Abstract

Purpose. The objective of the first study was to compare the results of primary patency of failing dialysis arterio-venous fistulas and grafts when using drug-coated balloon catheters in comparison with simple balloon catheters. The aim of the second study was to quantify perfusion changes on CT pulmonary angiography (CTPA) in patients with chronic thromboembolic pulmonary hypertension (CTEPH).

Methods. In the first study, a total of 76 patients were randomized to the study – 38 patients were treated with percutaneous transluminal angioplasty using a drug-coated balloon catheter, and 38 patients were treated with percutaneous transluminal angioplasty using a simple balloon catheter. Follow-up DSAs were performed at 3, 6, 9, and 12 months after baseline intervention. In the second study, CTPA in 58 patients with CTEPH were evaluated. The volume of the hypoperfused part of the lungs was measured using density thresholding in semi-automatically segmented lung volume and compared with hemodynamic parameters from catheterization.

Results. In the first study, the primary patency in the PTA group with a drug-coated balloon catheter versus the PTA group with a simple balloon catheter was 86.7 ± 5.6% vs. 74.2 ± 7.4% at 3 months, 52.8 ± 8.4% vs. 25.6 ± 7.9% at 6 months, 21.8 ± 8.1% vs. 11.0 ± 5.9% at
9 months and 17.4 ± 7.5% vs. 11.0 ± 5.9% at 12 months. The median time required for reintervention was 181 days (95% CI 156-91 days) in the PTA group with a drug-coated balloon catheter vs. 98 days (95% CI 92-108 days) in the PTA group with a simple balloon catheter (p=0.019). In the second study, a correlation between the hypoperfused volume and pulmonary vascular resistance was found (p=0,02).

Conclusions. Treatment of failing native and prosthetic dialysis arterio-venous shunts using drug-coated balloon catheters prolongs the primary patency period and prolongs the time to necessary reintervention. The volume of hypoperfused lung measured on CTPA in patients with CTEPH correlates with pulmonary vascular resistance.

Keywords: *dialysis shunt, percutaneous transluminal angioplasty, drug-coated balloon catheter, chronic thromboembolic pulmonary hypertension, CT pulmonary angiography*