haemodialysis. The study was carried out in the department of anaesthesia at Prathima Institute of Medical Sciences, Karimnagar, Telangana state, India, from March 2016 to March 2018.

### Inclusion Criteria

Patients with end-stage renal disease managed by chronic haemodialysis

Adults maintained on haemodialysis for at least 3 months

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prior to general anaesthesia and who received it for surgery.

**Exclusion Criteria**

Patients managed with peritoneal dialysis. Patients undergoing procedures with fluid shifts in excess of those predicted from preoperative haemodialysis (cardiopulmonary bypass, veno-veno bypass, liver transplantation, and intra-operative haemodialysis). Patients found with incomplete documentation of the timing of haemodialysis. The time gap between the haemodialysis end & the introduction of general anaesthesia was calibrated from the records available from the inpatient & outpatient files. The side effect after the end of anaesthesia post operatively was recorded in our databank. based on the available information from the records document between the haemodialysis & general anaesthesia, the subjects were divided into three groups: Group 1 interval >24 hours; Group 2 interval from

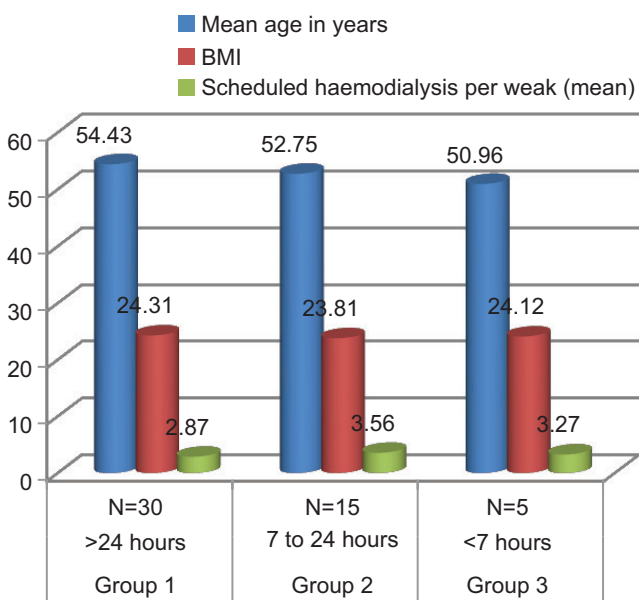
7-24 hours; or Group 3 interval < 7 hours. Complications were expressed as a percentage of each respective group. The outcome measure was the difference in complications between groups.

**STATISTICAL ANALYSIS**

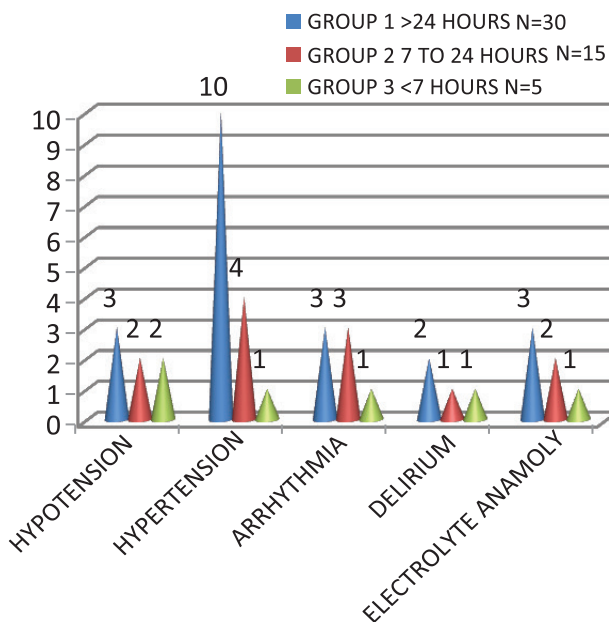
Analysis was performed using computerized statistical software (GraphPad Prism, GraphPad Software, La Jolla, CA). Continuous data were analyzed with ANOVA or Kruskal-Wallis tests. Bivariate data were analyzed by Fisher’s Test. Relative Risks and Confidence Intervals were calculated for comparisons reaching statistical significance (p=0.05).

**RESULTS**

This chart review yielded 68 chronic haemodialysis patients with surgery under general anaesthesia in the study period.



**Graph-1:** Demographic features of the study sample



**Graph-2:** Complications recorded in all the subjects

S No	Feature	Group 1 >24 Hours N=30	Group 2 7 to 24 Hours N=15	Group 3 <7 Hours N=5	P value
1	Mean age in years	54.43±12.5	52.75±13.2	50.96±13.8	0.63
2	Gender (M:F)	18:12	9:6	3:2	0.82
3	BMI	24.31	23.81	24.12	0.54
4	Scheduled haemodialysis per weak (mean)	2.87	3.56	3.27	0.72

**Table-1:** Demographic features of the study sample

S No	Feature	Group 1 >24 hours N=30	Group 2 7 to 24 hours N=15	Group 3 <7 hours N=5	P value
1	Hypotension n:(%)	3 (10%)	2 (13.33%)	2 (40%)	<0.001*
2	Hypertension n:(%)	10 (33.33%)	4 (26.66%)	1 (20%)	0,628
3	Arrhythmia n:(%)	3 (10%)	3 (20%)	1 (20%)	0.454
4	Delirium n:(%)	2 (6.66%)	1 (6.66%)	1 (20%)	0.532
5	Electrolyte anomaly n:(%)	3 (10%)	2 (13.33%)	1 (20%)	0.438
6	Death n:(%)	0 (0%)	0 (0%)	0 (0%)	NA

**Table-2:** Complications recorded in all the subjects

Of these, 18 were excluded, making a total sample of 50. Demographic and illness scores were not different between groups (Table 1 and Graph 1).

The only difference in complications was postoperative hypotension, which was more common in Group 3 than either Group 1 or 2 (Table 2 and Graph 2).

## DISCUSSION

Hypotension prior to operation is common during & after the operative period<sup>6</sup> and may be an important determinant of postoperative AKI, as well as other postoperative complications. Various definitions of intraoperative hypotension (IOH) have been evaluated in the literature, with the most common definitions being a systolic blood pressure less than 80 mmHg, a mean arterial pressure (MAP) less than 55 to 60 mmHg, and a decrease in either systolic blood pressure or MAP of 25% from baseline.<sup>9,10</sup>

However, the minimum magnitude and duration of hypotension needed to trigger harm is unclear. Walsh et al., in a large retrospective analysis, found a graded increase of AKI risk in patients with MAP less than 55 mmHg of more than 1min and a modest risk of AKI with MAP of 55 to 59 mmHg lasting for more than 5minutes.<sup>11</sup>

Cases in which the time gap between the end of procedure of haemodialysis & induction of general anaesthesia was below 7 hours were detected with have a increased risk of developing post-operative hypotension that requires treatment, independent of surgical urgency. In our present study important point to be noted is that it involved very few ASA 5 patients. Since ASA status is more useful for predicting the operative mortality the teasing out individual factor of risk. We observed that this is measure of inert observer variability. Furthermore it is a valid observation that such a study could be a path breaking in recognizing sub-groups in which our association may hold truer than in others.

### Limitations:

Retrospective nature of our study and thus our inability to review the haemodialysis prescriptions of patients dialyzed at independent outpatient haemodialysis centers.

The variability between haemodialysis prescriptions. Many factors contribute to the rate & degree of shift of fluids during & following the dialysis treatment including fine filtration rate/amount dialysate sodium, calcium contents patients' pre haemodialysis solute load.

The most important limitation of our study was the low number of emergency surgeries included.

Hence a prospective study with blinding and controls on haemodialysis interval/prescription may provide a better delineation of haemodialysis timing and prescription for outpatients.

## CONCLUSION

The present study results suggest that it is prudent to put a time lag the elective & urgent induction of general anaesthesia for major surgeries for about 7 hours subsequent to haemodialysis in order to minimize hypotension. Planning

before the operation and visually the situation can make an immense impact on a patient's mentality, even well into the post-operative period. Studies putting light on the effect of various dialysis modalities and varied ways of coordination of dialysis with surgery may be valuable in finding ways to optimize patient outcome and efficiency.

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