Cryoballoon versus Radiofrequency Ablation in Patients with Paroxysmal Atrial Fibrillation:

A Systematic Review and Meta-analysis of Randomized Controlled Trials

RWD249

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Purpose

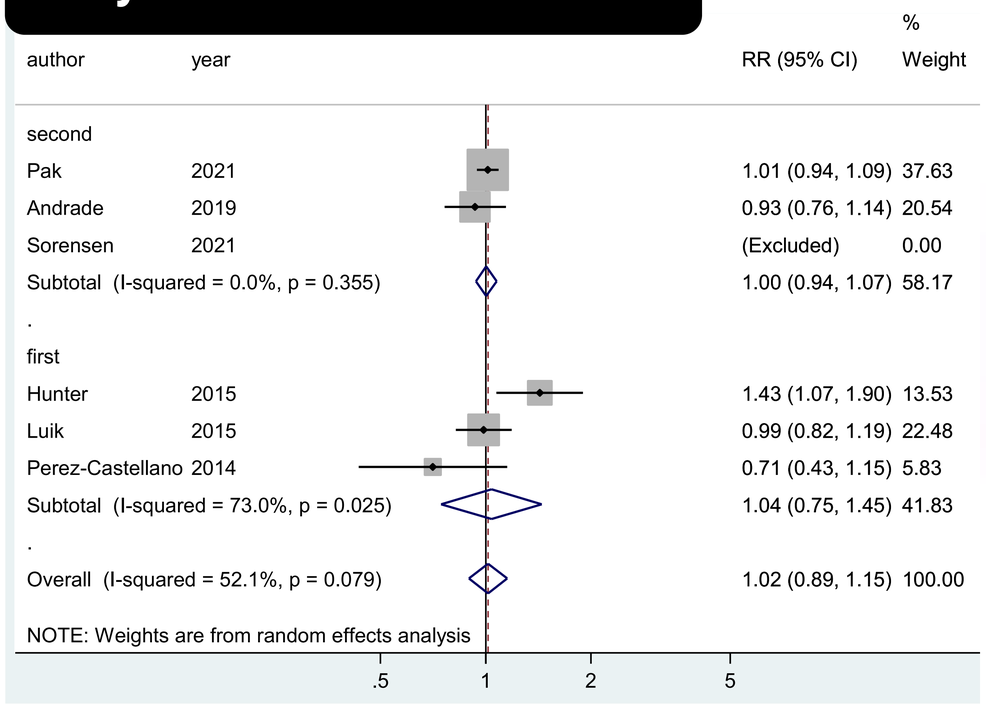
Cryoballoon ablation (CBA) has become an alternative to radiofrequency ablation (RFA) for managing atrial fibrillation (AF). This study aimed to compare the clinical outcomes of CBA versus RFA in patients with paroxysmal AF.

Methods

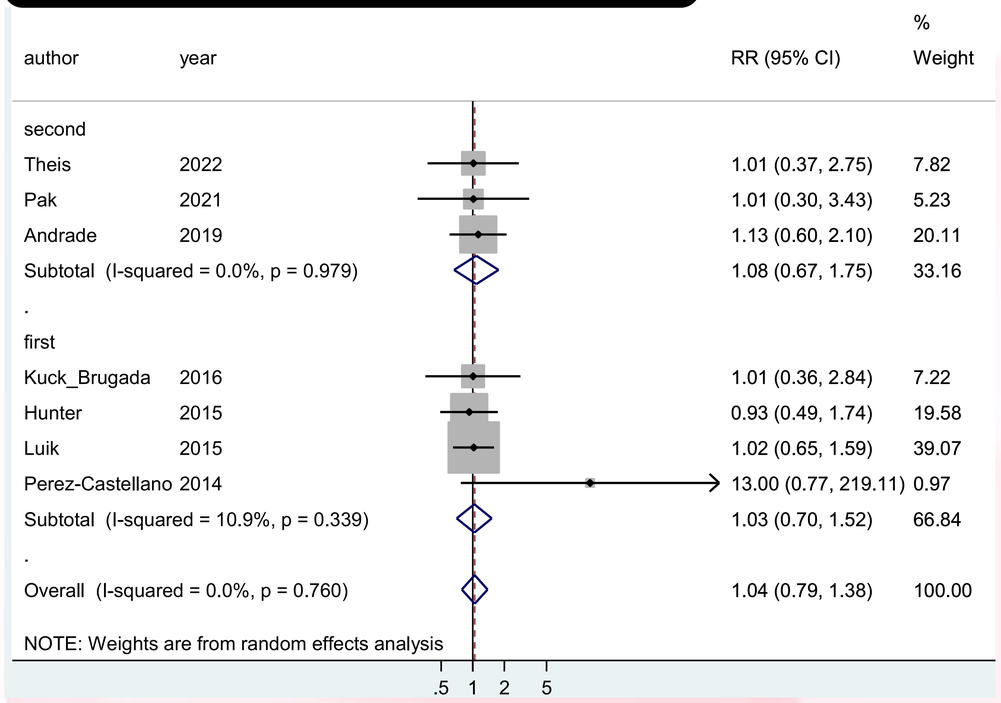
- A systematic literature search was conducted in PubMed, Scopus, and Embase from inception to February 2025 to identify randomized controlled trials (RCTs) comparing CBA and RFA.
- Eligible studies were evaluated for methodological quality using the revised Cochrane risk-of-bias tool for randomized trials version 2.0.
- Data were extracted and analysed using predefined clinical outcomes.
- Pooled analyses were performed using risk ratios (RR) or mean differences (MD) to assess outcomes, including procedure time, AF recurrence, and need for re-ablation within one year.
- Heterogeneity was assessed using the I^2 statistic.

Results

1-year freedom from AF



1-year re-ablation



Procedural time

Procedural time (mins)	No. of study	MD (mins)	95%CI	p-value
Any CBA vs. RFA	5	-19.57	-37.587, -1.533	0.033
Second generation CBA vs. RFA	2	-45.257	-49.273, -41.241	<0.001
First generation CBA vs. RFA	3	2.107	-23.134, 27.349	0.870

- 9 RCTs involving 2,150 patients with paroxysmal AF (1,072 CBA; 1,078 RFA) were included.
- CBA was associated with a significantly shorter procedure time than RFA (MD -19.6 minutes, 95%CI -37.6 to -1.6, I2 =95%, p 0.03).
- No significant differences were observed between CBA and RFA in the risk of AF recurrence (RR 1.02, 95%CI 0.89-1.15, I2 =52%, p 0.815) and re-ablation (RR 1.04, 95%CI 0.75-1.38, I2 =0%, p 0.762) within 1 year.

Conclusion

- CBA had a shorter procedure time compared to RFA, while both interventions showed comparable efficacy in terms of AF recurrence and re-ablation rates within 1-year follow-up.

Acknowledgement

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