Patient monitoring during anesthesthesia

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Effective monitoring reduces the potential for poor outcomes thatmay follow anesthesia by identifying derangements before they result inserious or irreversible injury. Standards for basic anesthetic monitoringhave been established by the American Society of Anesthesiologists(ASA). Today's standards (last amended on October 25, 1995) emphasizethe importance of regular and frequent measurements, integration ofclinical judgment and experience, and the potential for extenuatingcircumstances that can influence the accuracy of monitoring systems.(ASA, 2003) .Standard I requires qualified personnel to be present in theoperating room, to monitor the patient continuously and modifyanesthesia care based on clinical observations and the responses of thepatient to dynamic changes resulting from surgery or drug therapy.Standard II focuses attention on continually evaluating the patient'soxygenation, ventilation, circulation, and temperature and specificallymandates the following:1- Using an oxygen analyzer with a low concentration limit alarm duringgeneral anesthesia.2- Quantitative assessment of blood oxygenation during any anesthesiacare3- Continuously ensunng the adequacy of ventilation by physicaldiagnostic techniques during all anesthesia care. Quantitativemonitoring of tidal volume and capnography are encouraged inpatients undergoing general anesthesia.4- Ensuring the adequacy of circulation by the continuous display of theECG, and determining the arterial blood pressure at least at 5 minuteintervals. During general anesthesia, circulatory function is to becontinually evaluated by assessing the quality of the pulse, eitherelectronically or by palpation or auscultation.5- Endotracheal intubation requires qualitative identification of carbondioxide in the expired gas. During general anesthesia, capnographyand end-tidal carbon dioxide analysis are encouraged.6- During alii anesthetics, the means for continuous measuring thepatient's temperature must be available. When changes in bodytemperature I are intended or anticipated, temperature should becontinuouslt measured and recorded on the anesthesia record. (ASA ,2003).OXimetr~readings can be altered by a number of factors. The siteof measuremenf must be clean and dry and have minimal movement topermit adequate signal transmission. Nail polish and other environmentalfactors such as bright overhead lighting or sunlight can also interfere withtransmission. Cold ambient temperature, leading to peripheralvasoconstrictioj' decreases skin blood flow and may result in difficultyfor the oximeter to determine pulsatile flow needed for a reading.AlsoPatient conditilns that likewise are associated with poor peripheralperfusion, such as decreased cardiac output, some dysrhythmias, shock,and certainly cardiac arrest, may result in difficulty for the oximeter todetermine puis ~ile flow and giving a valid reading (Murray et af, 2000).Although the inherently reliability of pulse oximetry has led to itswide use in arsthesia and critical care,remaining problems includemotion sensitivity.causing false alarms and erronerous measurements, andhypoperfuusSilon'lIausm. g Iof'ss 0 signal.several manufacturers havedeveloped proprietary methods to address these problems based onanalysis of frbquency,waveform morphology,or saturation.Puplishedevidence supports the ability of new generation pulse oximetry to detecthypoxemic epihodes more reliably than conventional devices underconditions of pi tient motion and hypo thermic hypoperfusion.(Irita k etat, 2003)Capnography, the measurement of C02 in expired gases,hasevolved ;0 the rt few Y"'" into a commonly used procedure. Wh,,,,,a variety of te ihniques can be used for C02 measurement(e.g., massspectrometry, Raman analysis), most capnographs rely on infra redabsorption. Use of this technique can reliably and quantitatively providevital resPiratol monitoring information in the operating room and in allcritical 'M' MT.(Gm",o.""o Js etal, 2000).PAC profdes measurements of several hemodynamic parameterssuch as central yenous pressure (CVP), pulmonary artery pressure (PAP),pulmonary artery occlusion pressure(PAOP)or pulmonary capillarywedge pressure (PCWP) and other derived parameters .. There have beena number of su veys to determine how well physicians, nurses, and otherhealth care practitioners interpret PAC data. Even in the realm ofidealized press re tracings and data presentation, nurses, [Americanphysicians, and European physicians'all incorrectly interpret the data in25% to 50% lf cases. This deficiency has been recognized by theNational Instit~les of Health and a variety of professional societies whohave created in;liatives and resources to improve PAC education. (PACeducation ",Oj1'" 2005).It is difficult, and often impossible, by clinical evaluation ofrecovery of neuromascular function, to exclude with certainly clinicallysignificant residual curarization.,so in daily practice significant residualblock can be excluded with certainly only if objective methods ofneuromascular monitoring are used. Good evidence -based practicedictates that clinicians should always quantitate the extent ofneuromascular recovery using objective monitoring. At aminimum, theTOF ratio should be measured during recovery whenever a nondepolarizing neuromascluar block is not antagonized.(Eriksson Li, 2003).The effects of anesthesia and surgery on the eNS may bemonitored by recording processed EEG activity, as in the bispectral indexor the Patient State Index. These indices are used as measures ofhypnosis,sedation, and the probability of recall using a variety ofanesthetic agents (thiopental, propofol, midazolam, isoflurane, andsevoflurane). The use of the BIS can facilitate faster emergence andimprove recovery from general anes thesia by allowing more precisetitration of anesthetic effect. (Lehmann A et al , 2002) .