The outcome of atrial fibrillation ablation in patients undergoing radiofrequency ablation, guided by novel indices incorporating force, time and power

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Introduction: Ablation index (AI) and Lesion Size Index (LSI) are novel parameters that incorporates contact force, time, and power in a weighted formula. Recent studies have shown that such indices predict lesion size and durability of pulmonary vein isolation (PVI). However, the outcomes of ablation guided by these indices have not been well characterised. Thus, we aim to determine the association between indices of force-time-power and acute PV reconnections, Atrial fibrillation (AF) recurrence, procedure, radiofrequency and fluoroscopy time in patients undergoing radiofrequency PVI.

Methods: PUBMED and EMBASE were searched using the keywords catheter ablation, Ablation index, Lesion Size Index, contact force, force time integral, lesion size from inception through 22 May 2019. Studies reporting the procedure time, ablation time, fluoroscopy time, and incidence of AI acute and late reconnection and AF recurrence were included.

Result: Six eligible studies were included in the meta-analysis. Two studies compared minimum AI in reconnected vs. non-reconnected PV segments. Acute PV segment reconnection was associated with a lower minimum AI vs. non-reconnection (343.46 [95% CI; 297.40; 389.52] vs 387.04 [95% CI 345.88; 428.20]). Furthermore, in 4 studies (AI=3, LSI=1) that reported AI/LSI guided vs AI/LSI blinded ablation, AI/LSI guided ablation was associated with an increased relative risk of freedom from AF at follow-up (RR: 1.31 95% CI [1.18; 1.45], p<0.001). There was no reduction in procedure time ablation (n=4; AI/LSI guided (175.33 min 95% CI [155.83; 194.83]) vs. AI/LSI blinded (194.16 min [170.72; 217.60], p=0.198) and fluoroscopy time (n=4; AI/LSI guided (17.19 min, 95% CI; [11.2675; 23.11]) vs. AI/LSI blinded (21.69min, 95% CI; [8.35; 35.02]), p= 0.212) and ablation time (n=4; AI/LSI guided (47.14 min 95% CI; [38.34; 55.93]) vs. AI/LSI blinded (56.53 min 95% CI; [41.10; 71.95]), p= 0.083).

Conclusion: Radiofrequency ablation guided by AI/LSI was associated with lower acute PV reconnection rates and improved AF freedom after PVI. There was no difference in fluoroscopy, ablation or procedure time with the use of these novel parameters.