Echocardiographic Assessment of Cardiac Structural Changes in a Large Multiple Sclerosis Cohort

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INTRODUCTION

- Multiple Sclerosis (MS) is the most common autoimmune inflammatory disorder of the CNS, affecting 2.9 million individuals globally with a high North American prevalence of 288/100,000. Typically presenting between ages 20-40, MS is associated with a striking 28% increased hazard of acute coronary syndrome (ACS).
- Cardiovascular manifestations drastically compound the overall disease burden and reduce the quality of life for patients and families.
- Autonomic nervous system dysregulation within MS may impair vital physiological functions, leading to disruptions in heart rate, heart rhythm, and systolic function.
- While a general epidemiological correlation exists between MS and cardiovascular disease, a critical gap remains in understanding the exact prevalence and variability of structural cardiac changes across distinct MS patient subgroups.

RESEARCH OBJECTIVE

To evaluate structural cardiovascular health within a large MS cohort by analyzing concrete echocardiographic parameters, including chamber metrics, valvular disorders, and wall motion abnormalities, stratified by patient demographics and comorbidities.

METHODS

1. Cohort Selection and Baseline Profiling

Conducted retrospective chart reviews from an IRB-approved study to identify a large cohort of MS patients. Extracted comprehensive baseline clinical profiles, including demographics, MS disease duration, and specific comorbidities (hypertension, diabetes, hyperlipidemia, thyroid, and respiratory diseases).

2. Echocardiographic Parameter Extraction

Isolated and categorized quantitative cardiac health variables from patient echocardiograms. Targeted analysis heavily prioritized structural health markers, specifically evaluating chamber parameters, valvular disorders, and wall motion dysfunctions.

3. Statistical and Subgroup Modeling

Summarized baseline data using descriptive statistics. Applied multivariable logistic regression for binary structural outcomes and linear regression for continuous measures, adjusting for age, sex, and comorbidities, alongside targeted subgroup analyses stratified by demographic and comorbidity burden.

MS COHORT DATA

Figure 1: Chronological Distribution of MS Diagnostics Across the Preliminary Cohort

(N=350)

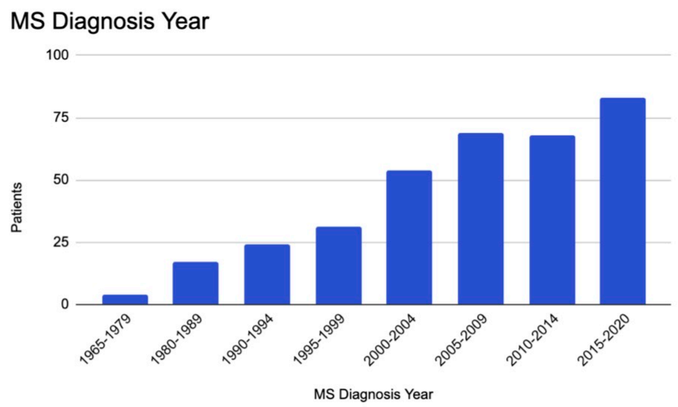
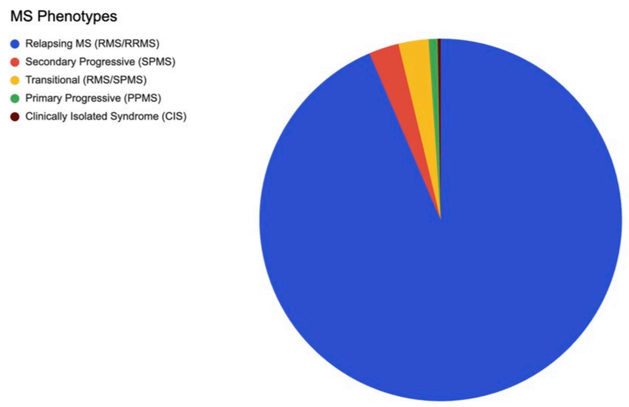


Figure 2: Distribution of MS Clinical Phenotypes within the Preliminary Cohort

(N=373)



DISCUSSION

- Characterizing specific echocardiographic anomalies helps map the precise relationship between MS pathology and structural heart disease.
- Identifying high-risk patient subgroups allows for targeted risk-stratification, enabling clinicians to tailor surveillance intervals and optimize preventative interventions for the most vulnerable individuals.
- Evaluating this specific cohort provides unique clinical value, capturing a diverse patient population across different MS phenotypes and years since diagnosis, allowing for a more nuanced understanding of how cardiac structural changes evolve alongside disease progression.
- Investigation into the prevalence of structural cardiac changes is critical to determining the clinical necessity for early, proactive cardiovascular screening in the MS population.
- Regular echocardiographic monitoring for MS patients may serve as a vital tool for detecting subclinical structural anomalies before they progress to symptomatic cardiovascular dysfunction.
- Advancing our understanding of these structural trends provides actionable insights to improve preventative care guidelines, clinician education, and therapeutic management. Integrating cardiac risk mitigation into standard neurological care can substantially alleviate the long-term systemic disease burden for MS patients.

REFERENCES