Section: Anaesthesiology

Original Research Article

ANALYSIS OF CARDIOPULMONARY STATUS IN RENAL TRANSPLANT RECIPIENTS – A RETROSPECTIVE STUDY

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ABSTRACT

Background: Uremic syndrome is Known to invariably involve all systems in the body. The cardiopulmonary status of patient in end stage renal disease need meticulous evaluation and contemplation for perioperative management. safe induction and planning of elective ventilation depends on cardiac function, anemia & pulmonary hypertension along with urine output on the table following vascular anastomosis. This study analysis well defined parameters to formulate recommendation on concrete observation.

Materials and Methods: Study: Retrospective, Study period: April 2022 - June 2023, Study population: all patient who presented for PAC for renal transplantation. All patient were on antihypertensive and on hemodialysis, Sample size: 40 patients, All patient has undergone renal transplantation with successfull outcome under general anaesthesia, Patient data: age/sex/pulse BP Parameters analysed: EF /RWMA/ Hb. /RVSP, the ejection fraction indicates LV systolic function, RWMA about LV dilatation and hypokinesia, Anemia the severity is multifactorial and RVSP indicate pulmonary hypertension, **Aim:** To analyse data documented data for cardiopulmonary status in renal transplant recipients, **Objective:** • Predict and anticipate specific problems for intraoperative choice of drugs. • Anticipate and plan for elective post-operative ventilation. • Recommendation for further intensive and extended monitoring.

Results: • Right ventricle systolic pressure which indicates pulmonary hypertension correlates significantly with hemoglobin with p value of 0.038
• Duration of renal disease categorically correlated with anemia (p 0.9) this parameters may have limitations as duration is subjective
• Ejection fraction which denotes LV systolic function correlated with duration of hemodialysis (p 0.5)
• 5 patients had global hypokinesia of LV along with anemia and moderate PHT

Conclusion: Untreated or Neglected duration of hypertension or protenuria was associated with severe anemia all the effect of end stage disease is due to vascular remodeling & endothelial dysfunction. This is indicated by severe anemia often associated with moderate to severe pulmonary hypertension. Duration of dialysis is related to cardiac dysfunction due to fluid and circulatory volume handling altered by kidney.

Keywords: Renal transplant recipients, RVSP, EF.

INTRODUCTION

Hypertension and Type 2 Diabetes Mellitus are the • Renal transplantation is the most successful of all the organ transplant procedures

- End-stage renal disease revolves around fluid Handling and load on Cardiovascular and pulmonary system

- cardiopulmonary status of the patient in end-stage renal disease need meticulous evaluation and contemplation for perioperative management
- Renal replacement therapy further alters the hemodynamics, challenging every stage of conduct of anesthesia
- The outcome depends on the urine output and morbidity and mortality depends on cardiopulmonary status of the recipient
- This study analyses the Cardiopulmonary status, evaluation by simple routine parameters and correlation of the indicators

Aim

- To analyze the EF /RWMA/ Hb. /RVSP (right ventricle systolic pressure) from PAC data in renal transplant recipients

Objective

- Predict and anticipate specific problems such as perioperative pulmonary edema and hypoxia
- Anticipate and plan for elective post-operative ventilation
- Recommendation for further intensive and extended monitoring

MATERIAL AND METHODS

Study: retrospective
Study period: April 2022 to June 2023
Study population: all patients with ESRD who presented for PAC for renal transplantation.
All patient were on antihypertensive and on hemodialysis
Sample size: 40 patients
All patient has undergone renal transplantation with successful outcomes
Parameters analyzed: EF /RWMA/ Hb. /RVSP
The ejection fraction indicates LV systolic function, RWMA about LV dilatation and hypokinesia
The causes of Anemia in ESRD are multifactorial and RVSP indicate pulmonary hypertensiony.

RESULTS

- Right ventricle systolic pressure which indicates pulmonary hypertension correlates significantly with hemoglobin with p value of 0.038
- Duration of renal disease categorically correlated with anemia (p 0.9) this parameter may have limitations as duration is subjective
- Ejection fraction which denotes LV systolic function correlated with duration of hemodialysis (p 0.5)
- 5 patients had global hypokinesia of LV along with anemia and moderate PHT

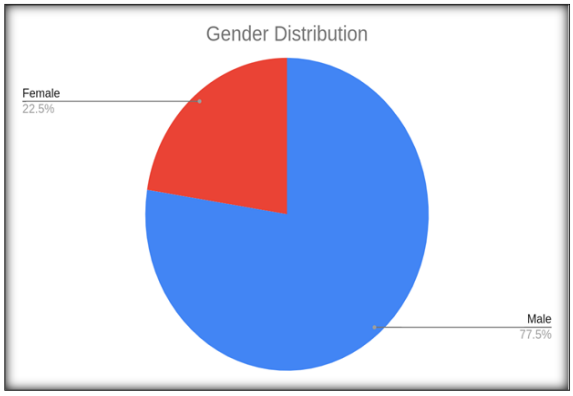

Figure 1: Gender distribution

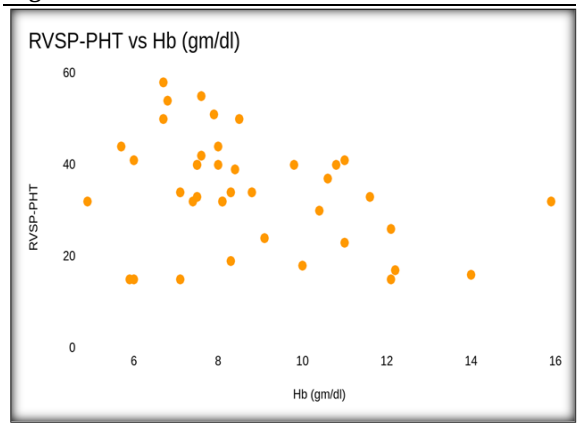

Figure 2: RVSP -PHTN vs Hb

Statistic	-0.32
P - value	0.038

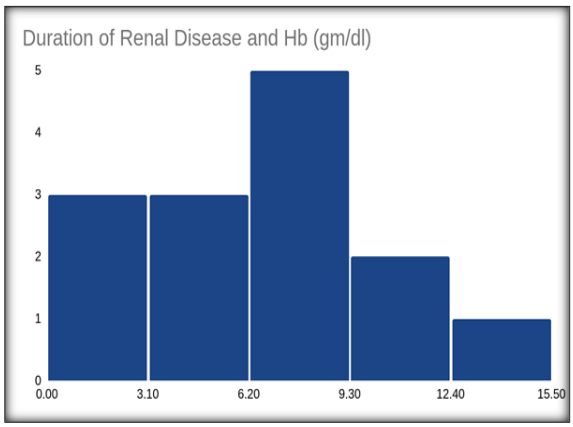

Figure 3: Duration of renal disease and hb

Statistic	0.03
P - value	0.94

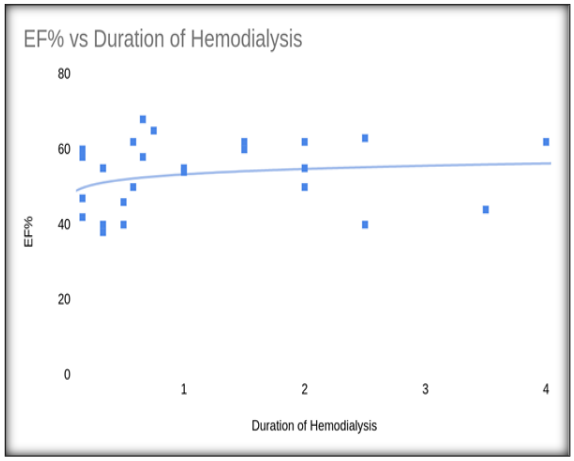

Figure 4: EF vs Duration of hemodialysis

Statistic	0.13
P - value	0.51

Table 1: Cardiac status

S.no	PR	BP	EF %	RWMA	Hb%
1	84	170/100	62%		15.9
2	102	140/80	63		5.7
3	76	150/100	54		9.1
4	80	190/110	40		7.6
5	90	130/80	60		7.1
6	96	170/90	55		12.1
7	86	160/80	63		10.6
8	88	140/80	55		8.8
9	86	150/100	60		8.1
10	86	90/70	62		14
11	90	170/90	60		7.5
12	80	200/100	46		8
13	86	160/80	58		7.1
14	80	140/90	62		12.2
15	60	200/120	55		6.7
16	76	120/90	63		11.6
17	90	140/80	65		10
18	120	150/90	40		6.7
19	90	130/50	42		6.8
20	76	100/60	47		6
21	80	150/100	68		8.0
22	90	150/100	44	Global hypokinesia LV	8.4
23	70	200/100	40	+	12.1
24	80	200/100	62		8.3
25	92	150/100	55		7.4
26	76	130/70	50		11.0
27	86	120/70	55		7.5
28	80	160/90	58		6.0
29	82	160/90	55		10.4
30	120	150/90	60		8.5
31	86	140100	55		4.9
32	80	17080	62		11.0
33	88	13090	34		10.8
34	96	16094	38	+	5.9
35	70	220140	52	+	8.1
36	90	16080	50	+	7.9
37	80	14090	38		9.8
38	90	12070	60		7.6
39	84	13080	60		8.3
40	76	16060	62		7.5

Table 2: Pulmonary status

S.no	RR	Spo2	RVSP	Hb%
1	22	98	32	15.9
2	20	96	44	5.7
3	18	99	24	9.1
4	26	95	55	7.6
5	16	98	15	7.1
6	18	97	26	12.1
7	20	99	37	10.6

8	20	98	34	8.8
9	22	98	32	8.1
10	24	98	16	14
11	22	99	40	7.5
12	24	99	44	8
13	20	99	34	7.1
14	20	98	17	12.2
15	18	100	50	6.7
16	18	99	33	11.6
17	18	99	18	10
18	18	98	58	6.7
19	18	98	54	6.8
20	22	97	41	6
21	20	95	40	8
22	18	99	39	8.4
23	18	99	15	12.1
24	22	98	19	8.3
25	20	99	32	7.4
26	20	100	41	11
27	18	99	33	7.5
28	22	95	15	6
29	22	96	30	10.4
30	26	98	50	8.5
31	20	96	32	4.9
32	22	98	23	11
33	18	100	40	10.8
34	24	96	15	5.9
35	18	99	32	8.1
36	20	99	51	7.9
37	18	100	40	9.8
38	18	99	42	7.6
39	18	99	34	8.3
40	22	98	40	7.5

DISCUSSION

The incidence of pulmonary hypertension is high in patients with ESRD.

The gold standard of pulmonary hypertension evaluation is right heart catheterization- an invasive procedure with risks.

Echocardiography provides measurement of right ventricle systolic pressure based on estimated flow through tricuspid vale.

Adaptation of cvs in ESRD

ESRD ---> Increased vascular resistance and
increased circulating fluid volume

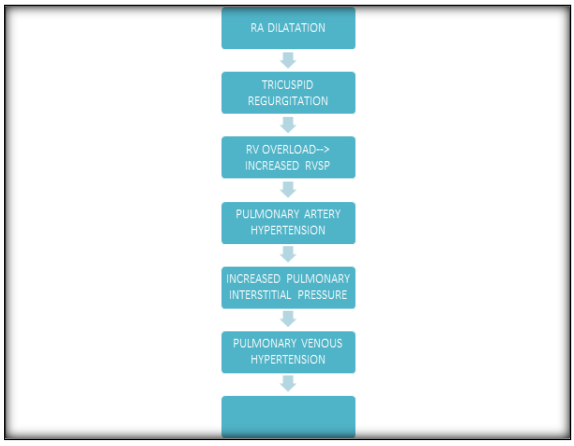

Figure 5: Adaptation of CVS in ESRD

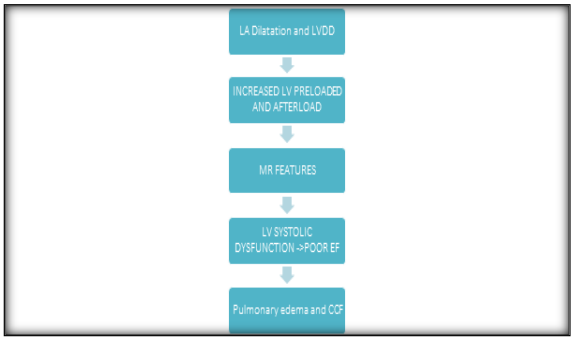

Figure 6: Adaptation of CVS in ESRD

Causes of anemia in ESRD

- Vascular and renal endothelium shares the same origin
- Uremia causes endothelial dysfunction and vascular remodeling
- Platelet dysfunction and splenic sequestration
- Uremic gastritis and occult gastric bleed
- Immune mechanism
- Rate of hemolysis is 2-3 times due to uremic toxins
- Erythropoietic response of bone marrow to anemia fails
- Increased oxidative stress due to uremic toxins
- Increases flow from AV fistula causes vascular calcification
- Heparin-induced bleeding due to usage on hemodialysis

Table 3:

Condition	Prevalence %
Stage 5 CKD	9-39.3
HD	18.5-68.5
PD	0-42

Table 4:

Factors affecting cardiopulmonary status in ESRD
Anemia
Pulmonary hypertension
Ejection fraction
Right ventricle systolic pressure

Table 5:

Pulmonary pressure	RVSP mm/hg
Normal	<35
Mild PHT	35-45
Moderate	45-60
Severe	>60

CONCLUSION

- With endothelial Dysfunction has common Denominator severity of anemia (Hb<9gm) associated with pulmonary hypertension.
- hence correlation of anemia might help in reducing pulmonary pressures apart from Pharmacological management**.**

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