

## ***Long-term Results of Pulmonary Endarterectomy***

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**Objectives** Pulmonary endarterectomy (PEA) is treatment of choice for chronic thromboembolic pulmonary hypertension (CTEPH). Although several reports on excellent mid-term survival after PEA exist, long-term outcomes remain unclear. In the present study, we sought to review long-term outcomes and to determine risk factors for late adverse events after PEA.

**Methods** We retrospectively reviewed 93 patients who underwent PEA through lateral thoracotomy (16 patients) or median sternotomy (77 patients) at Chiba University Hospital or Chiba Medical Center Between 1986 and 2010. Follow-up data was available for 89 patients (95.6% complete). Median follow-up period was 5.7 years and maximum follow-up period was 23 years. Fifty-five patients (59%) were female. The majority of the patients (82%) were in NYHA class III or IV. Mean PAP was  $47\pm 10$  mmHg and PVR was  $859\pm 317$  dyn.s.cm<sup>-5</sup>. The disease was classified as CTEPH type 1 (n=67), type 2 (n=17), and type 3 (n=9).

### **Results**

There were 13 hospital deaths. During follow-up period there were 13 all-cause deaths including 4 disease-specific deaths due to right heart failure and three sudden deaths. At the most recent follow-up, 60 patients (90%) were in NYHA class I or II. Freedom from disease-specific death at 5, 10, and 15 years were 85%, 79%, and 67%, respectively. Freedom from disease-specific death or NYHA class III at 5, 10, and 15 years were 81%, 74%, and 65%, respectively. In Cox proportional hazard model, postoperative

mPAP was identified as a risk factor for late adverse events (disease-specific death, and disease-specific death or NYHA class III) (HR, 1.17; 95%CI, 1.013-1.349,  $p=0.03$ , and HR, 1.15; 95%CI, 1.071-1.240;  $p<0.001$ , respectively). In receiver operating curve analysis, postoperative mPAP of 27 mmHg was the cut-off values for disease-specific death and the adverse events (AUC, 0.89; sensitivity, 1.00; specificity, 0.66, and AUC, 0.88; sensitivity, 0.93; specificity, 0.64, respectively).

Patients with mPAP  $<27$ mmHg had good late outcomes. Ten-year freedom from disease-specific death and the adverse events were 100 and 98%, respectively. In contrast, patients with mPAP  $\geq 27$ mmHg experienced significant adverse events beyond 5 years after PEA. Ten-year freedom from disease-specific death and the adverse events were 86% and 66%, respectively.

**Conclusions** PEA provided sustained favorable effects on long-term survival. Postoperative mPAP was an independent predictor for late adverse events and postoperative mPAP of 27 mmHg was the cut-off value for predicting late adverse events.