Incidence And Factors Associated With Atrial Fibrillation In People Living With Human Immunodeficiency Virus In British Columbia, Canada

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Background

For people living with HIV (PLIHV) who access combination antiretroviral therapy (ART), the overall incidence of AIDS or deaths related to infection by HIV has significantly decreased. In contrast, cardiovascular disease has emerged as an important cause of morbidity and mortality amongst these individuals. Even with effective ART, PLHIV have a higher risk of myocardial infarction and cardiovascular death than age-matched uninfected controls. Although, atrial fibrillation (AF) is the most common cardiac arrhythmia in the general population little is known about its incidence and related factors in PLHIV.

Objective

The primary aim of this study was to compare the incidence of AF amongst PLHIV and HIV negative individuals in the province of British Columbia(BC), Canada. Secondarily, we also assessed the association between AF incidence and markers of HIV infection (CD4/viral load) and ART treatments.

Methods

A population-based data set was created via linkage between the BC Centre for Excellence in HIV/AIDS and Population Data BC. PLHIV aged 19 years and older were compared to a random 10% sample of HIV negative individuals from the BC population. The International Classification of Diseases 9 and 10 codes were used to identify AF diagnosis from 1996 to 2013. Generalized estimating equation (GEE) models with Poisson distribution were constructed to examine the relationship between the incidence rate of AF in PLHIV and demographic/clinical variables. The age-adjusted incidence rates were calculated using the age distribution of 2011 Canadian standard population.

Results

- Of a total of 528,859 individuals included in the analyses, 13,907 were PLHIV and 514,952 were HIV negative individuals. Of these, 265 (1.91%) and 20,244 (3.93%) developed AF respectively during follow up (median of 7.15 and 12.42 years). AF occurred at a median age of 61 years (Q1-Q3: 52-70) in PLHIV vs 75 years (Q1-Q3: 66-82) (p-value <0.001) in the HIV negative individuals.
- The age standardized incidence rate per 1000 person year was 2.40 (95% CI: 2.01-2.78) in PLHIV and 2.75 (95% CI: 2.71-2.79) in the HIV negative individuals with a rate ratio of 0.87 (95% CI: 0.73-1.01). Among individuals aged < 50 years, PLHIV had higher rates of AF (0.98% vs. 0.45%) with a rate ratio of 2.20 (95% CI:1.68- 2.89) (Figure 1).
- Among PLHIV, individuals with a CD4 <350 cells/mm3 were more likely to have AF for every age strata (Figure 2), although these differences were not statistically significant.
- In adjusted models, variables associated with higher rates of developing AF in PLHIV included: older age, male sex, lower CD4 cells count at baseline and having a prior AIDS defining illness (ADI). Longer exposure to ART and the use of either protease inhibitors or non-nucleoside reverse transcriptase inhibitors were negatively related to the development of AF (Table 1).

Conclusions

- In this study, PLHIV developed AF at an earlier age compared to HIV negative controls.
- PLHIV had a higher rate of developing AF if they were older, male, or had indicators related to advanced HIV infection (i.e.: low CD4 cell count and prior ADI), irrespective of the ART class exposure.

Table 1. Multivariable GEE model

		Rate Ratios	95% Confidence Interval	
			Lower	Upper
Age at AF diagnosis or end of follow-up (per 10 years increase)		2.13	1.91	2.38
Sex	Female [ref]	1.00		
	Male	1.58	1.04	2.09
Categorized baseline CD4 (cells/mm^3)				
	≤ 199 [ref]	1.00		
	200 – 349	0.86	0.54	1.37
	350 – 499	0.56	0.33	0.93
	≥ 500	0.36	0.21	0.62
	unknown	0.19	0.12	0.32
ADI status at baseline	No [ref]	1.00		
	Yes	1.84	1.15	2.95
ART includes NNRTI	No [ref]	1.00		
	Yes	0.66	0.49	0.90
ART includes boosted PI	No [ref]	1.00		
	Yes	0.53	0.38	0.75
Overall duration of ARV before AF or end of follow-up (every 1 year increase)		0.82	0.79	0.86

NNRTI: non-nucleoside reverse transcriptase inhibitor
PI: protease inhibitors

Figure 1. Cumulative incidence of AF by HIV status and age group

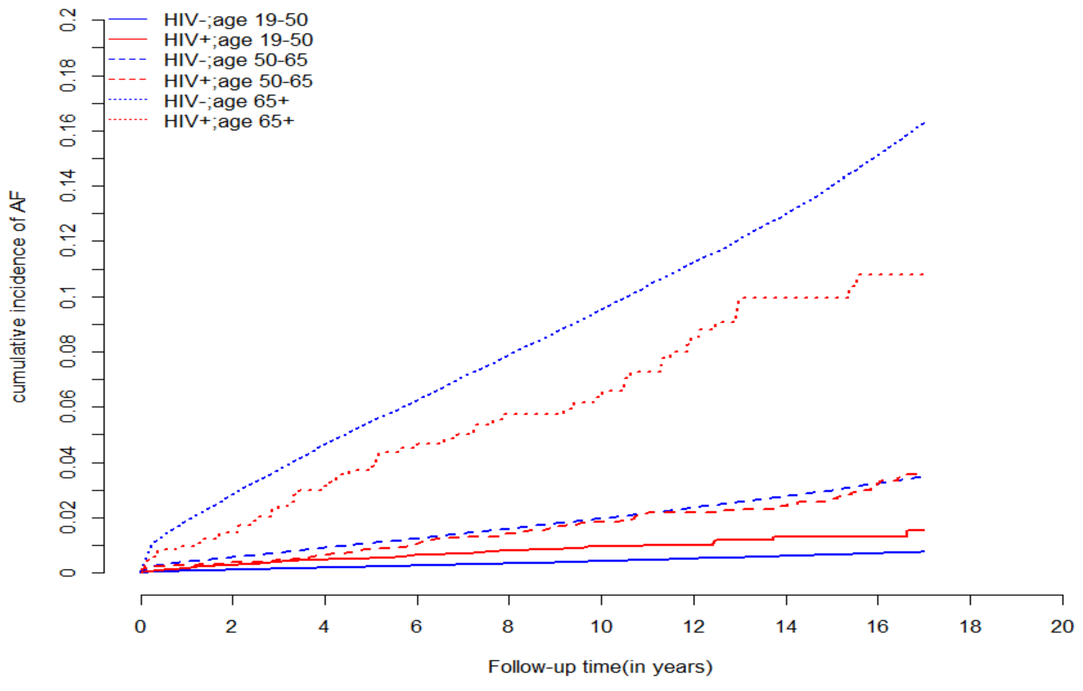
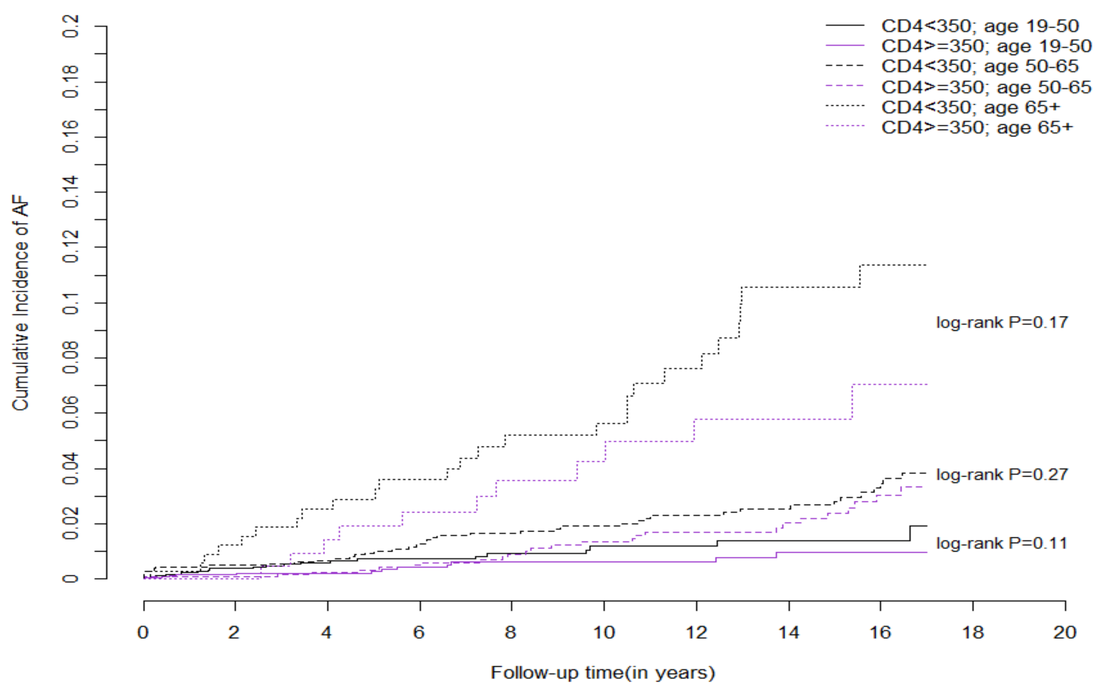


Figure 2. Cumulative incidence of AF by baseline CD4 and age group among PLHIV



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