Background: Patterns of deployment of transcatheter balloon-expandable aortic valves may impact hemodynamics and durability. This study correlated the frame deployment assessed with multi-detector row computed tomography (MDCT) with the occurrence of valve dysfunction at follow-up in patients treated with transcatheter aortic valve implantation (TAVI).

Methods: 140 patients with symptomatic severe aortic stenosis treated with TAVI underwent pre and post-procedural MDCT. Eccentricity and expansion grade of the transcatheter valve frame were analysed with MDCT. Aortic valve area (AVA), mean and peak valvular gradients and presence of new valve regurgitation were assessed with transthoracic echocardiography at follow up (pre-discharge, 6, 12 and 24 months).

Results: Overall mean valve expansion was 80% of the nominal area. Patients were divided according to tertiles of valve expansion (0.55 - 0.77, 0.78 - 0.84, 0.85 - 1.0). Eccentric valve deployment was observed in 17%. During a median follow-up of 23 (12-25) months, AVA decreased significantly (1.73 to 1.54 cm², p=0.001) without significant hemodynamic consequences. In addition, new significant aortic regurgitation was not observed. Pattern of expansion (circular vs. eccentric) and expansion rate were not associated with significant changes in valve hemodynamics.

Conclusion: At 2-years follow-up, transcatheter balloon expandable aortic valves show stable hemodynamics regardless type and rate of expansion frame as assessed with MDCT.