

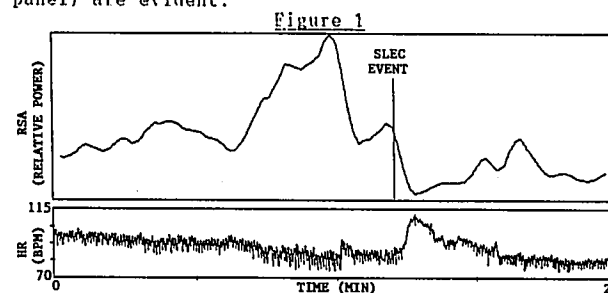
TITLE: INTRAOPERATIVE CHANGES IN RESPIRATORY SINUS ARRHYTHMIA: ? AN INDICATOR OF ANESTHETIC DEPTH
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Changes in the amplitude of the respiratory sinus arrhythmia (RSA) correlate with changes in vagal tone. Prior studies have suggested that the dose-dependent reductions in RSA caused by anesthetics might provide an index of the "depth" of anesthesia.¹ However, the effects of surgical stress on RSA have not been investigated. Intraoperative changes in surgical stress have significant effects on autonomic nervous system tone, and hence would be expected to influence RSA. The purpose of this study was to examine the effects of intraoperative changes in surgical stress on RSA during periods of relatively stable isoflurane concentrations. For the purpose of this study, a change in surgical stress was defined as the new appearance of spontaneous lower esophageal contractions (SLEC).

With informed consent and institutional approval, we studied 8 ASA class I patients. Anesthesia was induced with thiopental 3-5 mg/kg plus sufentanil 0.2-0.3 µg/kg, and was maintained with isoflurane 0.5-1.5% in 60% N₂O. All patients were paralyzed with vecuronium and mechanically ventilated at a fixed rate and tidal volume. SLEC was monitored using an Antec Lectron 301. A continuous heart rate (HR) signal was derived from digital recordings of the EKG. RSA was quantified every 15 sec by measuring the spectral power at the respiratory frequency in overlapping 64 sec epochs of the HR signal.²

Twenty-one SLEC events (new SLEC >15 mmHg) occurred in 7 patients. An increase in RSA of at least 30% was observed during the 5 min periods preceding 18

events. However, if the SLEC event was accompanied by an abrupt increase in mean HR of 10 bpm or more, there was usually a transient decrease in RSA concomitant with the increase in HR. An example of data from one patient is depicted in Fig 1. RSA amplitude (spectral power) is plotted in the top panel, and the derived HR signal is shown in the bottom panel. The vertical line marks the beginning of the SLEC event. Both the preceding increase in RSA (top panel), and the subsequent decrease in RSA with the sudden change in HR (bottom panel) are evident.



These results indicate that changing levels of surgical stress have significant effects on RSA. An increase in RSA preceded 86% of SLEC events. This increase might serve as a sensitive indicator of changing anesthetic "depth" (i.e., the interaction between anesthetic dose and intensity of surgical stimulation). However, the effect of abrupt increases in mean HR, which caused a transient decrease in RSA, must also be considered in any future attempts to use RSA as a monitor of anesthetic depth.

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2)Anesth Analg 70:S226, 1990.

A521

TITLE: COMPARISON OF MANUAL AND AUTOMATIC CHARTING WITH A COMMERCIALLY-AVAILABLE AUTOMATIC ANESTHESIA RECORDKEEPER
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Introduction. Our hospital has installed commercially-available automatic anesthesia recordkeepers in all general operating rooms. Records from these devices are used as the official hospital record in over 90% of the anesthetics in these rooms.

One of the obstacles to the acceptance of automatic anesthesia recordkeeping in regular clinical practice is that the automatic record will differ in several ways from the manual record [1]. This study was designed to look specifically at how the record produced by a commercial device differs from a manual record.

Methods and Materials. During the introduction of the these recordkeepers, there was a period during which both manual and automatic records were kept in parallel. We retrospectively collected 24 cases with complete manual and automatic records.

Analysis focused on the total number of recordings of the available vital sign variables between the two records. The Wilcoxon matched-pairs signed ranks test [2] was applied to paired readings to compare the values of each vital sign between the manual and automatic records. In addition, Lee, Koh, and Ong [3] have described a method for comparing two measures of the same variable. This "intraclass correlation coefficient" is a ratio of variances that will be 0.0 with no agreement and 1.0 with perfect agreement. The criterion for interchangeability of measures is, of course, a matter of judgment; but Lee, Koh, and Ong have suggested that meaningful agreement is obtained when the lower limit of the 95% confidence interval is greater than 0.75.

Results. Systolic and diastolic blood pressures were recorded almost as often on the manual record as on the automatic. Respiratory rate, end-tidal carbon dioxide, oxygen saturation, and temperature were recorded more than three times as often on the automatic record as on the manual. Although some values were

statistically significantly different by the Wilcoxon matched-pairs signed ranks test, these differences were of no clinical significance. By the criteria of Lee, Koh, and Ong, systolic and diastolic blood pressure and pulse were interchangeable while end-tidal CO₂ was marginal and respiratory rate, oxygen saturation, and temperature were problematic.

Discussion. An earlier study at our institution [4] (with an automatic blood pressure recording device alone) suggested substantial discrepancies in the recording of blood pressures on manual vs. automatic records. The present automatic recordkeeper performs median filtering on blood pressures obtained during a five-minute interval. In this manner some peaks and valleys of blood pressure are smoothed out. It is also possible that, with the introduction of the automatic record as the official chart, anesthesia personnel are now recording the blood pressures more accurately on the manual record. Also noteworthy is that values such as end-tidal CO₂ and oxygen saturation are routinely recorded only every 15 minutes on the manual record. On the automatic record they are stored at one-minute resolution and usually printed (by user selection) at five-minute intervals. One might argue that these variables are more important than blood pressure and heart rate, and should therefore be charted at least as often!

This study serves, therefore, to assuage fears about blood pressure recordings. Clearly the greater frequency of recording on the automatic record is an improvement. A further advantage of the automatic record is that, on demand, the vital signs data may be obtained from the diskette and examined in one-minute resolution for detailed study and analysis.

References:

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