Introduction:
Despite the clinical benefit of endovascular treatment (EVT) for large vessel occlusion (LVO) in ischemic stroke, space-occupying brain edema (BE) represents a common complication during the course of disease. Routinely, CT imaging is used for monitoring of these patients, notably in the critical care setting, yet novel and easy bedside techniques with the potential to reliably predict BE without repetitive imaging would be valuable for a time and cost effective patient care. We assessed the significance of automated pupillometry for the identification of BE patients after LVO-EVT.

Methods:
We enrolled 40 patients admitted to our neurocritical-care unit who received EVT after anterior circulation large vessel occlusion. We monitored parameters of pupillary reactivity [light-reflex latency (Lat; s), constriction and re-dilation velocities (CV, DV; mm/s), and percentage change of apertures (per-change; %)] using a portable pupilometer (NeurOptics®) up to every 60 minutes during the first 72 hours of ICU stay. BE was defined as midline-shift ≥5mm on follow-up imaging within 3-5 days after EVT. We assessed differences in pupillary reactivity between patients with and without BE (U-test) and evaluated prognostic performance of pupillometry for development of BE (ROC analysis).

Results:
In 32 patients (19 women, 74.3±12.0 years) without BE, 1,224 assessments were compared to 207 assessments in 6 patients (3 women, 71.7±11.8 years) with BE. On day 1, day 2, and day 3 after EVT, patients with BE had significantly lower CVs and DVs, and smaller per-changes than patients without BE, whereas Lat did not differ between both groups. ROC-analyses revealed a significant negative association of CV, DV, and per-change with development of BE.

Conclusion:
Automated pupillometry seems to identify patients at risk for BE after EVT. A prospective study should validate whether automated pupillometry harbors the potential to reduce unnecessary follow-up CT imaging.