

# ECG Diagnosis: Type I Atrial Flutter

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Atrial flutter (AFL) is a cardiac dysrhythmia characterized by rapid and regular depolarization of the atria that appears as a sawtooth pattern on the electrocardiogram (ECG) and is categorized into type I (typical) and type II (atypical) AFL.<sup>1</sup> The ECG in type I (typical) AFL is characterized by an inverted sawtooth flutter (F) wave pattern in the inferior leads II, III, and aVF, low amplitude biphasic F waves in leads I and aVL, an upright F wave in precordial lead V<sub>1</sub>, and an inverted F wave in lead V<sub>6</sub>.<sup>2</sup> Type I AFL is most commonly caused by the presence of a macro-reentrant circuit in the right atrium that includes a small strip of tissue between the inferior vena cava and the tricuspid annulus known as the cavotricuspid isthmus.<sup>3</sup> The ECG in atypical (type II) AFL is characterized by upright F waves in leads II, III, aVF, and V<sub>6</sub> and by biphasic F waves in leads I, aVL, and V<sub>1</sub>. The underlying mechanism of type II AFL is unclear.<sup>1</sup> Risk factors for AFL include presence of heart failure, chronic obstructive pulmonary disease, antiarrhythmic medications, thyrotoxicosis, pulmonary embolism, prior cardiac surgery or prior atrial ablation. Common symptoms of AFL include palpitations, light-headedness, fatigue, presyncope, mild shortness of breath, and possibly chest pain or hypotension. The initial treatment for AFL focuses on rate control of the ventricular response with AV nodal blocking agents such as beta-blockers and calcium channel blockers.<sup>4</sup> If rhythm identification is unclear and the patient is stable, adenosine or Valsalva maneuver may be employed to slow conduction through the AV node such that the atrial flutter waves are more readily apparent.<sup>1</sup> Hemodynamically unstable patients with AFL should receive synchronized electrical cardioversion.<sup>1</sup> ♦

## References

1. Filippone LM, Caldwell CC. Chapter 28: Can the electrocardiogram determine the rhythm diagnosis in narrow complex tachycardia. In: Brady WJ, Truweit JD, editors. *Clinical Decisions in Emergency and Acute Care Electrocardiography*. West Sussex, UK: Wiley-Blackwell; 2009. p 240-41.
2. Sawhney NS, Anousheh R, Chen WC, Feld GK. Diagnosis and management of typical atrial flutter. *Cardiol Clin* 2009 Feb;27(1):55-67. DOI: <http://dx.doi.org/10.1016/j.ccl.2008.09.010>.
3. Granada J, Uribe W, Chyou PH, et al. Incidence and predictors of atrial flutter in the general population. *J Am Coll Cardiol* 2000 Dec;36(7):2242-6. DOI: [http://dx.doi.org/10.1016/S0735-1097\(00\)00982-7](http://dx.doi.org/10.1016/S0735-1097(00)00982-7).
4. Hood RE, Shorofsky SR. Management of arrhythmias in the emergency department. *Cardiol Clin* 2006 Feb;24(1):125-33, vii. DOI: <http://dx.doi.org/10.1016/j.ccl.2005.09.005>.

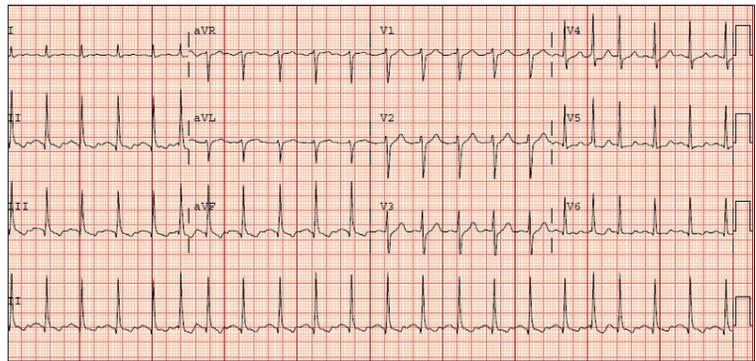


Figure 1. 12-lead electrocardiogram from a 54-year-old man with palpitations and light-headedness for 3 hours. Demonstrates an irregularly-irregular rhythm with a ventricular rate of approximately 127 beats/minute.

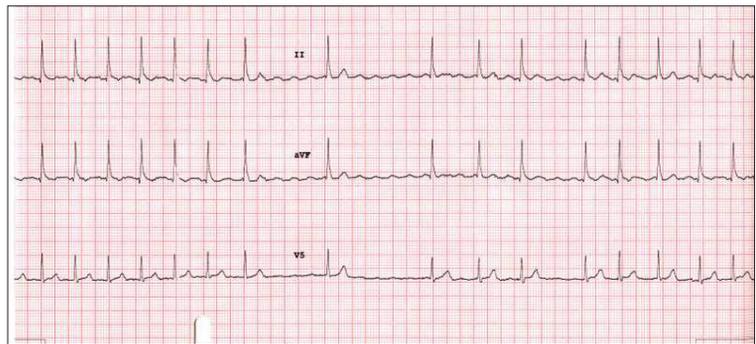


Figure 2. Rhythm strips (leads II, aVF, and V5) from same patient during administration of 12 mg intravenous adenosine. Demonstrates type I atrial flutter waves with slowing of AV conduction.

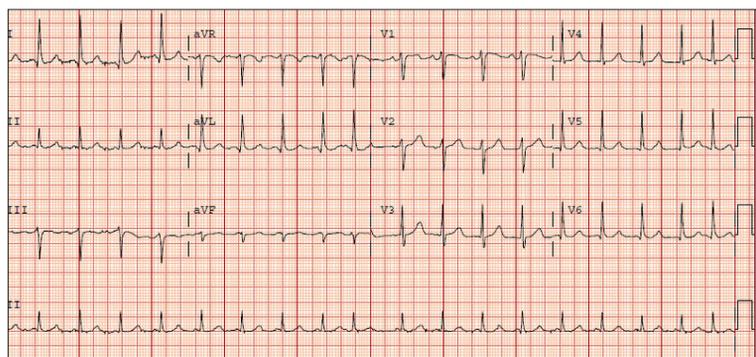


Figure 3. 12-lead electrocardiogram from same patient following synchronized electrical cardioversion with 200 Joules demonstrates sinus rhythm with premature atrial contractions (PACs).

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