Atypical flutter: effectiveness of a systematic strategy based on comprehensive high-density map analysis

J. Brito[1], B. Valente Silva[1], P. Alves Da Silva[1], B. Garcia[1], A. Abrantes[1], A. Nunes Ferreira[1], G. Lima Da Silva[1], N. Cunha[1], P. Teixeira[1], L. Carpinteiro[1], N. Cortez-Dias[1], F. J Pinto[1], J. Sousa[1]

[1]Cardiology Department, Santa Maria University Hospital (CHULN), CAML, CCUL, Lisbon School of Medicine, Universidade de Lisboa, Lisbon, Portugal

Funding Acknowledgements: None.

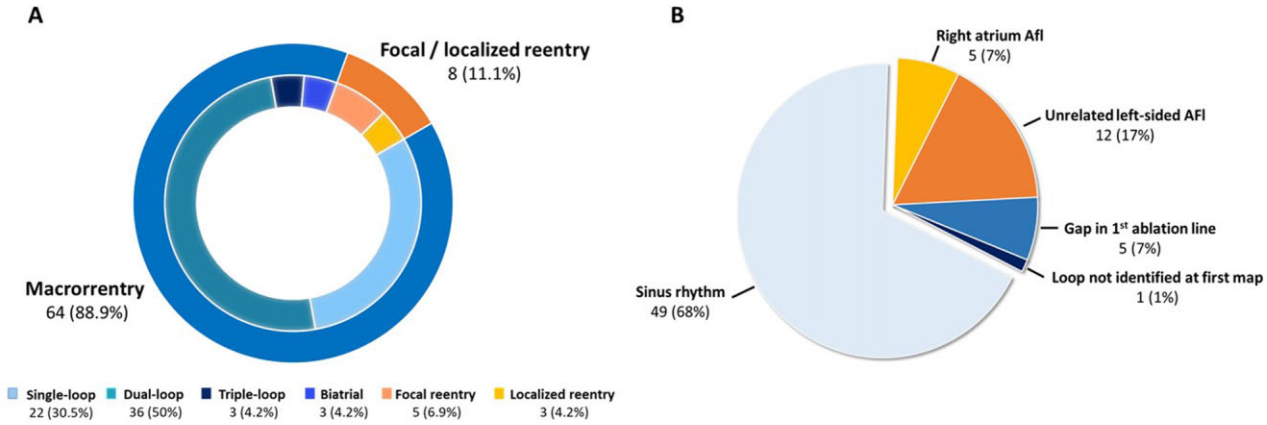
Introduction: High-density mapping tools expanded the mechanism characterization of atypical flutters (AFl). Systematic analysis of substrate and activation maps is critical for proper interpretation and targeted ablation strategy.

Purpose: Between 2016 and 2017, we developed a comprehensive stepwise workflow for AFl map interpretation in 25 pts. This study evaluates its effectiveness in a validation cohort.

Methods: Prospective single-center study of pts with left-sided AFl referred for ablation from 2018 to 2022. Pts with prior AFl ablation procedures were excluded. Complete high-density map collection was performed using Carto, Ensite or Rhythmia, displaying only voltage data. The comprehensive workflow was applied for activation map interpretation, starting by facing the mitral annulus and following the sequence of colors to systematically identify all potential circuits, their common-isthmuses and eventual slow-conduction sites. Additional algorithms (Coherent, Ripple, SparkleMap or LumiPoint) were used subsequently for interpretation validation purposes. A mechanism-tailored ablation strategy was applied targeting AFl common-isthmuses. If AFl persisted after completion of 1st ablation set, a remap was performed. Acute success was defined as conversion to sinus rhythm with the completion of the final ablation set. Entrainment maneuvers were only used to confirm the interpretation if AFl persisted after completion of the planned ablation set. Arrhythmic relapse was defined as atrial fibrillation or AFl recurrence.

Results: 72 pts were included in the AFl validation cohort (male 61.1%; 67±12 years old). Substrate maps revealed low-voltage areas (<0.3 mV) out of the pulmonary veins in 88%. AFl mechanism was macro-reentrant in more than 88%, most often with dual-loop circuits (50%, N=36) and including a perimitral rotation (54%, N=36 pts). The 1st set of mechanism-tailored ablation restored sinus rhythm in 49 pts (68%). The residual AFl (N=23) was found to be: (1) same AFl using a line gap (N=5); (2) same AFl using a loop previously not recognized in 1; (3) completely different AFl with a distinctive circuit (N=12); or (4) a right-sided peri-tricuspid flutter in 5 pts. Completion of the ablation set resulted in sinus rhythm restoration in 21 of these 23 pts, resulting in an overall acute success rate of 97% (70/72). In the remaining 2 pts, response to entrainment maneuvers was compatible with conduction persistence through the ablation line, being unsuccess explained by ablation failure. After a single procedure, the 3y success rate was 63% increasing to 74% with additional procedures - pic2.

Conclusion: This comprehensive stepwise workflow for AFl high-density map allows a mechanism-tailored ablation strategy that results in a very high acute and long-term success rate. Our study enforces that if AFl persists after the 1st ablation set and a remap is pursued, the additional targeted ablation usually results in a final procedural success.



Picture 1 - A: Mechanism distribution of left-sided AFl. **B:** Response after 1st ablation set.