Chapter 28: Pacemakers and Implantable Defibrillators Worksheet

Electrophysiology

1. Pacemakers were originally designed to treat disorders of impulse _________________ or impulse _________________ resulting in symptomatic bradycardia.

2. ______________________ bradycardia is a term used to define a bradycardia that is directly responsible for symptoms such as syncope, near syncope, transient dizziness, or light-headedness, and confusion resulting from cerebral hypoperfusion caused by slow heart rate.

3. Symptomatic bradycardia can be caused by sinus node ______________________ or by conduction failure in or below the AV node.

4. Sinus node dysfunction is the most common indication for __________________ pacing, followed by AV node dysfunction.

5. Pacemaker therapy can have beneficial effects on hemodynamics and clinical status by providing __________ response for patients whose sinus node is not capable of increasing its rate appropriately in response to the body's need for increased __________________

6. ______________________ with biventricular pacing improves septal wall motion, mitral valve function, and the dynamics of LV contraction in patients with severe HF or dilated cardiomyopathy.

7. Pacemaker therapy has been very successful in many patients with atrial ________________

8. Other indications for cardiac pacing include hypersensitive carotid sinus syndrome, neurocardiogenic syncope, ___________ _____ ___________ and sleep apnea.

9. _________________ pacing is indicated to treat symptomatic bradycardia after AMI or cardiac surgery, or when associated with hyperkalemia or drug toxicity; bradycardia-dependent ventricular tachycardia; before permanent pacemaker implantation in symptomatic patients; and in reversible conditions that will not likely result in the need for permanent pacing, such as bacterial endocarditis, Lyme disease or cardiac trauma.

10. _________________ atrial pacing is sometimes used in an attempt to terminate atrial flutter or fibrillation after cardiac surgery when atrial epicardial leads are in place.
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11. A permanent pacemaker has a ______________ placed in a subcutaneous pocket in the pectoral area and the pacing lead is inserted either through the cephalic or subclavian __________ and advanced into the right ventricular apex. If a dual-chamber pacemaker the second lead is placed in the right atrial appendage.

12. ___________________ pacemakers are placed using transvenous, epicardial or transcutaneous methods.

13. ___________________ pacing is performed by percutaneous puncture of the internal jugular, subclavian, antecubital or femoral vein and threading a pacing lead into the apex of the right ventricle for ventricular pacing, the right atrium for atrial pacing, or both chambers for dual-chamber pacing.

14. ___________________ pacing is performed through electrodes placed on the atria or ventricles during cardiac surgery.

15. ___________________ pacing is external pacing in a noninvasive method used as a temporary measure in emergency situations for treatment of asystole, severe bradycardia or overdrive pacing for tachyarrhythmias until a transvenous pacing lead can be inserted.

16. ___________________ ventricular pacing is the most frequently used temporary transvenous type of pacing and can also be used for permanent pacing.

17. ___________________ pacing is a frequently used method of permanent pacing and can also be performed via epicardial pacing leads.

18. ___________________ pacing means that both ventricles are simultaneously paced via a lead in the RV apex for RV pacing and a lead threaded through the coronary sinus into a lateral or posterior cardiac vein for LV pacing.

19. The NBG code for pacing nomenclature describes the expected ______________ of the device according to the _________ of the pacing electrodes, and the ______________ of pacing.

20. Most commonly used pacing modes are VVI and __________.

21. ___________ is the most commonly used mode of pacing with temporary transvenous leads because it is the quickest and easiest method of pacing in an emergency.

22. The pacing ___________ consists of the pacemaker, the conducting lead, and the myocardium.
23. Once a permanent pulse generator is implanted, the only way to alter its pacing parameters is with a __________________ that communicates with the pacemaker through a wand placed over the pulse generator.

24. The pacing __________ is an insulated wire used to transmit the electrical current form the pulse generator to the myocardium. A ___________________lead contains a single wire and a __________________ lead contains two wires that are insulated from other.

25. In a unipolar lead, the electrode is an exposed metal tip at the end of the lead that contacts the myocardium and serves as the ______________________ pole of the pacing circuit.

26. In a bipolar lead, the end of the lead is a metal tip that contacts myocardium and serves as the negative pole, and the ______________________ poles is an exposed metal ring located a few millimeters proximal to the distal tip.

27. _______________ permanent pacemakers are most commonly used.

28. Bipolar pacemaker makes a ______________ pacing spike on the electrocardiogram as the pacing stimulus travels between the two poles and followed by P wave or QRS complex depending where the lead is placed.

29. With unipolar pacemakers there is only one of the two poles in or on the heart and the back of the ________________________ serves as the second pole.

30. Unipolar pacemakers’ results in a ___________ pacing spike on the ECG as the impulse travel between the pole on the lead and the back of the generator.

31. A pacemaker programmed to an asynchronous mode paces at the ________________ rate regardless of intrinsic cardiac activity.

32. ________________________ pacing in the ventricles is unsafe because of the potential for pacing stimuli to fall in the vulnerable period of repolarization and cause ventricular fibrillation. This is less dangerous for atrial pacing but it can cause atrial fibrillation.

33. The term ________________ means that the pacemaker paces only when the heart fails to depolarize on its own.

34. ________________ means that a pacing stimulus results in depolarization of the chamber being paced.
35. The ___________________ circuit controls how sensitive the pacemaker is to intrinsic cardiac depolarizations, the higher the number the larger the intrinsic signal.

36. An important function for monitor technicians is to document significant __________________ that may require pacemaker therapy and to relate these bradycardia events with clinical symptoms whenever possible.

37. A ___________ inactivates the sensing circuit of a permanent pacemaker and causes it to revert to the asynchronous mode of pacing. This is performed to verify a pacemaker’s ability to pace when it is being inhibited by a patient’s own natural rhythm.

38. The ___________________ threshold is the minimum pacemaker output necessary to capture the heart consistently.

39. The __________________ threshold is the minimum voltage of intrinsic cardiac activity that can be sensed by the pacemaker.

40. ____________________________ refers to pacemaker output, or the ability of the pacemaker to generate and release a pacing impulse. Evidenced by a pacing spike.

41. The pacemaker has a __________________ period, which is a period of time after either pacing or sensing in the ventricle during which the pacemaker is unable to respond to intrinsic activity.

42. _____________ ________________ is recognized by the presence of pacing spikes that are not followed by paced ventricular complexes.

43. ____________________________ means that the pacemaker fails to sense intrinsic activity that is present.

44. ____________________________ means that the pacemakers are so sensitive that it inappropriately senses internal or external signals as QRS complexes and inhibits its output.

45. Complications of temporary or permanent pacemaker insertion are usually related to ________________ and include pneumothorax or hemothorax, lead perforation, air embolus, and ventricular arrhythmias. Later complications include infection, endocarditis, hematoma, venous thrombosis, skin erosion, lead dislodgment or fracture.

46. ____________________________ syndrome is manipulation of a permanent pulse generator within its pocket by the patient. This can lead to rotation of the pacemaker and twisting of the leads, which can result in lead fracture and dislodgement.
47. _______________ syndrome refers to a constellation of symptoms resulting from inadequate timing of atrial-ventricular contraction.

48. An _________________________ ______________________ ________________________ is a battery powered electrical impulse generator that continuously monitors the heart rhythm and delivers either a life-saving shock or burst of rapid pacing to terminate a ventricular arrhythmia and restore normal rhythm.

49. ICD consist of a pulse generator and ___________________________ lead electrodes for arrhythmia detection and therapy delivery.

50. The ICD provided high-energy shocking capabilities for___, ATP features for VT and fast VT, atrial therapies for ___________ arrhythmias, and CRT for HR patients. ICDs provide _________________ data to assist the clinician in providing cardiac care to their patients. Presently there are studies involving leadless ICDs.