

In our study we included 13 patients (7 males and 6 females). The mean age of patients were 49 (SD ± 22) years. Patient inclusion criteria were - approved diagnosis of Chronical thromboembolic pulmonary hypertension (CTEPH) with sever symptomatic course and regression in 6 minute walk test. As a treatment method for these patients were chosen Pulmonary endarterectomy (PEA).

At the time of diagnosis mean mPAP was 61.31 (SD ± 14.41) mmHg, PVR was 10.98 (SD± 3.86) WU and mean 6-minute walk test were 267.38 (SD ± 58.01) m.

Due to latest research recommendations, 8 out of 13 operations were performed in PEA excellence centre in Vienna university hospital (VUH) and 5 out of 13 were performed in Pauls Stradiņš clinical university hospital (PSCUH) together with colleagues from Poland and Austria.

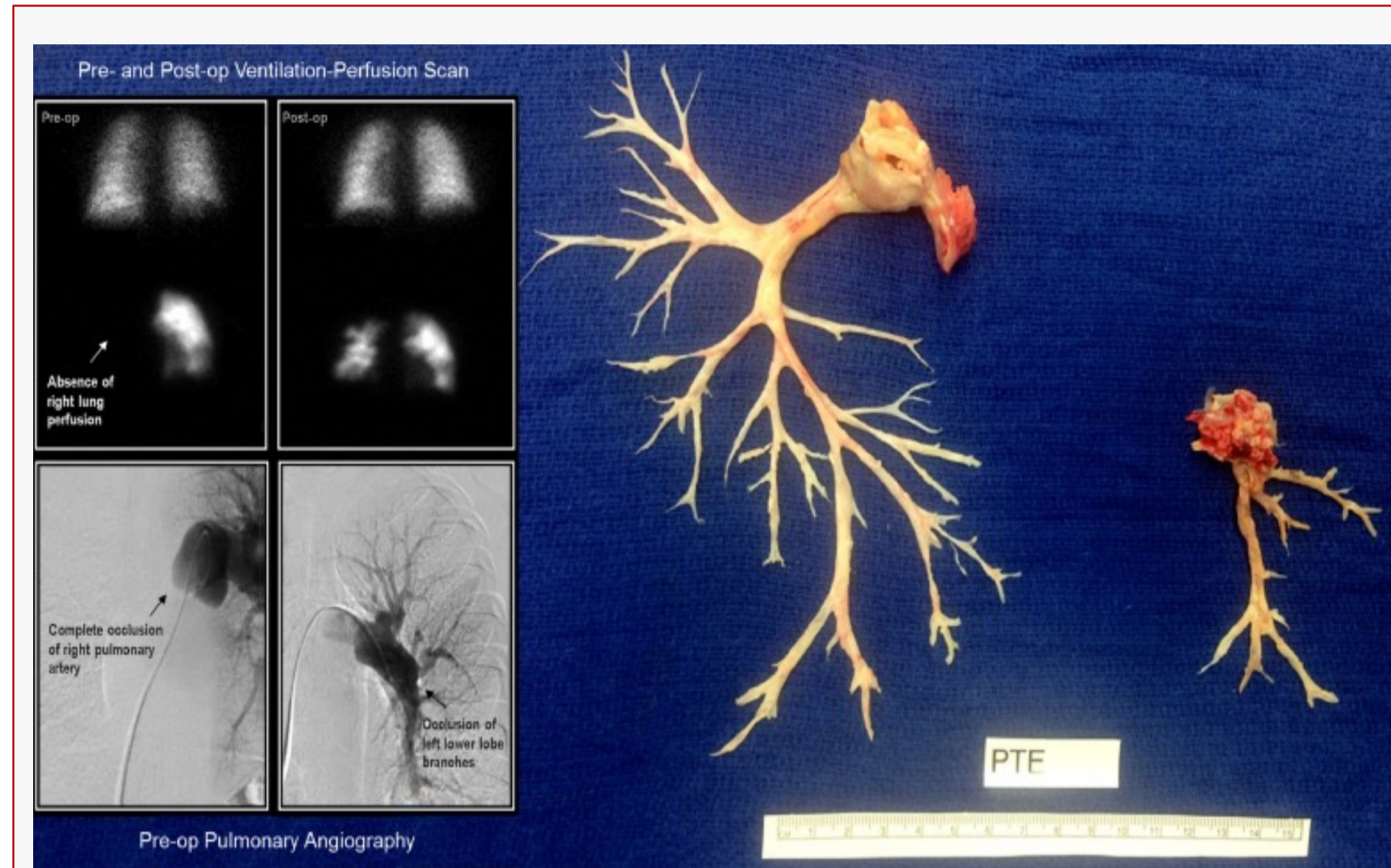
PEA is a surgical procedure that involves removing chronic thromboembolic material from the pulmonary artery branches. PEA is the gold standard treatment for CTEPH, a condition characterized by persistent high blood pressure in the lungs due to the presence of organized blood clots. The procedure involves a median sternotomy and the use of cardiopulmonary bypass and deep hypothermic circulatory arrest to stop the heart temporarily. Once the heart is stopped, the surgeon removes the thromboembolic material from the pulmonary artery branches, often using a combination of blunt dissection and suction. Following the procedure, patients require close monitoring in the intensive care unit, with a focus on managing potential complications such as bleeding, infection, and neurological complications. While PEA is a highly effective treatment for CTEPH, it is a complex and risky procedure that requires a skilled surgical team with experience in the management of this condition.

After PEA for CTEPH, several hemodynamic parameters can be measured to assess the procedure's results and improvements in patients' quality of life. The most important hemodynamic values include mean pulmonary arterial pressure, pulmonary vascular resistance and cardiac output. A reduction in pulmonary arterial pressure and pulmonary vascular resistance is a primary indicator of successful PEA, indicating improved blood flow and reduced strain on the right heart. Cardiac output and mixed venous oxygen saturation are also crucial parameters to monitor, as they can indicate improved oxygen delivery to the body and reduced risk of right heart failure. Quality of life can be assessed through various methods, including the 6-minute walk test and patient-reported outcomes.

PEA = Pulmonary endarterectomy  
CTEPH = Chronical thromboembolic pulmonary hypertension  
mPAP = Mean arterial pressure  
PVR = Pulmonary vascular resistance

References:

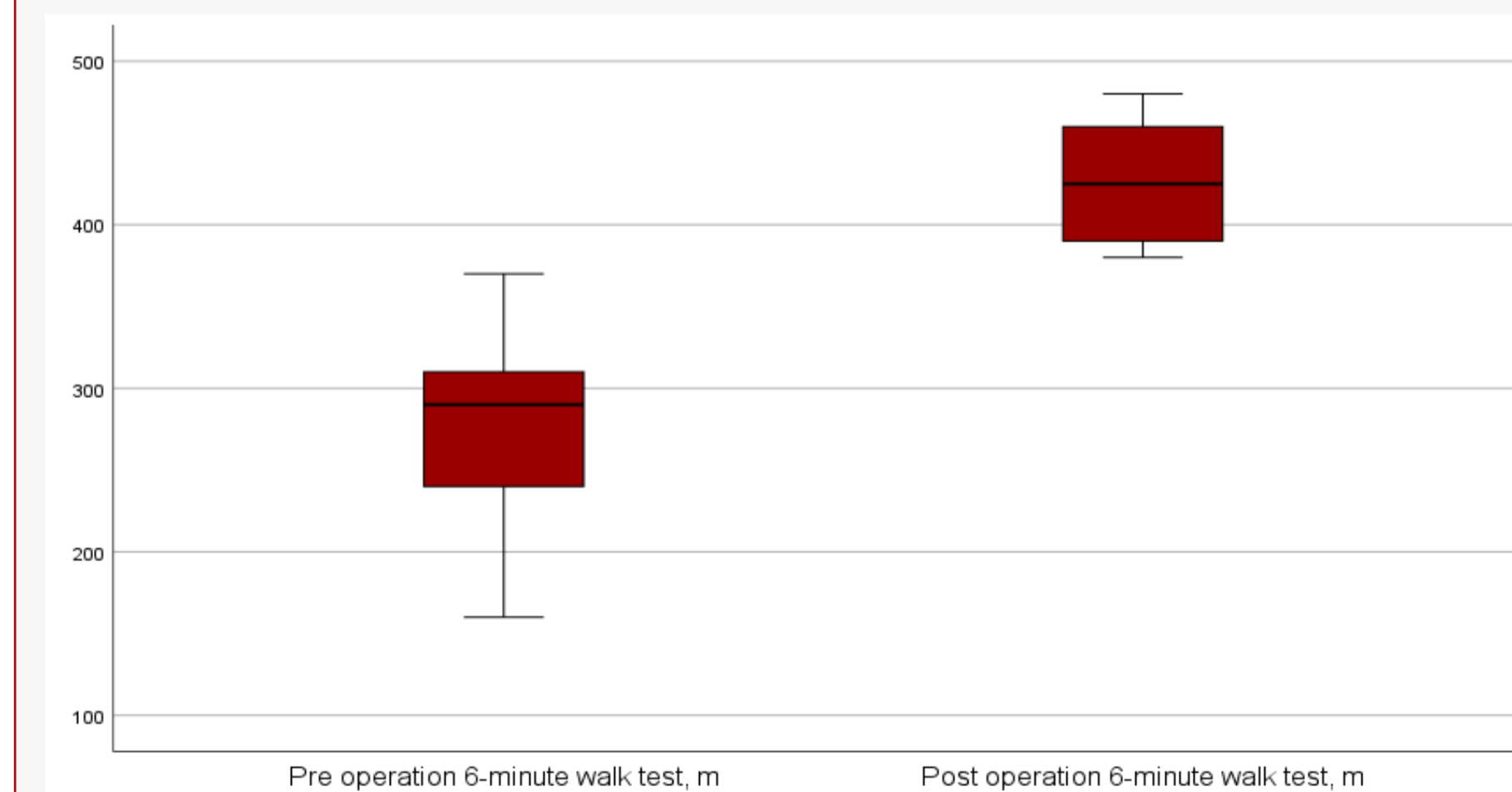
1. Quan, Ruilin, et al. "Risk prediction in medically treated chronic thromboembolic pulmonary hypertension." BMC Pulmonary Medicine 21.1 (2021): 1-11.



Endarterectomy specimen of the right and left pulmonary artery from a patient with complete occlusion on the right side and segmental obstruction on the left side. Complete obstruction of one of the major arteries and complete nonperfusion of the entire lung.

Gernhofer, Yan K., and Victor Pretorius. "Operative Technique in Pulmonary Thromboendarterectomy." *Operative Techniques in Thoracic and Cardiovascular Surgery* 24.4 (2019): 219-236.

### Comparison of 6-minute walk test before and 1 year after pulmonary endarterectomy



Pre-operation median value was 267.38 m  
1-year follow up media value was 427.00 m  
P<0,05, 95% CI

After treatment, in 1-year follow up testing there was noticeable reduction in mPAP to mean 43.60 (SD ± 22,49) mmHg. Although 8 out of 9 successfully operated patients had persistent pulmonary hypertension there were significant decrease in mPAP values. We observed statically significant positive increase in 6-minute walk test in all patients via increased of media 150.4 m (P<0,005, 95% CI) (View chart Nr. 1) and statistically significant decrease in PVR by mean 4.88 WU (P<0,13, 95% CI) (View chart Nr. 2)

Values of mPAP from pre-operative measurement results decreased on average by 28.67 ± 18.64 mmHg in patients operated in VUH, while mPAP in patients operated in PSCUH on average decreased by only 7.75 ± 26.32 mmHg.

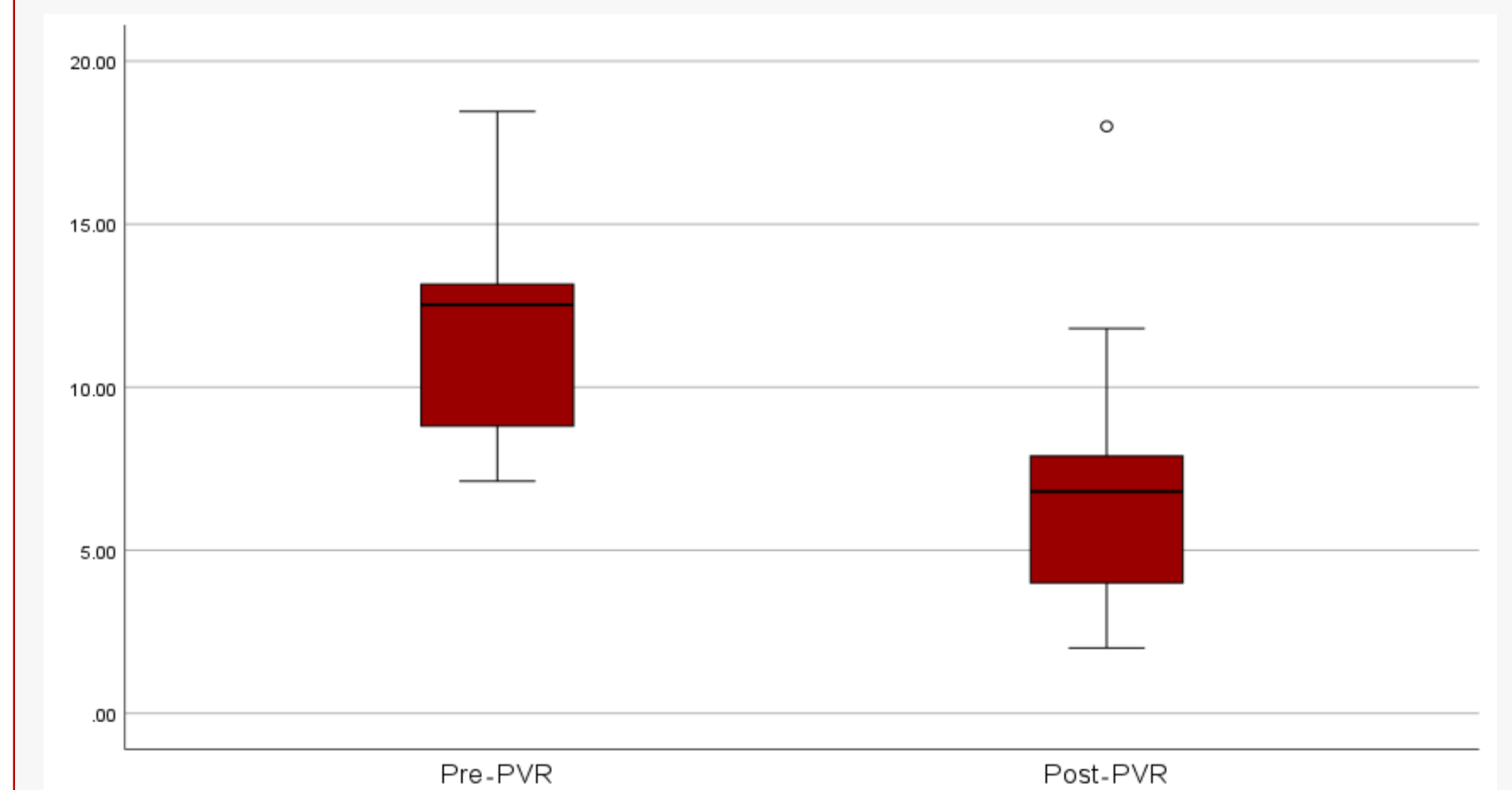
Values of PVR from pre-operative measurement results decreased on average by 5.67 ± 5.56 WU in patient operated in VUH while PSCUH patients PVR reduced on average for 3.71 ± 5.97 WU

The survival rate of both patient groups was similar in both, VUH and PSCUH. The difference in the results of mPAP of both patient groups did not affect survival rate.

3 patients who died due to post-operation complications caused by PEA were include in survival rate calculations.

2 patients, who had smallest improvement in mPAP and PVR, died due to unknown causes, but were included in survival rate calculation. Most likely cause of death were persistent pulmonary hypertension caused Chronical heart disease.

### Comparison of pulmonary vascular resistance before and 1 year after pulmonary endarterectomy



Pre-operation median value was 10.98 WU  
1-year follow up media value was 7.19 WU  
P<0,13, 95% CI

On 1-year follow up testing, all surviving patients had significant improvement in PVR and 6-minute walk test. There were noticeable correlation in PVR and 6-minute walking test and patient survival rate. Patient 1, 3, 5-year survival rate was 77%, 77% and 72%, while the 8-year survival rate is 57%. Latest data from 2021 1-, 2- and 3-year survival rates of patients operated in the European Register are 93%, 91% and 89%, respectively, while the survival rates of 1, 2 and 3- years for non-surgery are 88%, 79% and 70%. [1] Due to small number of CTEPH patients and slow but gradual progress in treatment methods in Latvia, PEA treatment has great potential in CTEPH treatment even in small specialised centres, who don't meet 20 patient per year minimal standard, as long as there is strong cooperation with VUH in order to ensure the availability of quality PEA