Right ventricular function and right heart catheterization as predictors of ECMO requirement in lung transplantation

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Introduction: Lung transplantation (LT) often requires extracorporeal life support with extracorporeal membrane oxygenation (ECMO) because of several complications (included acute heart failure) during the intervention. Data on predictors of intraoperative ECMO use in these patients are scarce but it is an interesting topic because ECMO support has been linked to worse outcomes after LT.

Purpose: The main aim of our study is to assess which pre-surgical characteristics of right ventricular (RV) function and data from right heart catheterization (RHC) could help us to anticipate the need of ECMO in LT.

Methods: We conducted a retrospective observational study of all patients who underwent LT at our institution along 2018. We analysed data from echocardiogram (ECO) and RHC. All subjects underwent transthoracic echocardiography (TTE) according to the latest ASE/EACVI guidelines. Strain analysis was carried out by speckle-tracking echocardiography (QLAB 10.7, Philips).

Results: We included all 47 patients who underwent LT from January to December of 2018. They were middle age patients (52±11.8 years old) 51.1% men, 61.7% smokers (other cardiovascular risks: diabetes mellitus (8.5%), hypertension (23.4%) or dyslipidaemia (27.7%)). 24 (51%) of them needed intraoperative ECMO. 21 patients (45%) were evaluated by RHC before LT and ECO quality was good enough to evaluate different data in 41 patients (87%).

Variables related to ECMO requirement vs non-ECMO use were: mean pulmonary artery pressure (23.1±7.3 vs 16.67±4.9 mmHg, p=0.027), mean transpulonary gradient (16.9±6.6 vs 8.9±3.6 mmHg, p=0.027) and diastolic transpulmonary gradient (9.8±8.1 vs 2.3±4.7 mmHg, p=0.002) from RHC and RV mid cavity diameter (3.4±0.8 vs 2.8±0.6 mm, p=0.001) from ECO. Besides this, free-wall RV longitudinal strain (FWRVLS) showed a tendency to be lower in patients who required ECMO (17.3±4.5% in vs 21.4±4.5%, p=0.072).

Conclusion: According to our results, RV mid cavity diameter measured by ECO and mean pulmonary artery pressure, mean and diastolic pulmonary gradients measured by RHC are useful tools to predict which patients could require ECMO during LT. FWRVLS showed an interesting tendency of lower values of it in LT using ECMO. This exploratory finding opens an important investigation line about a parameter which could help us to identify patients with subclinical right ventricle dysfunction.
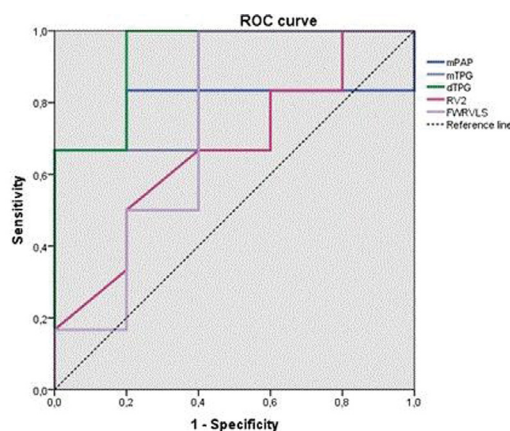
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Variables	Area	P^b	inferior limit	superior limit
mPAP	.800	.100	.497	1.000
mTPG	.867	.045	.643	1.000
dTPG	.933	.018	.779	1.000
RV2	.667	.361	.334	1.000
FWRVLS	.733	.201	.399	1.000

ROC curve