Isolated Atrial Infarction in a Patient with Single Vessel Disease of the Sinus Node Artery*

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Atrial infarction is found in approximately 17 percent of autopsy-proven cases of myocardial infarction, but is a frequently missed clinical diagnosis. The antemortem diagnosis of atrial infarction occurring in the absence of ventricular infarction has not been previously reported. We present a patient with ischemic chest discomfort associated with paroxysmal atrial fibrillation. Electrocardiographic and enzymatic changes were consistent with atrial infarction. Cardiac catheterization demonstrated single vessel critical stenosis at the origin of the sinus node artery. Combined atrial and ventricular infarction occurs frequently and should be considered in the setting of paroxysmal supraventricular arrhythmias occurring early in the course of ventricular myocardial infarction. Lone atrial infarction is a rare but distinct clinical entity. The tetrad of typical ischemic chest discomfort, paroxysmal supraventricular arrhythmia, P-Ta segment shifts, and elevated cardiac enzyme levels without evidence for ventricular infarction strongly suggests isolated atrial infarction. (Chest 1991; 100:255-56)

Atrial infarction is considered an unusual event and is rarely reported. The frequency of this clinical entity is more common than generally recognized, found in approximately 17 percent of autopsy-proven cases of myocardial infarction.1 Antemortem diagnosis of atrial infarction is difficult because the subtle and frequently transient electrocardiographic changes are often obscured by the more overt features of an associated ventricular infarction.

We report a patient with isolated atrial infarction diagnosed by clinical and angiographic features. Coronary arteriography revealed single vessel critical stenosis at the origin of the sinus node artery. Previous reports of atrial infarction, both isolated and with concomitant ventricular infarction, have generally been based on autopsy findings.1 This is the first angiographically-confirmed report of isolated atrial infarction diagnosed in a living patient.

**CASE REPORT**

A healthy 69-year-old white man with a previous history of hypercholesterolemia was admitted to the coronary care unit with the abrupt onset of ischemic chest discomfort associated with palpitations. Unstable angina was suspected.

Physical examination revealed a slender white man with a blood pressure of 126/90 mm Hg and a rapid irregularly irregular pulse. Heart sounds were normal. No murmurs were detected. Lungs were clear to auscultation bilaterally. The abdomen was benign and the liver was not enlarged. Peripheral pulses were normal. There

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**FIGURE 1.** A 12-lead electrocardiogram revealing P-Ta (PR) segment changes in the inferior leads suggestive of atrial infarction.
was no pedal edema.

Laboratory tests documented an initial creatine kinase of 117 IU (normal 39 to 275) with 0 percent MB fraction (normal ≤5 percent). The electrocardiogram demonstrated atrial fibrillation with a ventricular response of 110 beats per minute. The QRS complexes, ST segments, and T waves were normal. The cholesterol level was 246 mg/dl.

Eight hours after admission, atrial fibrillation converted to what was initially interpreted as a low atrial rhythm (Fig 1). The CK peak was 351 IU with a MB fraction of 13 percent. The electrocardiogram, upon reevaluation, exhibited P-Ta (PR) changes consistent with atrial infarction. An echocardiogram revealed normal left ventricular function without segmental wall motion abnormalities. Cardiac catheterization demonstrated a 90 percent proximal stenosis of the sinus node artery (Fig 2) with only minimal intimal irregularities in the remaining coronary arteries.

The patient recovered uneventfully and was discharged in three days. He has had no further episodes of chest pain or arrhythmia.

**DISCUSSION**

The relatively high incidence of atrial infarction was not appreciated until 1942, when Cushing et al.1 reported atrial infarction in 31 of 182 autopsy-proven cases of myocardial infarction. Wartman and Hellerstein2 subsequently noted 17 cases of atrial infarction in a similar autopsy study comprised of 184 patients. These two early postmortem studies listed 37 cases of combined atrial and ventricular infarction, as well as 11 cases of isolated atrial infarction.

The antemortem diagnosis of atrial infarction is difficult because of the subtle, nonspecific, and frequently transient nature of the electrocardiographic changes. These changes include the following: paroxysmal supraventricular arrhythmias, typically atrial fibrillation; abnormalities in the P-wave morphology; deviations of the P-Ta (PR) segment from the isoelectric baseline; and atrioventricular conduction disturbances.3,4 During combined atrial and ventricular infarction, the P-Ta segment changes are often obscured by the more overt features of ventricular infarction. Differentiation between abnormal P-wave morphology with P-Ta segment depression and low atrial rhythm (inverted P waves in the inferior leads with a PR interval of ≥0.12 s) cannot be made with certainty. The precise P wave to P-Ta segment junction cannot be accurately determined. Indeed, low atrial rhythm has been described in atrial infarction.5 The presence of either P-Ta segment depression or low atrial rhythm upon reversion from a paroxysmal supraventricular tachyarrhythmia should prompt consideration of atrial infarction.

Hellerstein6 was the first of several authors7,8,9,10 to report the antemortem diagnosis of atrial infarction. In all cases, the clinical presentation of atrial infarction was confounded by concomitant ventricular myocardial infarction, and with few exceptions,10 confirmation has been made only at autopsy. The antemortem diagnosis of isolated atrial infarction has not been previously reported.

Accurate diagnosis of atrial infarction is important because of the potential for complications. These include supraventricular arrhythmias which may exacerbate ischemia or precipitate congestive heart failure, mural thrombosis with thromboembolism, and atrial rupture.2,3,6,7

The diagnosis of acute ventricular myocardial infarction requires at least two of the following three criteria: (1) ischemic chest discomfort and appropriate electrocardiographic, and (3) enzymatic evolution. In the case presented, the patient fulfilled similar criteria, warranting a diagnosis of acute atrial infarction. In addition, angiography revealed only critical stenosis of the sinus node artery. We believe the lesion represents a recanalized occlusion.

In summary, we report a case of isolated atrial infarction diagnosed by clinical rather than autopsy data. Critical origin stenosis of the sinus node artery constituted the only flow-limiting lesion found on coronary arteriography. Previous authors have suggested that isolated atrial infarction does not present with a distinct clinical picture.4 This unique case demonstrates that isolated atrial infarction can present as a distinct clinical entity analogous to ventricular myocardial infarction. The sudden onset of paroxysmal supraventricular arrhythmias in patients presenting with the features of ventricular myocardial infarction suggests combined atrial and ventricular infarction.3,4 Typical ischemic chest discomfort, paroxysmal supraventricular arrhythmias, P-Ta segment shifts, and elevated cardiac enzyme levels without evidence for ventricular infarction strongly suggests the diagnosis of isolated atrial infarction.

**REFERENCES**

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256 Isolated Atrial Infarction (Wong et al)