

Single Center Clinical Experience with Hybrid Convergent Ablation and Impact on atrial fibrillation burden as determined by cardiac rhythm management devices

Mashal Tahirkheli, Arslan Ahmad, Qasim Manzoor Amjad, Hannah Hameed, Bireera Muzaffar, Sakina Batool, Sara Ahmed, Paul J. Garabelli, Hussnain Zafar, Zarrar Sani, Hunter Weitzel, Muhammad Baig M.D., Sidra Ahmad, Alysha Siddiqi, Mehak Ali, Coty W. Jewell M.D., Naeem K. Tahirkheli M.D.
Oklahoma Heart Hospital South, Oklahoma City, Oklahoma

1 INTRODUCTION

Hybrid convergent (HC) ablation for atrial fibrillation(AF), is a closed chest epicardial and subsequent endocardial ablation, to isolate the left atrial posterior wall and pulmonary veins. The aim is to leverage the strengths of both approaches, with an intent to achieve more transmural and durable lesions. Herein, we report 264 consecutive cases from 2015 to 2019, with a mean 2-year follow-up. Almost all patients had long-term continuous monitoring devices (CRM).

2 OBJECTIVES

To assess the efficacy of convergent procedure in patient with atrial fibrillation monitored on long term cardiac rhythm management devices.

3 MATERIALS AND METHODS

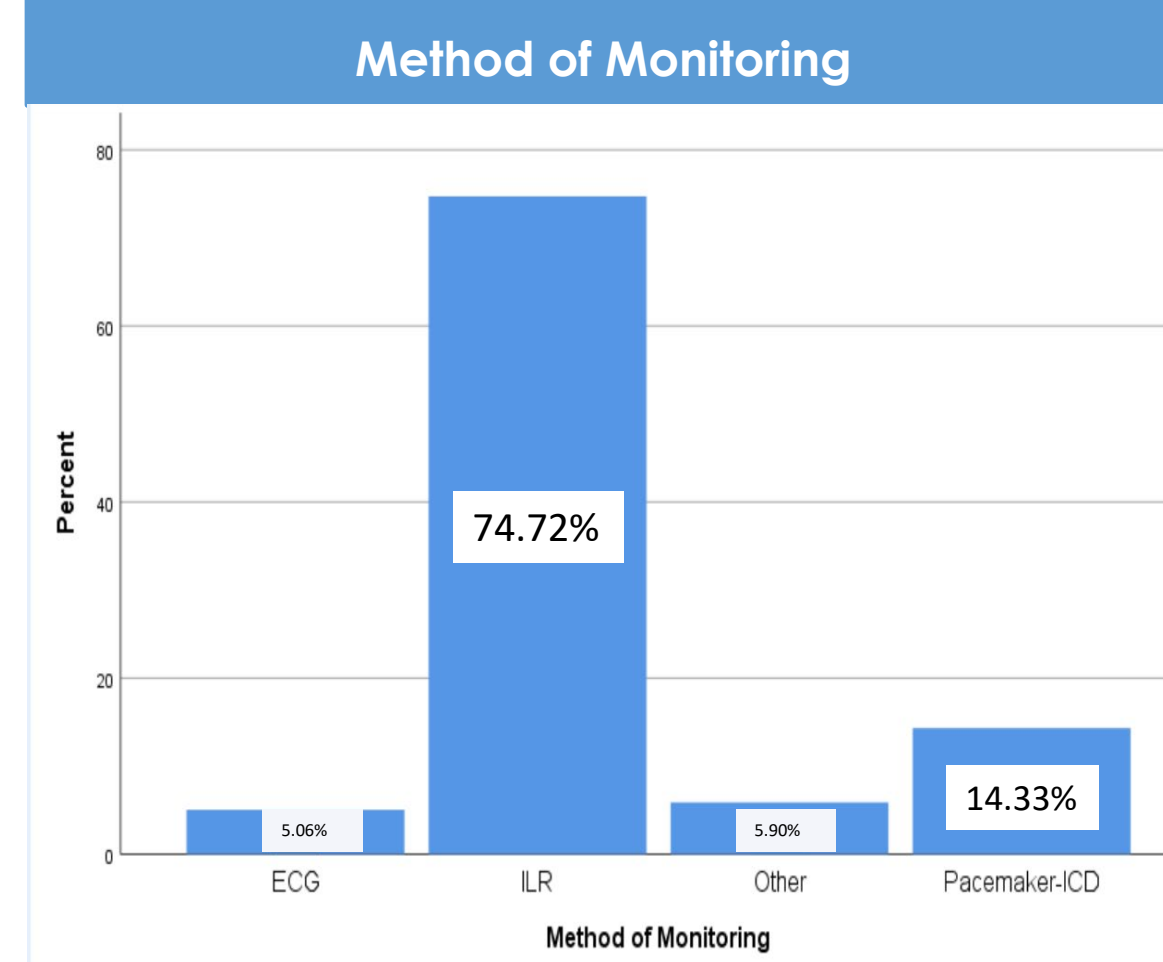
This descriptive case series study was conducted at Oklahoma Heart Hospital-South from May, 2015 to August, 2019. The study included all individuals from the hospital registry who underwent Hybrid Convergent ablation for atrial fibrillation in the above period. Data was collected retrospectively for 357 patients. The data was collected pre-procedure, during the procedure, at the time of discharge and during routine/non-routine follow-ups. The majority of patients were followed using continuous rhythm monitoring (CRM) devices for AF after the procedure. Quantitative data is presented as mean ± SD while qualitative variables are presented as frequency and percentages. Effect modifiers are controlled through stratification and the post-stratification chi-square test was applied taking a p-value of ≤0.05 as significant. Our main outcome consisted of 4 composite variables i.e. Death, AF Burden >5%, Recurrence of symptoms, and re-hospitalization for AF. Kaplan-Meir curve and cox-regression analysis was performed for the main outcome and secondary outcomes using follow-up data.

4 Results

357 patients were included in the study and followed for 5 years with a mean follow-up of 2.21 ± 1.37 yrs. Mean age was 65 ±10.4 years. 71.7% were male and 39.4% were female. Table 1 shows the baseline characteristics of our patients. Table 2 shows procedure data for hybrid convergence (HC). In >90% of patients all pulmonary veins were ablated. 27.3% of patients underwent LA Appendage isolation and 50% of patients underwent Roof lesion ablation. The complication rate was 3.9%. Graph 1 shows the Kaplan-Meir curve for the main outcome. Graph 2 shows the Kaplan Meir curve for primary outcome stratified based on AF classification. Graph 3A shows >80% of patients were symptom-free from AF at the end of follow-up among patients with paroxysmal and persistent AF. Cox regression analysis shows significant difference between Paroxysmal and Permanent AF with respect to main outcome variables. The best response to HC ablation is observed in paroxysmal AF. The post-stratification analysis doesn't show any significant association with comorbid and other risk factors.

Table 01: Baseline characteristic		
BASELINE CHARACTERISTICS		
		Mean ± SD
Mean age		65 ± 10.4
Females (%)		39.4% (141/357)
Mean BMI		33.6 ± 11.5
AF CLASSIFICATION	Paroxysmal	53.7% (192/357)
	Persistent	26.6% (95/357)
	Long-Term Persistent	0.008% (3/357)
	Not Available	16.5% (59/357)
COMORBIDITIES		
CHA2DS2VASc Score		2.6 ± 1.4
Ejection Fraction		53.7 ± 10.4%
Left Atrial Diameter		3.66cm ± 0.96cm
HAS-BLED score		1.7 ± 1
Anti-Arrhythmic drugs		92.4% (329/357)
Anti-thrombotic drugs		94.4% (336/357)
FOLLOWUP		
Mean Follow-up		2.21 ± 1.37 years

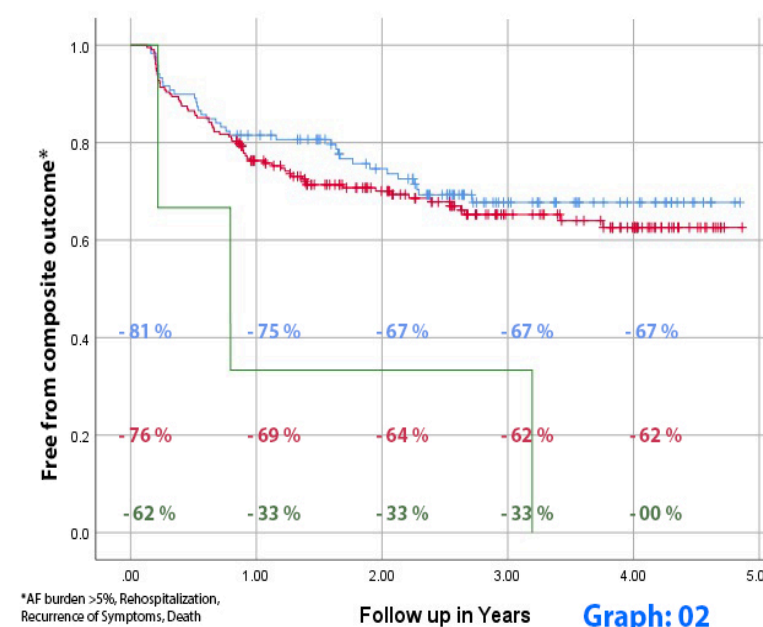
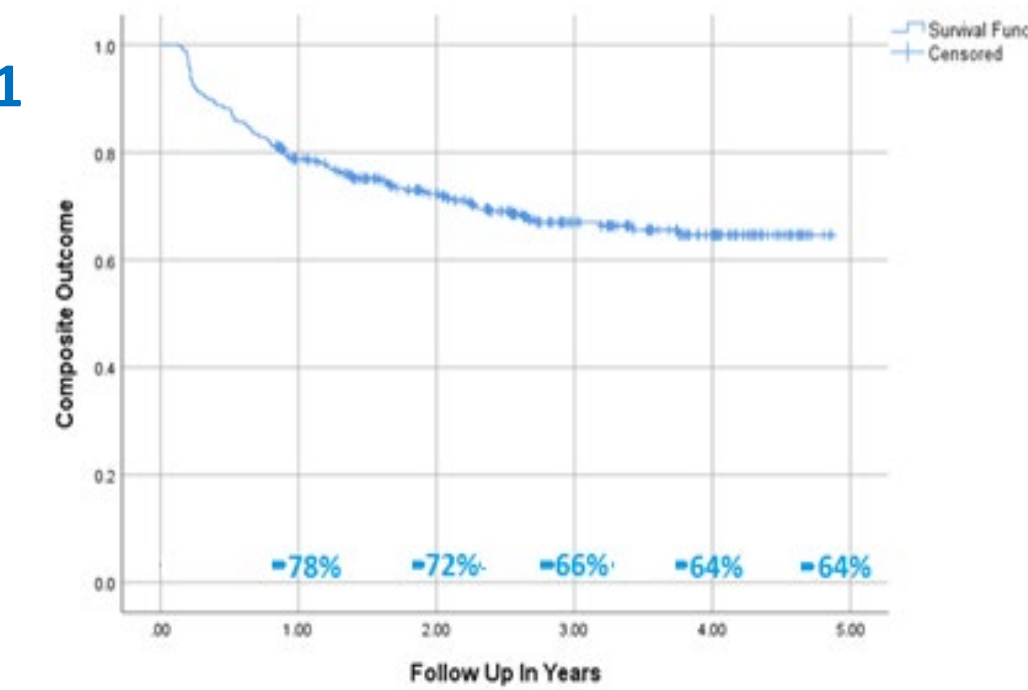
Table 02: Procedure Aspects		
Procedure	Site	Percentage of Patients
RF Ablation	Left Pulmonary Vein	91.30%
	Left Inferior Pulmonary Vein	91.30%
	Right Pulmonary Vein	91%
	Right Inferior Pulmonary Vein	90.70%
	Mitral Isthmus	74.7%
	Roof lesion	50%
	Left Atrial Appendage	27.20%
	Epicardial Coronary Sinus	0.60%
Complications		3.9%



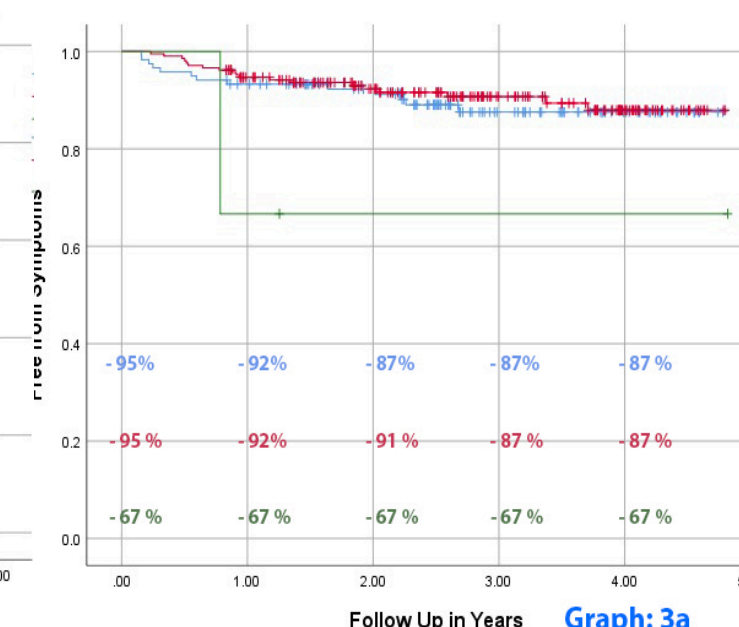
Mean Time to composite outcome*			
Estimate	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
3.542	.104	3.337	3.747

* Death, AF Burden>5%, Hospitalization, Recurrence of Symptoms

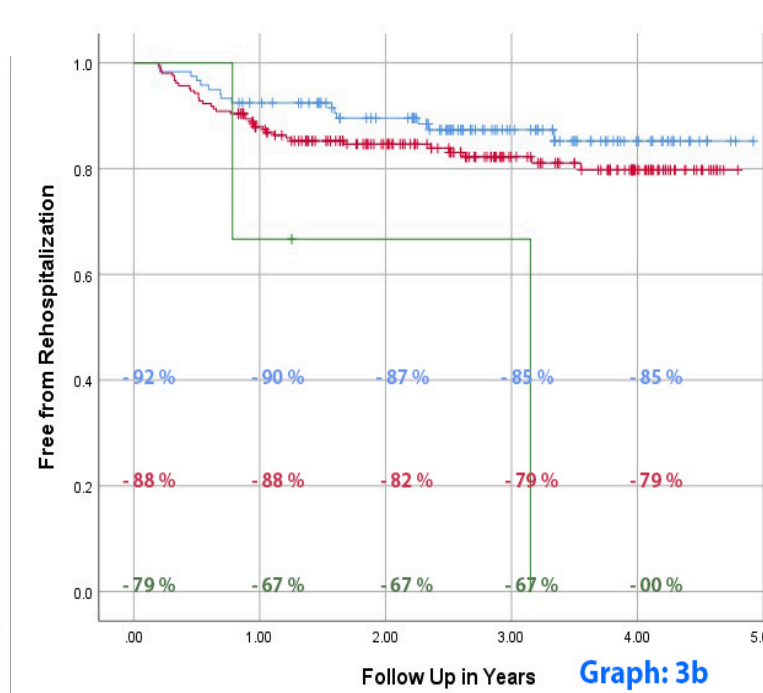
Graph: 01



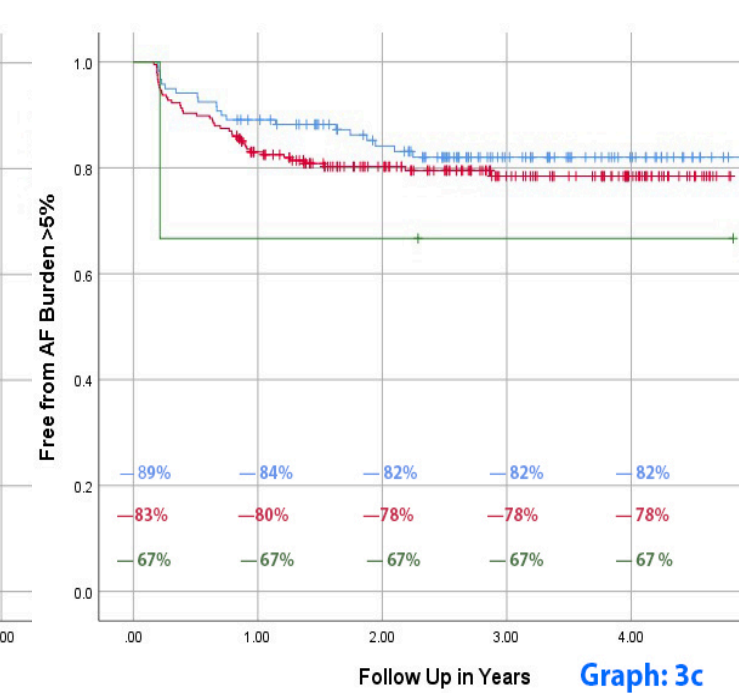
Graph: 02



Graph: 3a



Graph: 3b



Graph: 3c

Table 04: Cox regression Analysis

AF Classification	B	Std. Error	Wald	P-Value	Exp(B)	df
Paroxysmal				0.032		2
Persistent	0.167	0.208	0.646	0.421	1.182	1
Long-Standing Persistent	1.578	0.602	6.866	0.009	4.487	1

Table 05: AF classes and individual outcomes

AF Classification	Mean Time to detection of AF Burden of >5%				Mean Time to Rehospitalization				Mean Time to recurrence of symptoms			
	Est.	Std. Error	95% CI LB	95% CI UB	Est.	Std. Error	95% CI LB	95% CI UB	Est.	Std. Error	95% CI LB	95% CI UB
Paroxysmal	4.211	0.145	3.926	4.496	4.4	0.126	4.153	4.647	4.338	0.117	4.109	4.566
Persistent	3.925	0.120	3.689	4.161	4.074	0.11	3.859	4.288	4.425	0.081	4.266	4.585
Long Standing Persistent	3.284	1.253	0.827	5.741	2.362	0.911	0.576	4.147	3.474	1.098	1.321	5.627
Overall	4.081	0.095	3.895	4.268	4.179	0.097	3.989	4.369	4.408	0.068	4.274	4.541

LB: Lower Bound, UB: Upper Bound, CI: Confidence Interval

5 CONCLUSIONS

Hybrid convergent is a safe and effective procedure, showing maximum benefit in patients with paroxysmal atrial fibrillation.

6 REFERENCES

- DeLurgio DB, Crossen KJ, Gill J, Blauth C, Oza SR, Magnano AR, et al. Hybrid Convergent Procedure for the Treatment of Persistent and Long-Standing Persistent Atrial Fibrillation: Results of CONVERGE Clinical Trial. *Circ: Arrhythmia and Electrophysiology*. 2020 Dec;13(12):e009288.
- Gersak B, Pemat A, Robic B, Sinkovec M. Low Rate of Atrial Fibrillation Recurrence Verified by Implantable Loop Recorder Monitoring Following a Convergent Epicardial and Endocardial Ablation of Atrial Fibrillation. *Journal of Cardiovascular Electrophysiology*. 2012 Oct;23(10):1059-66.
- Kurfirst V, Mokra ek A, Bulava A, anadyova J, Hani J, Pe I L. Two-staged hybrid treatment of persistent atrial fibrillation: short-term single-centre results. *Interactive CardioVascular and Thoracic Surgery*. 2014 Apr 1;18(4):451-6.
- Maclean E, Yap J, Saberwal B, Kolvekar S, Lim W, Wijesuriya N, et al. The convergent procedure versus catheter ablation alone in longstanding persistent atrial fibrillation: A single centre, propensity-matched cohort study. *International Journal of Cardiology*. 2020 Mar;303:49-53.

7 Contact Information

Arslan Ahmad
 Oklahoma Heart Research
 ahmarlsan7@gmail.com