Title   :   MORBIDITY AND BLOOD PRESSURE VARIABILITY

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Introduction. Recently we reported on the relationship between the preoperative and intraoperative physiological status and the postoperative outcome of 66 general surgical patients.[1] We found that a prediction of postoperative outcome, morbid or not morbid, could be correctly made in 55 of these patients (83%) on the basis of a discriminant function calculated from six patient descriptors. Four of the six descriptors were statistical summaries of the variability of automatically obtained intraoperative blood pressure. This analysis strongly suggested that important outcome predictions could be based upon the variability of intraoperative vital signs. The present study was designed to confirm this in a larger and separate patient population.

Methods. We studied adult patients who received general anesthesia for elective general surgical procedures. Institutional approval for the study was obtained. Preoperative and intraoperative patient information, such as preoperative blood pressure, age, hematocrit and operative procedure were transferred from the patient record to a set of special data collection forms. Intraoperative physiological data, which included noninvasive blood pressure every two minutes and heart rate every minute, were collected by a computer-controlled surveillance system.

Postoperative outcome was measured by the Nursing Assessment Index. The index uses the patient's senior clinical nurse to assign a score from 0 (no morbidity) to 3 (major problem) to each of 7 organ systems on postoperative day 7. A patient given a total score of one or more was considered to have had a morbid postoperative outcome.

We began statistical analysis of the data by using the mathematical function developed in the previous study to predict the postoperative condition of the patients in the second series. From the second data set we then determined a new discriminant function of six risk factors which would best classify all patients from each series into morbid and not morbid categories.

Results. Of the 164 patients included in the second study, five died during the first postoperative week. Forty-eight patients (29%) were assigned a nursing assessment score of 1 or greater. The mathematical function determined from the previous study correctly classified 96 (59%) of these patients as morbid or not morbid. A new set of six patient descriptors, ap-

propriate to both series, was calculated by discriminant analysis and found to be:

1. Systolic blood pressure, Negative Cusum
2. Cardiac work index, Negative Cusum
3. Length of anesthesia, minutes
4. Length of operation, minutes
5. ASA physical status number
6. Intraoperative blood loss, ml

Substituting the numerical values for these descriptors into the new discriminant function produced the following classification matrices:

Old Data Set -- New Discriminant Function

	Predicted Not Morbid	Predicted Morbid	Total	Percent Correct
Not Morbid Outcome	28	(16)	44	64%
Morbid Outcome	(8)	14	22	64%

New Data Set -- New Discriminant Function

	Predicted Not Morbid	Predicted Morbid	Total	Percent Correct
Not Morbid Outcome	83	(33)	116	72%
Morbid Outcome	(13)	35	48	73%

Discussion. Two variables which describe the stability of intraoperative blood pressure are included in the new list of best discriminators, as opposed to four of six variables in the previous study. Variables such as the length of anesthesia and surgery, blood loss and ASA physical status classification number are again confirmed as important predictors of postoperative outcome. It is encouraging to note that descriptors of the variablity of intraoperative blood pressure remain important in the final discriminant function. While this analysis supports the general concept that intraoperative variability of physiological status frequently precedes poor outcome, the exact measure of this variability needs further definition.

References.

1. Schneider AJL, Knoke JD, Zollinger RM Jr., et al.: Morbidity prediction using pre- and intraoperative data. Anesth: In press.