

INCIDENCE AND RISK FACTORS OF INTRADIALYTIC HYPOTENSION IN CHRONIC DIALYSIS PATIENTS

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ABSTRACT

INTRODUCTION: Intradialytic hypotension is a common clinical complication that patients on renal replacement therapy encounter during their hemodialysis sessions. It is associated with decreased dialysis compliance and increased morbidity in patients on chronic hemodialysis. Both patient-specific factors (autonomic insufficiency, cardiac disease) and dialysis treatment-related factors (ultrafiltration, increased core body temperature) are thought to have significant causative roles. we conducted a prospective cross-sectional study, to explore the magnitude of the problem; the incidence of Intradialytic hypotension, and its risk factors in thrice weekly chronic hemodialysis patients.

RESULTS: The estimated incidence of hypotensive episodes reached to 70% of dialysis sessions in group A. being symptomatic in 77.9%, with 61.5% of episodes occurred during 3th hour of dialysis session. This group of patients may be related to excess ultrafiltration more than 2 Kg every session of hemodialysis (61%). Anuria found to be a strong and significant risk among cases with IDH with (15) i.e (75%) of patients in comparison to 5 controls i.e. 25%.

CONCLUSION: Intradialytic hypotension is an important cause of morbidity among dialysis patients. Anuric patients tended to develop IDH more than oliguric ones. Patients with CKD who are at risk for IDH may require evaluation for the presence of underlying cardiovascular and autonomic function.

Keywords: Intradialytic hypotension, hemodialysis, ultrafiltration, anuria

INTRODUCTION

Intradialytic hypotension is a common clinical complication, that patients on renal replacement therapy encounter during their hemodialysis sessions. It is associated with decreased dialysis compliance and increased morbidity in patients on chronic hemodialysis. Both patient-specific factors (autonomic insufficiency, cardiac disease) and dialysis treatment-related factors (ultrafiltration, increased core body temperature) are thought to have significant causative roles (1).

Intradialytic hypotension (IDH) estimated to occur in 15% to 20% of hemodialysis (HD) patients (1), Symptomatic IDH is generally defined as a decrease in systolic blood pressure (BP) of at least 10 mmHg or a systolic BP less than 100 mm Hg, with symptoms such as cramps, nausea, vomiting, and dizziness. Repeated episodes of symptomatic as well as asymptomatic IDH contribute to adverse outcomes for the dialysis population, especially in elderly and cardiovascularly compromised patient, leading to early termination of dialysis, inadequate fluid removal, and reduced efficacy of the dialysis therapy. Therefore prevention of IDH remains an important chal-

lenge to dialysis physicians. (2). A symptomatic reduction in blood pressure during or immediately after dialysis occurs in approximately 20 -30% of dialysis sessions. The treatment includes stopping or slowing the rate of ultrafiltration, placing the patient in the Trendelenburg position, decreasing the blood flow rate, and restoring intravascular volume (3).

AIM OF STUDY

To evaluate the incidence of intradialytic hypotension, and its risk factors in thrice weekly chronic hemodialysis patients.

METHODOLOGY: patient and study design We conducted a prospective cohort study, at hemodialysis unit of Benghazi medical center, involving adult chronic dialysis patients (> six months on hemodialysis), two hundred patient were selected randomly, receiving regular dialysis therapy, they were followed for twelve weeks, recording episodes of IDH, using mercurial and sphygmomanometer. Patients with chronic gastritis or diarrheal illness were excluded from the study population. The Case control study which included

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20 patient with intradialytic hypotension and 20 patients as control group where collected from total 200 patient hemodialyzed in Benghazi medical center. The study done during 3 months from May to July 2016 (around 36 sessions for each patient). We defined hypotension episodes as any drop of systolic BP more than 20mmHg or mean arterial blood pressure (MAP), less than 65 mmHg, for the sake research simplicity. For data analysis we used the statistical software «SPSS V.18», a multivariate log regression analysis was used.

RESULTS:

According to Fig (1), The Study shows significant difference between cases & controls with regard to hypotension, where 14 cases (87.5%) in comparison to only 2 controls (12.5%) who experienced intradialytic hypotension with (p-value = 0.000, odd ratio = 0.048).

Patients on dialysis with autonomic dysfunction show an exaggerated drop in systolic and diastolic blood pressures and MAP, compared to those without underlying autonomic dysfunction. Other risk factors include older age (>60 years), female sex (intradialytic hypotension was more common among females {M: F ratio = 1:2 with odd ratio 2.33}, as seen in Fig (2), diabetes mellitus, presence of CAD, and the use of anti hypertension medication before a dialysis session.

In our study, we shows evidence of 195 episodes of intradialytic hypotension during 3 months and most of them are symptomatic with history of dizziness and vomiting and around (152) whom those underwent medical intervention.

In relation to table (1), A small group of patients (1.5%) may have low systolic blood pressure (<100 mm Hg) at the initiation of dialysis and majority of patients (61.5%) of intradialytic hypotension episodes occurred one hour before the end of dialysis session.

This group of patients may related to excess ultrafiltration more than 2 Kg every session of hemodialysis (61%) and also may related to post prandial hypotension (44.1%); as in Fig (3,4), which happen mostly in diabetic patients with persistent orthostatic hypotension due to autonomic dysfunction.

Corresponding to Fig (5), Regarding the response to management we found 42% of patients responded to normal saline while 36.2% of patients showed interrupted sessions as a consequence of hypotension.

According to Fig (6), Anuria found to be a strong and significant risk among cases with IDH with (15) i.e (75%) of patients in comparison to 5 controls i.e. 25%.

DISCUSSION:

Many definitions have proposed for IDH, Symptomatic IDH is generally defined as a decrease in systolic blood pressure (BP) of at least 10 mmHg or a systolic BP less than 100 mm Hg, with symptoms such as cramps, nausea, vomiting, and dizziness, the most widely accepted definition are; a fall of systolic BP below 100 mmHg and a fall in diastolic BP of at least 20 mmHg with symptom (4), or as systolic blood pressure (SBP) <100 mmHg, even in the absence of symptoms, or a fall in SBP >10% of the

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	Time of IDH			
	Frequency	Percent	Valid percent	Cumulative percent
Valid 1 st Hour	3	1.5	1.5	1.5
2 nd Hour	49	25.1	25.1	26.7
3 rd Hour	120	61.5	61.5	88.2
4 th Hour	23	11.8	11.8	100.0
Total	195	100.0	100.0	

Incidence of IDH

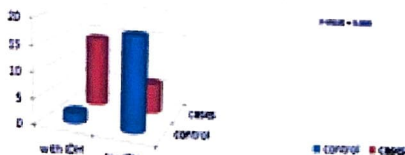


Figure (1) The Study shows significant difference between cases & controls with regard to hypotension, where 14 cases (87.5%) in comparison to only 2 controls (12.5%) who experienced intradialytic hypotension with (p-value = 0.000, odd ratio = 0.048)

Incidence of IDH in relation to gender



figure (2) Intradialytic hypotension was more common among females (M: F ratio = 1:2 with odd ratio 2.33)

Incidence of hypotension episodes in association with eating during dialysis

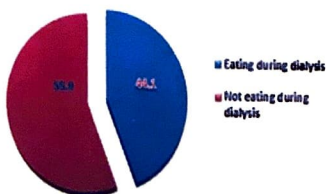


Figure (3), (44.1%) of intradialytic hypotension happens post prandial

pre-dialysis reading in association with any symptom classically associated with hypotension" (5). Dialysis hypotension may occur in one of three clinical patterns: (i) acute (episodic) hypotension, defined as a sudden drop of systolic blood pressure below 90 mmHg or of at least 20 mmHg with accompanying clinical symptoms; (ii) recurrent, as detailed by prevailing in a minimum of 50% of dialysis sessions and (iii) chronic, persistent hypotension in which interdialytic systolic blood pressure is maintained at less than 90–100 mmHg" (6). Its symptoms include nausea, vomiting, diaphoresis and cramps, to more dangerous conditions including angina, arrhythmias, unconsciousness, seizures, and cardiac arrest (7,8). Consequences of IDH could result in; myocardial infarction, stroke, road traffic accident, inability to achieve required dry body weight (DBW), or dialysis efficiency.

It is mainly due to rapid fluid removal during dialysis. Additional causes include plasma osmolality changes, acetate in the dialysate, warming of blood in the extra-corporeal circuit, autonomic dysfunction (especially in diabetic patients) and the administration of antihypertensive drugs shortly before dialysis (9).

The root cause of IDH is fluid removal. Two aspects of fluid removal are important: the rate of removal, and the amount of fluid removal. During the early part of a dialysis session, when most excess fluid is located closer to the central circulation, higher rates of fluid removal are tolerated. By contrast, toward the end of a dialysis session, the same rate of fluid removal might result in hypotension, because the slow rate of fluid transfer from distal edematous body compartments to the circulation results in poor vascular refilling, reduced cardiac output, and thus IDH (10).

Moving to a more frequent dialysis schedule is associated with a reduction in predialysis BP and a reduced need for antihypertensive medication. Avoidance of the long weekend interdialytic interval is another benefit of adding more treatments per week for anuric patient who have no residual renal function. With regard to fluid removal needs, one might achieve a considerable reduction in IDH by encouraging patients to eat less sodium, by avoiding high dialysis sodium concentrations, and by increasing weekly dialysis time (11).

The key issues in the prevention of IDH are optimal blood volume preservation and improvement of cardiovascular response

in patients with residual kidney function, repeated ischemic insults to a kidney caused by IDH, unable to autoregulate its blood flow may hasten the progression to anuria and loss of the substantial advantages that even small amounts of residual kidney function provide (5).

Many factors could contribute to IDH, some are patient-related others are procedure-related (table.2)

Conclusions:

Intradialytic hypotension is an important cause of morbidity among dialysis patients.

Anuric patients tended to develop IDH more than oliguric ones.

Frequency of ultrafiltration in IDH cases

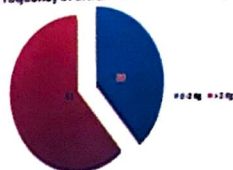


Figure (4). Patients with high ultrafiltration "U.F" more than 2 kg (51%) of sessions suffered more hypotension episodes than those with lower U.F weights.

Incidence of IDH in response to medication

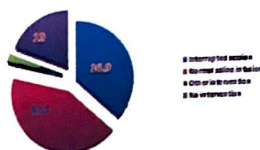


Figure (5). Regarding the response to management we found 42% of patients responded to normal saline while 36.2% of patients showed interrupted sessions as a consequence of hypotension

Frequency of Anuria in IDH cases

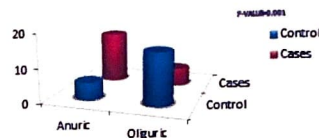


Figure (6). Anuria found to be a strong and significant risk among cases with IDH with (15) i.e (75%) of patients in comparison to 5 controls i.e. 25%.

Table .2 Factors influencing hypotension during dialysis therapy

PATIENT-RELATED FACTORS	PROCEDURE-RELATED FACTORS
Comorbidities (IHD, pericardial disease, arrhythmias)	Improper DBW
Medications	Acetate buffer
Autonomic neuropathy	Heavy snacks (↓TPR, ↓VR)
	Dialyzer reactions, hemolysis
	Low Hct %
IHD; ischemic heart disease. DBW; dry body weight. TPR; total peripheral resistance. VR; venous return.	

Further benefits may be derived from treatment with pharmacological agents that prevent the development of IDH.

Future study about objective evaluation of autonomic dysfunction in HD to avoid IDH.

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