Summary

Chronic thromboembolic pulmonary hypertension (CTEPH) is a disease characterized by increased pulmonary artery pressure. It is caused by intraluminal thrombi organisation, stenoses and occlusions of pulmonary artery and its branches and peripheral vascular remodeling. It is a chronic complication of acute pulmonary embolism. The obstruction of pulmonary artery branches increases pulmonary vascular resistance (PVR) and this leads to the right ventricular overload and right-sided heart failure. The treatment of choice is surgical pulmonary endarterectomy (PEA), a procedure that is performed in deep hypothermic cardiac arrest. Patients with peripheral type of CTEPH, who are not indicated for operation and also patients with residual pulmonary hypertension after PEA can be indicated for specific vasodilatation therapy. In indicated cases the treatment may involve the balloon pulmonary angioplasty or lung transplantation.

Despite the high effectivity of PEA, there is a number of patients, whose pulmonary arterial pressure remains high and this plays a key role in postoperative mortality and morbidity. Incidence of residual pulmonary hypertension is according to literature between 16 and 51%. This leads to a pursuit of finding possible tools to predict residual pulmonary hypertension after PEA. The aim of this work was to evaluate the possibility of prediction of clinical and hemodynamic outcome of patients after PEA by using analysis of preoperative CT pulmonary angiography (CTPA) and also by using peroperative classification of pulmonary endarterium removed during PEA (according to Jamieson and UCSD).

We have proven that the diameter of pulmonary artery and its indices measured in preoperative CTPA images can be used for prediction of residual pulmonary hypertension after PEA. We have found out that the best predictor out of all analysed parameters is the aortopulmonary index (the ratio between the diameter of ascending or descending aorta and the diameter of the main pulmonary artery measured at the level of its bifurcation, perpendicular to its long axis, on an axial slices). The aortopulmonary index can be used for prediction of residual pulmonary hypertension after PEA and also for the prediction of the effect of PEA characterised by the pulmonary artery systolic pressure decrease.

We have also found out that the lower value of aortopulmonary index ($\leq 0{,}88$ when indexed to the diameter of ascending aorta and $\leq 0{,}64$ when indexed to the diameter of descending aorta) is associated with a better result of surgical treatment of CTEPH. These findings can be used in clinical practice in the indication process of borderline patients (regarding both meeting the indication criteria and surgical risk stratification) and can lead to a better follow up with aim

for early identification of the presence of residual pulmonary hypertension and for early initiation of its treatment.

We have also proven that both classifications of pulmonary endarterium removed during PEA that are currently used (Jamieson classification and UCSD classification) have predictive value regarding postoperative hemodynamic and clinical parameters. When comparing the predictive value of both classifications, we found out that each of them is a better predictor for some parameters (Jamieson′s classification in prediction of pulmonary artery systolic and mean pressure, UCSD classification in prediction of pulmonary vascular resistance, postoperative endobronchial bleeding, early hospital mortality and long-term survival). The analysis of cumulative predictive value of both classifications, however, did not prove superiority of any of them. The clinical application of predictive values of these classifications is a matter of further research.

The findings presented in this work should become one of the pieces in the complex mosaic image of patients with CTEPH and thus help to improve the results of their treatment.