Monitoring Anesthesia: Making Sense of the Beeps

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1. Why do we monitor anesthesia?
   1. Patient’s normal physiology is altered by anesthetic drugs
   2. Compensatory mechanisms are diminished by anesthetics
   3. Concurrent diseases will alter normal physiology
   4. Monitoring improved the patient’s success by allowing for informed, timely responses to changes in status
2. Proactive decisions versus reactive decisions
3. Provides a good reference for additional anesthetic procedures
4. What do we need to know before we can monitor properly?
5. Pharmacology of anesthetic drugs
6. Pharmacology of current medications
7. Normal physiology
8. ASA status
9. Anesthetic record
10. Monitors
11. What information they provide
12. What information we can interpret from their use
13. How do we develop a monitoring plan?
14. Develop a plan based on body systems
15. Considerations of health
16. Current health status
17. Concurrent diseases
18. Procedure to be done
19. Available monitoring devices
20. Plan to monitor more than one system and more than one variable per system
21. Methods
22. Indirect/noninvasive
23. Readily apparent variables
24. Noninvasive testing
25. Easily attainable, no advanced skills needed, easily reproducible
26. Minimal secondary complications
27. Limited amount of data to be collected
28. Direct/invasive
29. Placing instruments inside the body
30. Increased data to be obtained
31. Less error in data that is collected
32. Secondary complications
33. Advanced knowledge and skill needed
34. Central nervous system
35. Anesthesia requires CNS depression
36. Movement on the table
37. Diligent monitoring helps maintain a stable plane of anesthesia
38. Monitor reflex activity
39. Eye signs (palpebral, corneal, pupil location)
40. Pedal reflexes
41. Skeletal muscle relaxation
42. EEG/BIS
43. End-tidal anesthetic gas concentration
44. MAC
45. Respiratory system
46. Readily available data with obsevation
47. Rate (Stethoscope, breathing frequency monitors, pulse oximeter, etc.)
48. Pattern
49. Tidal volume changes
50. Pulse oximeter
51. Pulse rate
52. Oxygen saturation (SpO2)
53. Does not measure adequacy of ventilation!!!
54. Needs a pulsatile signal for an accurate reading, therefore errors can occur with hypothermia, hypotension, changes in vascular resistance
55. Needs an understanding of the oxyhemoglobin dissociation curve for proper interpretation
56. End-tidal carbon dioxide monitor (CO2)
57. Most valuable monitor for assessing the adequacy of ventilation!!!
58. Capnometer vs. capnograph
59. Estimation of the alveolar CO2 concentration
60. Must use when controlling ventilation
61. Normal value is 40 mmHg
62. Gas monitors
63. Spirometry
64. Quantitate the tidal volume
65. Hemoglobin concentrations
66. Blood gas analysis
67. Cardiovascular system
68. Heart rate
69. Direst palpation
70. Ultrasonic Doppler
71. Piezoelectric crystal
72. Amplifies the sound of blood flow under the crystal
73. Can be used for blood pressure as well
74. Pulse oximeter
75. Peripheral perfusion
76. Function of arterial blood pressure and local vasomotor tone
77. Normal capillary refill time of 1-2 seconds
78. Urine production can be used
79. Central venous pressure (CVP)
80. Assessing patient’s blood volume
81. Affected by blood volume, vascular tone, cardiac contractility, heart rate, an non-cardiac factors (body position)
82. BLOOD PRESSURE!
83. Most important monitoring modality for assessment of the cardiovascular system
84. Can be made either directly or, more commonly, indirectly
85. Oscillometric monitors
86. Slowly releases air from the cuff (placed over a peripheral artery) until arterial pulsations are detected by the monitor and are then displayed by the monitor
87. Display the systolic, diastolic and mean blood pressure
88. Inaccurate in smaller patients and at low blood pressures, but should accurately reflect trends in the BP
89. Heart rate as well
90. Ultrasonic Doppler
91. Doppler crystal placed over a peripheral artery
92. Appropriately sized cuff placed proximal to the crystal
93. With the use of a sphygmomanometer air is slowly released from the cuff until a pulse is heard on the Doppler
94. The pulse corresponds most closely to the systolic blood pressure in dogs and the mean arterial blood pressure in cats
95. Doppler apparatus can be inaccurate at lower blood pressures
96. Direct arterial BP
97. Arterial catheter.
98. Accurate quantitative arterial BP value and a qualitative representation of the arterial pulse waveform
99. Systolic, diastolic, and mean arterial BP’s easily measured and displayed using this method.
100. Very accurate