



Foundations EKG II - Unit 12 Summary

Approach to Paced Rhythms

Paced rhythms provide a unique challenge in reading EKGs. The EKG can tell the provider information as to how the pacer normally works as well as how it could possibly be malfunctioning.

Pacemakers typically have 4 general modes of operation:

- Atrial sensing and pacing: if no atrial activity is sensed the pacer will initiate atrial pacing. If atrial activity is sensed it will not send out an impulse. This mode is useful if the SA node has malfunctioned the AV node is intact.
- Ventricular sensing and pacing: if no ventricular activity is sensed the pacer will initiate ventricular pacing. If ventricular activity is sensed it will not send out an impulse. This mode is useful if there is atrial dysfunction (ex. atrial fibrillation).
- Dual sensing and pacing: atrial pacing occurs if there is no atrial impulse, ventricular pacing occurs if there is no ventricular impulse.
- Magnet mode: when a magnet is applied over a pacemaker it sets the pacemaker into an automatic function. The pacemaker will pace at a set rate regardless of the ongoing native rhythm.

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When evaluating a paced EKG, one should look for pacer spikes.

Atrial pacers will show a spike before the p wave.



Ventricular pacers will show a spike before the QRS. If a ventricular pacer lead is in the right ventricle, the EKG will have left bundle branch morphology. Pacer leads placed in left epicardium will have right bundle branch block morphology.



Dual pacers depend on where impulses of the native rhythm are sensed.



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Pacemaker sensing can malfunction in two main ways: undersensing or oversensing.

Undersensing happens when the pacemaker fails to recognize the heart's native conducting cardiac activity. Causes include programming problems, inadequate lead contact, or new bundle branch blocks. EKGs may show few pacer spikes or pacer spikes within QRS complexes, but may also appear normal. Pacemaker mediated tachycardia may be suppressed by turning the pacer to magnet mode if needed.

Oversensing happens when the pacemaker sees a signal it misinterprets as native conducting cardiac activity which causes the pacer to inappropriately suppress pacing. Pacers can misinterpret large P or T waves or skeletal muscle activity as native conduction.

Pacer output failure should be suspected if a pacer spike is not seen where you would expect to see one (for example bradycardia less than set pacer range). There are many potential causes. Emergency Physicians should obtain a chest x-ray to evaluate for pacer lead displacement or possible wire fracture and contact cardiology to have the pacer interrogated for battery life, etc.

Failure to capture occurs when the pacer is appropriately sending out impulses but they do not cause the expected depolarization. This may be due to electrode displacement, wire fracture, electrolyte disturbance, and battery depletion.

