

Background: Calcification poses a significant challenge to the treatment of atherosclerotic plaques if solely balloon angioplasty and stent implantation are relied upon. Since the first use of rotational atherectomy (RA) in the 1980s, modifying calcified plaques to help optimize stent implantation has proven to be essential, leading to the development of new techniques, namely orbital atherectomy (OA) and intravascular lithotripsy (IVL), each employing a distinct mechanism. Currently, there is a scarcity in resources directly comparing the three techniques.

Aim: This retrospective observational study aims to clarify any differences between the three techniques in terms of safety and efficacy.

Methods: Data was collected from 108 patients treated at the Department of Cardiology and Heart Surgery of the University of Debrecen from 2020 to 2024. Statistical analyses were performed using R (version 4.4.2; R Core Team, 2024).

Results: There were no statistically significant differences in terms of safety, specifically regarding procedural complications, periprocedural myocardial infarction (MI) and mortality between the 3 techniques. Similarly, efficacy, assessed through follow-up ejection fraction (EF), wall motion abnormality and the need for new percutaneous intervention (PCI) and target vessel revascularization (TVR) showed no significant differences either.

EF prior to treatment was better for patients receiving IVL than for those receiving RA (IVL: 48.47 ± 14.50 vs. RA: 40.42 ± 12.59 ; $p = 0.046$), the proportion of secondary indication in patients receiving IVL was smaller than in those receiving RA (IVL: 5.26% vs. RA: 36.36%; $p = 0.031$) and the proportion of previous PCI was higher for IVL than for RA (IVL: 89.47% vs. RA: 44.16%; $p = 0.002$) or for OA (IVL: 89.47% vs. OA: 41.67%; $p = 0.024$). Between right coronary artery (RCA) and circumflex (CX) lesions, there was a statistically significant difference in the number of lesions treated with RA and those treated with OA ($p = 0.037$).

Conclusion: A tailored decision between the three modalities yielded similarly good outcomes, supporting the proposal that individual assessment is essential for selecting the optimal technique.