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Original Article

Retrospective Evaluation of Doppler-Defined Risk Factors for Pulmonary Hypertension Patients Admitted to Medical Intensive Care Unit Patients: A Clinical Study

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ABSTRACT

Background: Pulmonary hypertension (PH) is a one of the systemic diseases which has serious outcomes. Though clinical assessment plays an important role in diagnosis especially in initial stages, echocardiography is a key screening tool in the diagnostic algorithm. It has the advantages of being safe, portable and repeatable as compared to invasive measurements. The present study was conducted to retrospectively assess Doppler-defined risk factors for pulmonary hypertension patients admitted to medical intensive care unit. **Materials & methods:** The present retrospective study comprised of 162 patients with pulmonary hypertension of both genders. Patients with end stage liver, kidney or heart diseases were excluded from the study. General information such as age, name etc. was retrieved from case history performas. Echocardiograms were performed as a routine diagnostic tool and were interpreted by a cardiologist. Patients with tricuspid regurgitant (TR) jet velocity and ejection fraction were considered. There medical records were evaluated for the presence of previous history of mechanical ventilator use, laboratory reports, pre- existing abnormalities, history of renal replacement therapy, blood transfusion especially RBC, any vasoconstrictor medication. **Results:** Common reasons for patient admission was renal related in group I (23) and group II (19), heart related in group I (45) and group II (48), renal failure in group I (22) and group II (13), cirrhosis in group I (3) and group II (7), neurology related in group I (2) and group II (1), malignancy in group I (1) and group II (2), diabetes mellitus in group I (4) and group II (3), drug overdose in group I (2) and group II (1), GIT related in group I (5) and group II (6) and others in group I (55) and group II (60). **Conclusion:** Approximately one-third of adults screened with echocardiography have PH, defined as an elevated tricuspid regurgitant jet velocity (TRV) of ≥2.5 m/s.

Key words: Doppler, Intensive care unit, Pulmonary hypertension

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INTRODUCTION

Pulmonary hypertension (PH) is a one of the systemic diseases which has serious outcomes. It may be seen as complication of certain diseases such as acute respiratory distress syndrome (ARDS) and pulmonary embolism commonly seen in the medical intensive care unit. There is limited data related to burden of PH in a general medical critical care population. Depressed left ventricular ejection fraction and pulmonary embolism are risk factors for the development of PH as shown by previous literature.[1- 3] PH is defined as a group of diseases characterized by a progressive increase in pulmonary vascular load, leading to marked increase in pulmonary artery pressure, right ventricular failure and premature death. Due to symptomless progression of this disease, PH is often diagnosed in its advanced stages.[4- 6] Though clinical assessment play an important role in diagnosis especially in initial stages, echocardiography is a key screening tool in the diagnostic algorithm. It has the advantages of being safe, portable and repeatable as compared to invasive measurements. [7- 9] The present study was conducted to retrospectively assess Doppler-defined risk factors for pulmonary hypertension patients admitted to medical intensive care unit.

MATERIALS & METHODS

The present retrospective study was conducted in the department for 1 year between 2016- 17. It comprised of

162 patients with pulmonary hypertension of both genders. All patients were above 18 years of age. In all, echocardiogram was performed to confirm the diagnosis which was admitted to the intensive care unit. Patients with end stage liver, kidney or heart diseases were excluded from the study. Before starting the study ethical clearance was obtained from institutional ethical committee.

General information such as age, name etc. was retrieved from case history performas. Echocardiograms were performed as a routine diagnostic tool and were interpreted by a cardiologist. Patients with tricuspid regurgitant (TR) jet velocity and ejection fraction were considered. There medical records were evaluated for the presence of previous history of mechanical ventilator use, laboratory reports, pre- existing abnormalities, history of renal replacement therapy, blood transfusion especially RBC, any vasoconstrictor medication. Doppler-defined PH was defined as a TR jet velocity ≥3 m/sec by echocardiography and a TR jet velocity <3 m/sec defined the control patients. Thus a total of 162 controls were involved in the study. Results thus obtained were subjected to statistical analysis using Wilcoxon rank sum tests for univariate analysis, Kaplan–Meier method and the log-rank test was used for univariate analysis. P value less than 0.05 was considered significant.

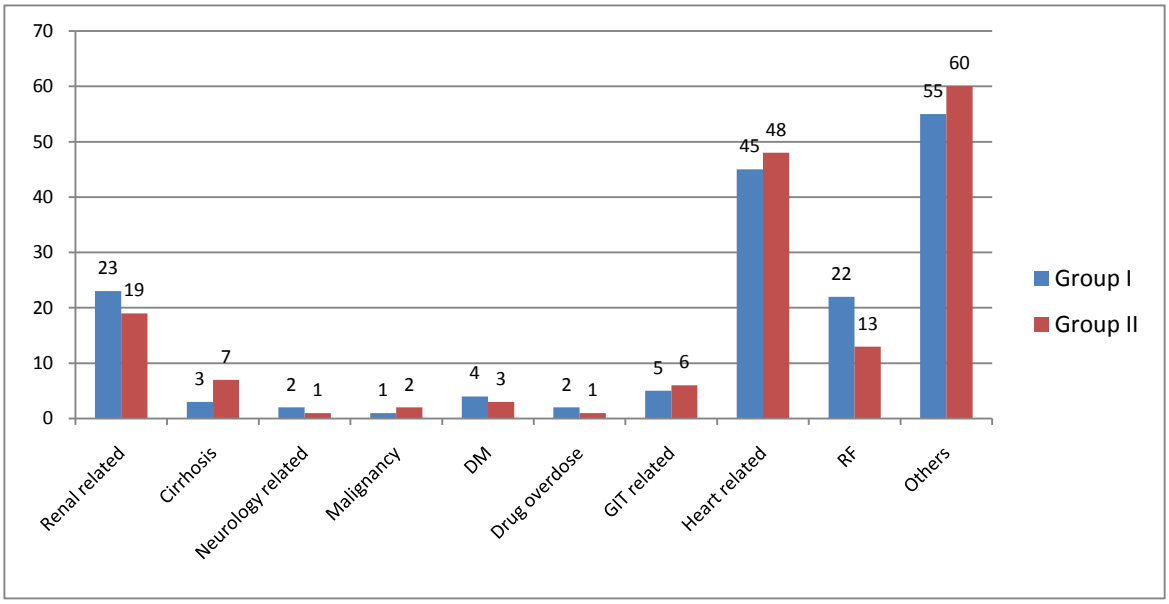
RESULTS

Table I shows that mean age of patients in group I was 62± 12 years and in group II 60± 11 years. In group I, males were 92 and females were 70 and in group II, males were 96 and females were 66. TR jet (m/sec) was 3.6± 0.6 in group I and 2.4± 0.4 in group II. The difference was significant (P- 0.05). Estimated sPAP (mmHg) was 58± 12 and 34± 8 in group I and group II respectively. The difference was significant (P- 0.01). Graph I shows that common reasons for patient admission was renal related in group I (23) and group II (19), heart related in group I (45) and group II (48), renal failure in group I (22) and group II (13), cirrhosis in group I (3) and group II (7), neurology related in group I (2) and group II (1), malignancy in group I (1) and group II (2), diabetes mellitus in group I (4) and group II (3), drug overdose in group I (2) and group II (1), GIT related in group I (5) and group II (6) and others in group I (55) and group II (60).

Table I Characteristics of patients

Parameter		Cases (Group I)	Control (Group II)	P value
Patients		162	162	-
Mean age (years)		62± 12	60± 11	0.4
Gender	Males	92	96	0.1
	Females	70	66	
TR jet (m/sec)		3.6± 0.6	2.4± 0.4	0.05
Estimated sPAP (mmHg)		58± 12	34± 8	0.01

Graph I Admission diagnosis in both groups



DISCUSSION

Pulmonary hypertension (PH) is a threatening complication in adults with sickle cell disease (SCD). Approximately 1/3rd of adults screened with echocardiography have PH which is defined as an elevated (≥2·5 m/s) tricuspid regurgitant jet velocity (TRV). This has been observed that an elevated TRV is strongly associated with an increased risk of mortality in adults. Studies have shown that there is a 40-month mortality rate of 40% in patients with PH as compared with <2% for those without PH as confirmed by SCD-PH screening. This increases risk of death incidence regardless of milder elevations of pulmonary artery pressure, lower pulmonary vascular resistance and higher cardiac output as compared to patients with idiopathic or other forms of secondary PH. Whether PH is a direct cause of death in SCD or is a manifestation of multi-organ disease from systemic vasculopathy remains uncertain.[10- 12]

In present study we assessed risk factors and clinical outcomes of PH in general medical intensive care unit patients. In this study we retrospectively evaluated admissions in a tertiary care medical intensive care unit to assess the hypotheses that PH is common in the modern medical intensive care unit population and that the presence of PH adversely impacts mortality. The information obtained from this study will give the background necessary information to plan further prospective epidemiologic and therapeutic trials of PH in a critically ill medical population.[14,15]

In present study we observed that approximately 30% of patients undergoing echocardiography have an elevated tricuspid regurgitant (TR) jet velocity suggests that the burden of PH in a general medical intensive care unit population may be significant. Our retrospective study design inherently results in selection bias, however and likely inflates the apparent burden of PH in the critically ill patients. The actual prevalence could not be determined in this study as not all patients admitted to the intensive care unit underwent echocardiography.

In a study by Stamm JA et al it was postulated that PH is an important comorbidity prevalent in the modern medical intensive care unit. They undertook a initial investigation to define the consequences of Doppler-defined PH in the critically ill patients especially in ICU. Patients underwent echocardiogram within 4 days of admission. Patients with pulmonary arterial and venous hypertension and a tricuspid regurgitant jet velocity ≥3 m/sec were considered positive for PH. Authors compared cases and controls for co morbidities, illness severity, diagnoses, and mortality. Multivariable regression was performed to detect clinical features associated with PH and mortality. 21% of admissions (299) had an eligible echocardiogram. 126 patients with PH had a higher unadjusted mortality than 173 controls and PH remained significantly associated with mortality after controlling for other clinical factors. It was found that low ejection fraction and pulmonary embolism were independently associated with PH. Doppler-defined PH is associated with mortality in the critically ill. In future, prospective studies are required to define the prevalence of pulmonary venous hypertension versus pulmonary arterial hypertension, and the clinical consequences of each, in a general medical intensive care unit population.[16]

CONCLUSION

Under the light of above obtained data, the authors conclude that approximately one-third of adults screened with echocardiography have PH, defined as an elevated tricuspid regurgitant jet velocity (TRV) of ≥2.5 m/s. However; further studies are recommended.

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