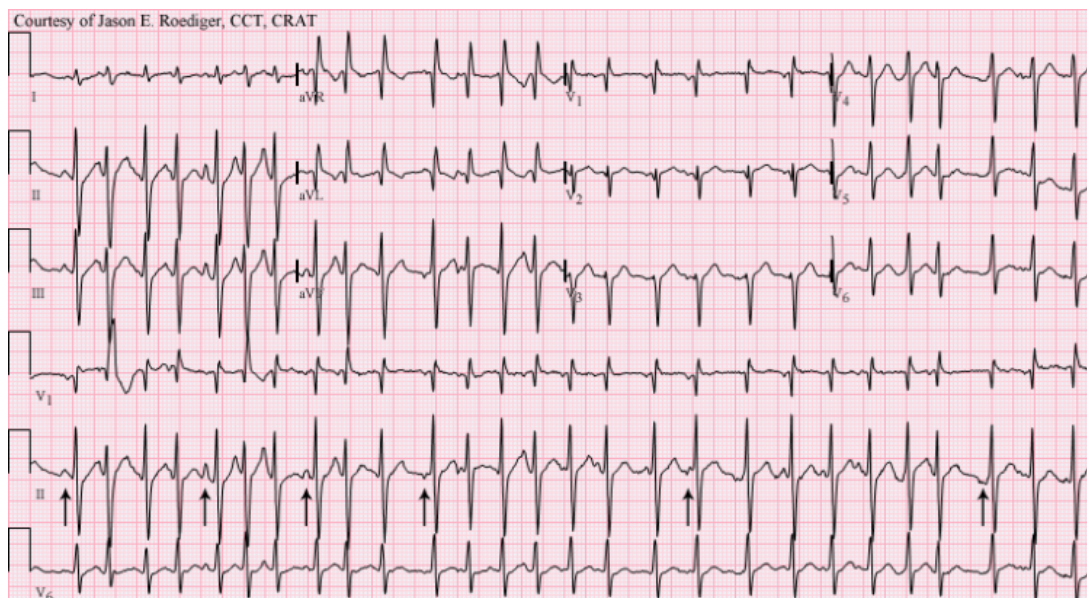


Multifocal Atrial Tachycardia — Symptoms and Treatment

[See online here](#)

Multifocal atrial tachycardia is a type of atrial arrhythmia characterized by rapid heart rate with at least 3 or more P wave morphologies. It is termed multifocal since the signals arise exclusively from atrial tissues instead of the sinus node. For an adult, normal heart rate ranges between 60 and 100 beats per minutes. In multifocal atrial tachycardia, the heart rate range between 100 and 250 beats per minute. It is more common in people with serious cardiopulmonary diseases (heart-lungs).



Definition

Multifocal atrial tachycardia is an **atrial arrhythmia** characterized by **3 or more different P-wave morphologies**.

Pathophysiology of Multifocal Atrial Tachycardia

The **heart** consists of four chambers. The upper two chambers of the heart represent right and left atrium; the lower two chambers represent the right and left ventricle. The electrical impulses normally arise from the sinoatrial node (termed: sinus node), which acts as a cardiac pacemaker which adjusts the rate at which the heartbeats. As the electrical signal passes from the SA node through the walls of the atria, it causes their contraction, the signal slows down allowing the atria to contract before the ventricles. This delay is demonstrated as the PR interval in the ECG.

The disease is a **consequence of an ectopic abnormal depolarization focus** (outside the sinoatrial node), which depolarizes independently and regularly or by a triggered activity. It can be secondary to advanced heart disease, severe lung disease, or intoxication by glycosides, beta-adrenergic, theophylline, or certain electrolyte disturbances (hypokalemia).

The location of the ectopic focus can be at the right or left atrium. In the first case, it is most often near the sinoatrial node at a structure called "crista terminalis". On the left, it is located most commonly near the site of the pulmonary vein. The appearance of the electrocardiogram can help locate the source of the arrhythmia with good reliability.

Etiology of Multifocal Atrial Tachycardia

Causes of the multifocal atrial tachycardia

The multifocal atrial tachycardia implies that **several areas of the heart emit electrical signals simultaneously**. This results in a **greatly increased heart rate**, between 100 and 250 beats per minute. Multifocal atrial tachycardia usually affects people over 50 years. It occurs in people with a reduced amount of oxygen in the [blood](#), as in the following causes:

- COPD due to exposure to lung irritants
- Bacterial pneumonia, a breathing disorder caused by a lung infection
- Congestive heart failure, a condition which prevents the heart to pump enough blood
- [Pulmonary embolism](#), the obstruction in the main artery of the [lungs](#)
- Lung cancer
- Pulmonary insufficiency

The risk of multifocal atrial tachycardia is also increased in the case of:

- [Diabetes](#)
- CHD
- Sepsis
- Surgical procedure experienced within the past six weeks
- Theophylline drug overdose, a substance used to treat respiratory disorders such as emphysema or asthma

Clinical Features of Multifocal Atrial Tachycardia

Many affected people might be asymptomatic, but if symptoms occur, they manifest sporadically. The most common symptoms of multifocal atrial tachycardia is a **rapid heartbeat and fainting**.

Fast pulse

A rapid heartbeat can occur during activities or during rest and is usually associated with **tightness of the chest, dyspnea, dizziness, and light-headedness**.

Fainting

In the case of multifocal atrial tachycardia, it is important to be aware of the possibilities of fainting resulting from prolonged breathlessness. The severity of these symptoms

varies considerably by age and the patient's general health. They tend to be more severe in people whose heart rate is higher.

Symptoms in infants

Multifocal atrial tachycardia in infants can cause **wheezy chest and weight loss**.

Diagnosis of Multifocal Atrial Tachycardia

Multifocal atrial tachycardia can be suspected if the **heart rate ranges between 100 and 250 beats/minute**, with a blood pressure located in the low average with signs related to poor circulation. The following investigations can be done:

- Electrocardiogram (ECG)
- Electrophysiological study (EPS): an invasive procedure which is used to monitor the electrical activity of the heart

According to the ECG, there are two forms of atrial tachycardia:

1. Atrial tachycardia with a block:

- The atrial activity is organized and regular with a return to the isoelectric line between P-waves which differentiates it from the classic look of atrial flutter.
- Atrial frequency is between 100 and 250/min.
- QRS complexes are narrow (except in the case of a block of an already existing functional or organic branch).
- Transmission to the cardiac ventricles is variable with a greater number of P-waves than QRS complexes.
- The ventricular rate depends on the atrial rate. If it is fast, conduction, without treatment, is often type 2/1.

2. Multifocal atrial tachycardia (chaotic):

It is characterized by the presence of at least 3 P-waves of different morphologies that have a frequency of more than 100/min, with varying PR intervals which lead to ventricular complexes (QRS) in an irregular but the fine frequency (except functional or organic block already existing).

Some indexes enable to suspect certain locations of the ectopic focus. This applies mainly to its "normal" atrial. For example, positive atrial activity in the V1 derivation is strongly suggestive of a left atrial focus. The doctor may also recommend monitoring the heart in order to record heart rate. This monitoring can be achieved through several methods:

1. **Holter monitor** - This monitor is worn for 24 hours during routine activities to record any abnormal arrhythmias.
2. **Ambulatory ECG event** - It is a device worn over the long term that records the heart's activity when symptoms appear.
3. **Hospital surveillance** - In case of hospitalization, cardiac activity is monitored around the clock.

Therapy of Multifocal Atrial Tachycardia

Treatment of the multifocal atrial tachycardia

The first step in the management of multifocal atrial tachycardia is to **treat the underlying cause**, which may include hypoxia (oxygen deficiency), theophylline toxicity, and congestive heart failure. Treatments eligible for increasing the oxygen levels in the blood can be administered. If there is a theophylline toxicity problem, use of medication will be stopped. **Electrolytes**, such as Magnesium & Potassium may be administered to correct any metabolic abnormalities. Certain medications may also be prescribed to treat the condition such as beta-blockers or calcium channel blockers.

People with uncontrollable multifocal atrial tachycardia may be treated with **atrioventricular ablation of the tissues** that send signals of contraction and implantation of a **permanent pacemaker**. No treatment is necessary for an asymptomatic infant with a relatively normal ventricular rate and normal heart function. Cardioversion is ineffective since the arrhythmia is frequently recurrent. A patient with a poor ventricular function may require treatment with **amiodarone**.

Prognosis of Multifocal Atrial Tachycardia

The symptoms of multifocal atrial tachycardia can be controlled properly as long as the underlying condition causing the high heartbeat is controlled. There are **several long-term complications** associated with multifocal atrial tachycardia. These complications can develop gradually over time if the disease is left untreated or if the person suffers from other heart diseases. Complications may include:

- Heart failure, in which the heart is unable adequately to pump enough blood to meet the body demands
- [Cardiomyopathy](#), a weakening or changes of the heart muscle

The natural course of the multifocal atrial tachycardia is a spontaneous resolution within weeks or months. For cases requiring medical treatment, it can be terminated after that period. Long-term prognosis is good, with no late recurrence.

Review Questions

The correct answers can be found below the references.

1. Multifocal atrial tachycardia is an atrial arrhythmia characterized by the presence of what?

- A. Presence of at least 3 P-waves of different morphologies
- B. Presence of 1 P-wave of different morphology
- C. Presence of at least 2 P-waves of different morphologies
- D. Presence of different P-waves in at least 3 leads

2. The heart rate in Multifocal atrial tachycardia is usually what?

- A. Higher than 300 beats per minute
- B. >Higher than 200 beats per minute
- C. Higher than 150 beats per minute
- D. Higher than 100 beats per minute

3. The first step in the management of multifocal atrial tachycardia is what?

- A. Electrical cardioversion

- B. Pharmacological cardioversion
- C. Correcting the underlying cause
- D. Heart rate-controlling agents

References

Bradley, D.J., Fischbach, P.S., Law, I.H., Serwer, G.A., & Dick, M. (2001). The clinical course of multifocal tachycardia in infants and children. *Journal of the American College of Cardiology*. 38(2), 401-408.

Iseri LT, Fairshter RD, Hardemann JL, & Brodsky, MA. (1985). *American Heart Journal*. 110(4), 789-94.

Multifocal Atrial Tachycardia. (2010, May 4) National Center for Biotechnology Information. Retrieved June 20, 2012, from <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001238/>

McCord, J. & Borzak S. (1998). Multifocal Atrial Tachycardia. *American College of Chest Physicians*. Retrieved June 20, 2012, from <http://chestjournal.chestpubs.org/content/113/1/203.full.pdf>

Schwartz, M., Rodman, D., & Lowenstein, S.R. (1994). Recognition and treatment of multifocal atrial tachycardia: A critical review. *The Journal of Emergency Medicine*. 12(3), 353-360.

Tucker K.J., Law J., & Rodrigues M.J. (1995). Treatment of refractory recurrent multifocal atrial tachycardia with atrioventricular junction ablation and permanent pacing. *Journal of Invasive Cardiology*. 7(7), 207-12.

Correct answers: 1A, 2D, 3C

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