

Modified Atrial Fibrillation Burden: A Novel Metric to Account for Both Rhythm and Rate Control

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Background

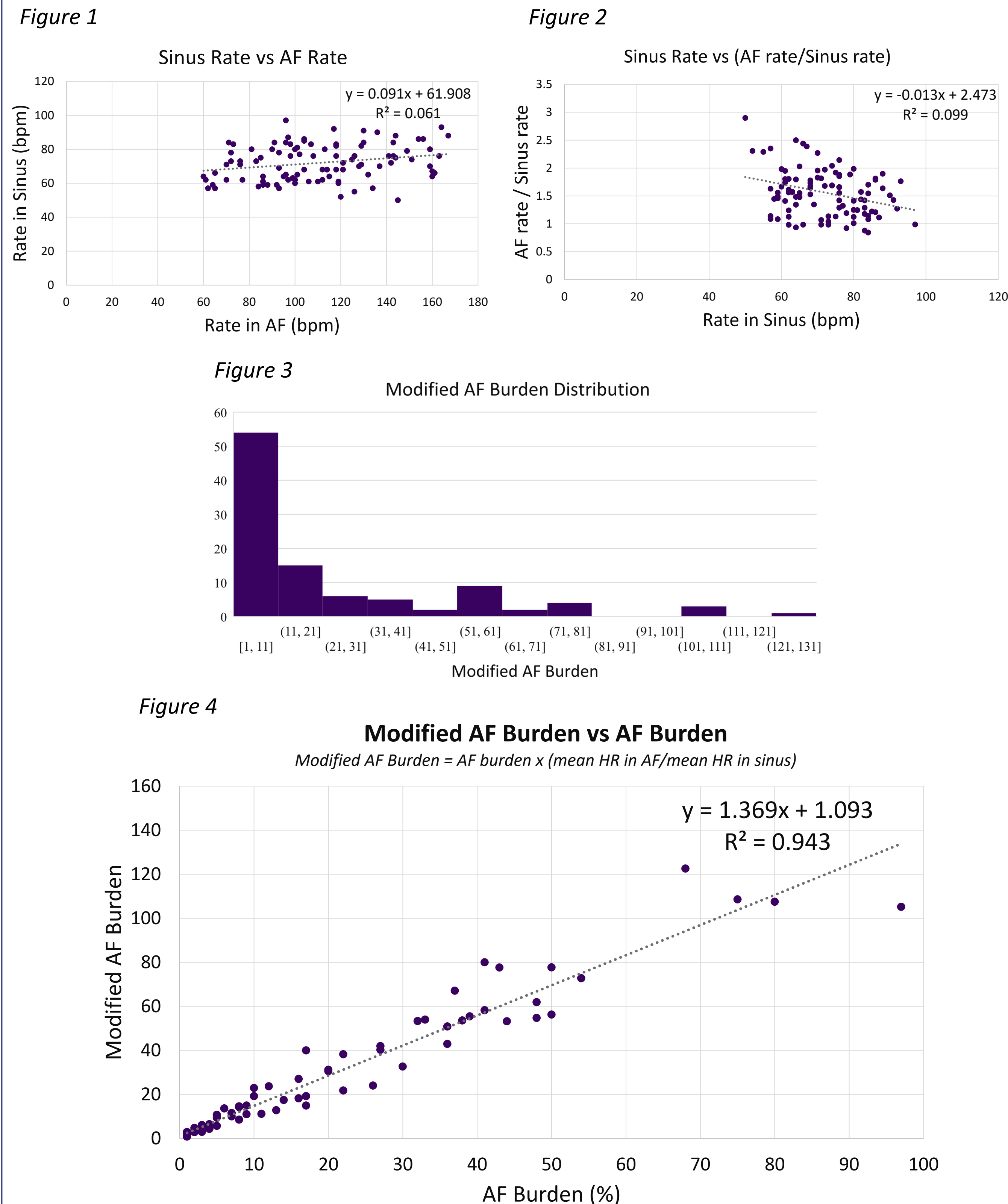
- Heart rate (HR) while in Atrial Fibrillation (AF) is a marker of AF severity that is associated with clinical outcomes, symptoms and tachycardia-induced cardiomyopathy.
- AF burden, measured as the percentage of time in AF, is increasingly being used as a metric to guide AF management due to its association with symptoms and clinical outcomes.
- A comprehensive metric that incorporates HR while in AF (rate control), and AF burden (rhythm control) may better characterize AF severity than the single metrics alone.

Research Objective

- To introduce a novel metric 'Modified Atrial Fibrillation Burden' that incorporates measures of both AF rhythm and rate control
- To investigate the relationship between Modified AF Burden and existing AF metrics

Methods

- Consecutive single-lead, patch-based, ambulatory ECG monitors (24-48hr Holter Monitors and 1-2 week Event Recorders, Ziopatch, iRhythm Technologies, San Francisco, CA) were reviewed by two physicians.
- Patients without AF and with continuous AF were excluded.
- Patient wear time, AF burden, mean HR in AF, and mean HR in sinus rhythm were recorded in an IRB-approved database.
- Modified AF Burden was calculated using the following formula: $AF\ burden \times (mean\ HR\ in\ AF / mean\ HR\ in\ sinus)$.
- Correlations between Modified AF Burden, AF burden, mean HR in AF, mean HR in sinus, and the ratio between mean HR in AF to mean HR in sinus were evaluated.



Results

- Of the 1,599 ambulatory monitors that were reviewed, 100 cases met the inclusion and exclusion criteria.
- The mean AF burden, mean HR in sinus, and mean HR in AF were 5% (IQR: 1%-22%), 72bpm (IQR: 63bpm-80bpm), and 108bpm (IQR: 99bpm-130bpm), respectively.
- There were no significant correlations between the mean HR in sinus and the mean HR in AF (Figure 1), or between the mean HR in sinus and the ratio between mean HR in AF and mean HR in sinus (Figure 2).
- The median Modified AF Burden was 8.6 (IQR: 1.9-31.9, range: 0.9-122.6) (Figure 3). There was a strong correlation between the Modified AF Burden and AF burden ($1.369x + 1.093$, $R^2 = 0.943$) with the greatest dispersion of Modified AF Burden seen in patients with a 20-50% AF burden. Specifically for patients with 20-30% AF burden, the Modified AF Burden ranged from 22-40, and for patients with 40-50% AF burden, Modified AF Burden ranged from 27-80 (Figure 4).

Limitations

- This study was a single-center, hypothesis-generating investigation meant to introduce a new metric for studying and managing AF.

Conclusions

- Modified AF Burden is a metric that incorporates both rate *and* rhythm control which can be calculated easily using data from ambulatory monitors.
- Future studies examining the association between Modified AF Burden and clinical endpoints (such as AF-related quality of life and AF-related health outcomes) should be performed to evaluate the incremental value this novel metric may provide compared to measures of AF rate or burden alone.