Medical Education

Implant Procedure Concepts

Pacemaker, ICD and CRT Overview

Disclaimer

- This presentation is provided with the understanding that the slide content must not be altered in any manner as the content is *subject to FDA regulations.*
- This presentation is to be used in conjunction with other resource material including the applicable Boston Scientific device *physician's manual* and any *implant accessories instructions* for use.
- This presentation is not intended to replace implant training.
- Proper surgical procedures and techniques are the responsibilities of the medical professional.
- If this presentation is not used in its entirety, the following information must be included:
  - Appropriate Indications
  - Contraindications
  - Warnings
  - Precautions and Adverse Events

Objectives

When we complete this program you will be able to:

- *List* the primary difference between a pacemaker and an implantable cardioverter defibrillator (ICD)
- *Identify* the purpose of a biventricular pacing/defibrillation system
- *Explain* the differences between magnet response in a pacemaker vs. an ICD
- *List* one medical procedure that is not recommended for patients with implanted devices

Lead Placement

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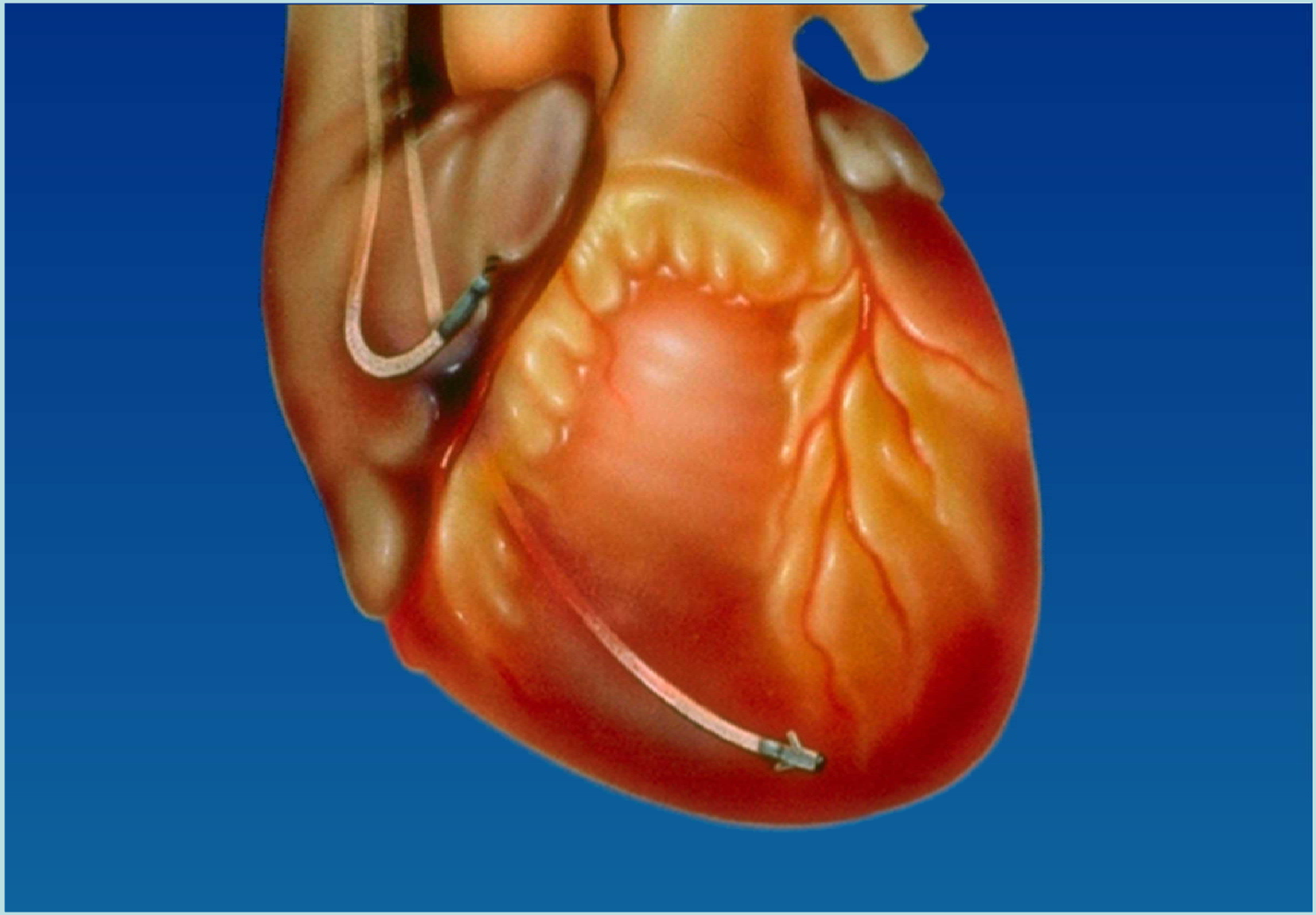

Device Differentiators

Pacemaker

Purpose
Maintain rhythm (bradyarrhythmias)
Selections
▪ Single or dual chamber ▪ Rate-responsive or sensor-driven abilities ▪ Longevity ▪ Size

Device Differentiators

Implantable Cardioverter Defibrillator (ICD)

Purpose

Break fast arrhythmias (tachyarrhythmias) — all ICDs have pacemakers

Selections

- Single (ventricular) or dual chamber models
- Rate-responsive or sensor-driven abilities
- Size
- Longevity

Device Differentiators

Biventricular or Cardiac Resynchronization Therapy (CRT)

Purpose

- CRT/CRT-D improves the symptoms of heart failure
- Involves placement of three leads (right atrium, right ventricle and left ventricle)
- Goal is to pace the ventricles 100%

Selections

Both pacemaker and ICD/pacemaker options available

Biventricular Lead Placement

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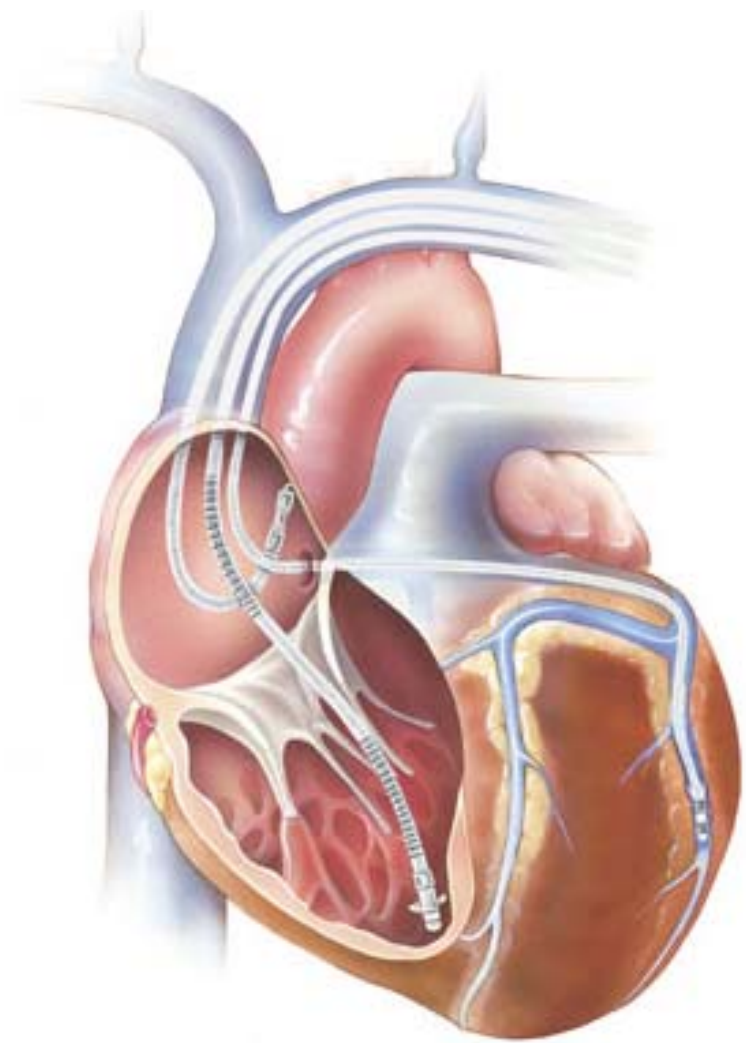

Magnets

How do magnets affect implantable devices?

- Application of a magnet affects all pacemakers and ICDs
- Pacemakers and ICDs respond differently
- Doughnut, horseshoe or rectangular magnet shapes will work on most devices (however, a doughnut magnet will work with all devices)

Magnets

What happens when a magnet is applied to a pacemaker?

- Cause the device to pace in a DOO, VOO, or AOO mode depending on programming
- Pacing rate is dependent on the company and model (but usually 80-100)
- Output is usually the programmed output

Magnets

What happens when a magnet is applied to an ICD?

- Will inhibit tachy therapy when magnet is present
- Does not affect the pacing settings or the ability of the device to pace and sense

Magnets

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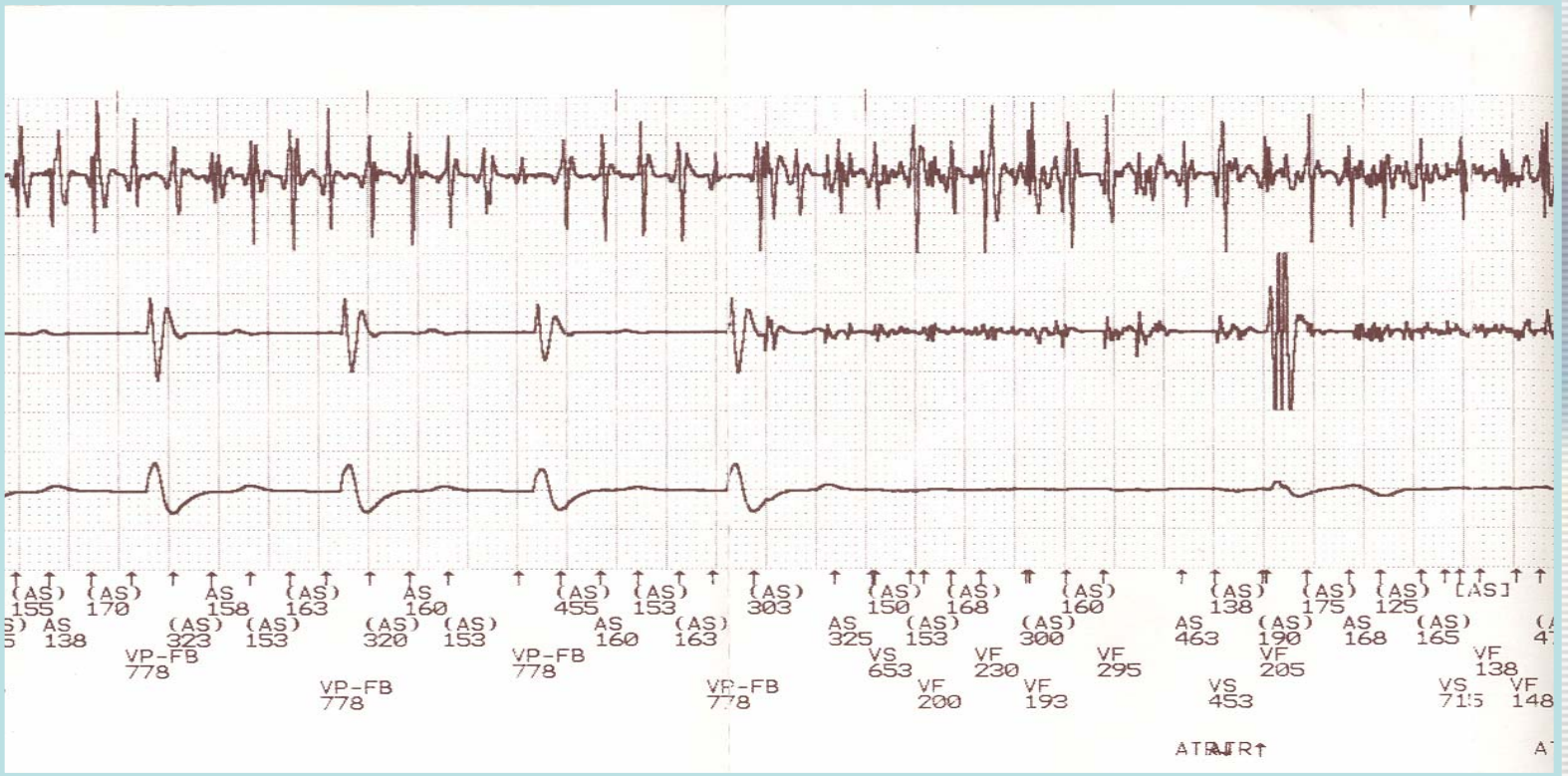
So do we really need to use magnets?



Note: Use caution for your pacer-dependent patient if cautery is used

Troubleshooting

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"I don't see any pacer spikes, the device isn't working right."

- There are several features in devices that may affect pacing function
- Telemetry can interfere with pacing spike display
- Main concern should be whether or not the rhythm is regular and safe for the patient

Troubleshooting

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"I think that something is wrong, what should I do now?"

- Determine if the patient has an ICD, Pacemaker, or both
- Determine the company of patient's device
  - Contact appropriate rep or technical services for quicker service
- Record rhythm strips to illustrate the problem you are seeing
- Gather as much information as possible with regard to device settings

Troubleshooting

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"Is this thing working right?"

- Knowing just a few of the device settings can give you a lot of information about how the device should be operating
  - Pacing mode
  - Lower rate limit (LRL) – slowest the rhythm should be allowed to go
  - Upper rate limit (URL, MTR, MSR) – maximum rate the pacemaker is allowed to pace
  - AV delay – the PR interval of the device

Common Questions

- Pacing into the QRS complex
  - Indicates a potential oversensing or undersensing issue
  - Can also be fusion between the pace complex and the intrinsic complex

Common Questions

- Patient is in VT but device is not doing anything, what should I do?
  - Use your medical judgment, if patient is unstable don't wait for the device to act, proceed with external cardioversion
  - Contact the company to have device interrogated

Precautions

Items that are considered safe

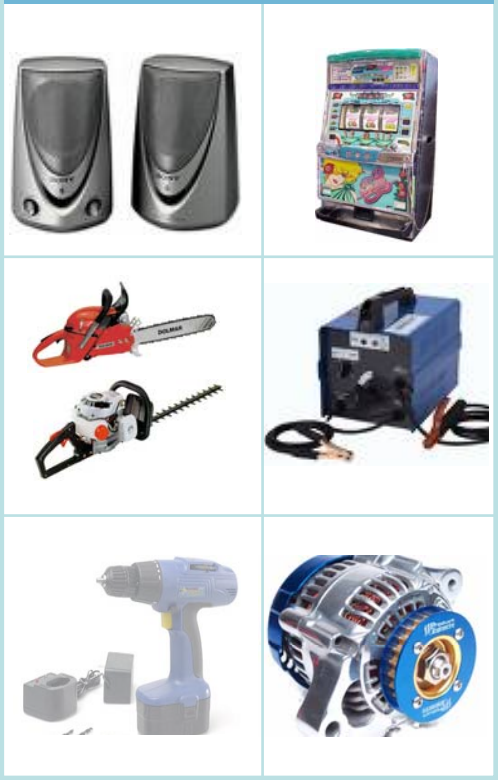
- Microwave ovens
- Televisions, VCRs
- AM/FM Radios, CD players
- Table top appliances (toasters, blenders, can openers, etc.)
- Hand-held appliances (shavers, hair dryers, etc.)
- Electric blankets, heating pads
- Personal computers
- Fax/copy machines

Precautions

Items that are considered safe at a distance

- Stereo speakers
- Slot machines
- Chain saws
- Hedge clippers
- Arc welders
- Battery-powered tools
- Running motors/alternators

12+ inches away



Precautions

Cell Phones

- Hold the cell phone on the opposite side
- Do not carry the active phone near the device

6+ inches away

Metal Detectors / Security Systems

- Walk through the systems at a normal pace
- Do not lean against the system
- If scanning with a hand-held metal detector is required
  - Inform the security personnel of the implanted electronic medical device
  - Show implant card

Photo courtesy Federal Aviation Administration (FAA)

Precautions

EMI from Medical Devices

- Electrocautery
- Cardioversion
- TENS (Transcutaneous electrical nerve stimulation)
- Radio Frequency Ablation
- Therapeutic radiation
- Magnetic Resonance Imaging (MRI)

Summary / Questions

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