Title : PREDICTING POSTOPERATIVE VENTILATORY NEED IN MYASTHENiA

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Introduction. About a third of patients with myasthenia gravis coming to surgery for thymectomy require postoperative ventilatory support. It would be clinically useful to have a system for predicting which patients will require postoperative mechanical ventilation and which will be readily extubatable. Many criteria have been proposed for making this prediction[1,2], but these have been based more on clinical impression rather than on rigorous statistical methods, and they have not been consistently accurate. We used the modern statistical technique of discriminant analysis[3] to select the preoperative factors most useful in identifying myasthenics needing postoperative ventilation.

Methods. Charts of patients who had undergone thymectomies for myasthenia were reviewed for the period 1975-1978. Demographic and historical data (e.g., age, duration of disease, medications, etc.) preoperative respiratory measurements, and laboratory results were extracted for each patient as well as postoperative variables such as time until extubation or need for reintubation. There were 24 patients, all of whom received endotracheal anesthesia with N_2O and either halothane or enflurane. No muscle relaxants were used. Postoperative outcome was classified into two groups: 1) Those patients who were extubated in the operating room or on admission to the ICU (using T-piece criteria routinely applied to our cardiac surgery patients[2]); and 2) Those patients who, unable to be extubated according to the same criteria, were ventilated, or those who were subsequently reintubated. Using stepwise multivariate discriminant analysis, we identified those preoperative factors that best predicted which patients would be extubated early and which patients would require ventilation. Weights were computed for each factor identified, based on their importance in making the prediction.

Results. Sixteen patients were extubated early while eight required ventilation. Discriminant analysis identified four preoperative variables that best predicted the need for postoperative ventilation: 1) Duration of myasthenia of six years or more, 2) Presence of other respiratory disease, 3) Pyridostigmine dose at time of surgery more than 750 mg/day, and 4) Preoperative vital capacity less than 2.9 L. No other factors were found to increase significantly the predicting ability of the analysis. Table 1 lists these four factors and their point values derived from their relative weights in the analysis. Using this point system, a patient received the indicated points for each factor present preoperatively, and a total score was obtained. A score of less than 10 indicated the patient was predicted to be extubatable. A score of 10 or more predicted the patient to need ventilatory support. Comparing the preoperative predictions to the actual postoperative outcomes for each patient, our model was correct in 91% of the patients (Figure). No patients were falsely predicted as extubatable and only two (with 10 and

12 points respectively) were predicted as needing ventilation when actually they were extubated early. This zone of 10-12 points, however, may be considered a borderline between needing and not needing ventilation.

Discussion. Discriminant analysis proved useful in determining those factors which can predict respiratory outcome in postthymectomy patients. Surprisingly, some traditionally used criteria, such as the presence of bulbar symptoms or previous respiratory failure, were insignificant, and vital capacity had only slight significance. Possibly with more cases the borderline zone would be better defined. We believe this study is important for two reasons. First, it is clinically useful in the postoperative care of myasthenic patients; and second, and perhaps more important, it is useful in demonstrating the utility of this statistical approach to clinical decision making.

References.

1. Loach A, Young A, Spalding J, et al: Postoperative management after thymectomy. Br Med J 1:309-12, 1975
2. Hirsh R, Geer R, Klineberg P: Respiratory management of myasthenics following thymectomy (Abstr). American Society of Anesthesiologists Annual Meeting, 1977, p127-128
3. Radhakrishna S: Discriminant analysis in medicine. The Statistician 14:147-167, 1964.

Table 1

Preoperative Factor	Points
Duration > 6 years	12
Other Resp. Disease	10
Pyridostigmine > 750 mg/day	8
Vital Capacity < 2.9 liters	4
Total	34

Total Score	Prediction
0 to 9	Readily Extubatable
10 to 34	Needs Ventilation

PATIENT'S SCORE