RECOVERY TIME FOLLOWING DEMEROL OR PENTOTHAL SUPPLEMENTATION OF NITROUS OXIDE ANESTHESIA *

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INTRODUCTION

It has been observed clinically (1) that demerol® is a valuable analgesic agent with which nitrous oxide anesthesia may be supplemented. It also has been observed that the waking time of patients receiving demerol is relatively short. Objective evidence has been presented indicating that a cumulative effect on sleeping time occurs with repeated fractional dosages of pentothal® (2). The use of pentothal to supplement nitrous oxide anesthesia is generally more widespread than the use of demerol for this purpose. It therefore seemed desirable to make some observations on the relative recovery times in patients who had received either of these two drugs as supplements to nitrous oxide anesthesia.

METHOD

The most objective test that was found for use in this study was Bender’s face-hand test (3, 4). This test was carried out as follows: as soon after anesthesia as the patient was able to talk, he was asked to close his eyes and tell the examiner what he perceived. The examiner then touched the patient’s cheek and the contralateral palm briefly but firmly with the two forefingers. Care was taken to apply the stimuli simultaneously with approximately equal pressure and duration. If, after 4 testings, no response or only the touch on the face was reported, the examiner left to return at fifteen to thirty minute intervals. When both stimuli were perceived correctly for 3 successive testings within a few seconds, recovery was considered to have occurred. The testing was done by 2 senior residents in Anesthesia (H. W. and T. A.).

The patients were those who happened to be assigned to the service of the resident involved and for whom nitrous oxide anesthesia seemed to be indicated. No open chest cases were included in the series. Of the 224 patients, 45 per cent were males. Premedication was given as usual. The average adult received 10 mg. of morphine and 0.4 mg. of

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scopolamine subcutaneously ninety minutes before surgery. The doses were varied somewhat with the age and the condition of the patient. Since the hypnotic effect of demerol becomes effective less rapidly than that of pentothal, the patients who received demerol as the chief supplement to nitrous oxide anesthesia were given induction doses only of pentothal. Supplements as needed for analgesia or hypnosis consisted thereafter of demerol in this series of 82 patients.

Demerol, when given intravenously, may depress respiration markedly (5, 6). The first intravenous dose of demerol therefore usually was restricted to 50 mg., and subsequent doses were restricted to 25 mg. One needs to be as alert after intravenous administration of demerol as after pentothal injection with regard to assisting respiration.

The 142 patients in the pentothal series received only pentothal as the supplement to the nitrous oxide anesthesia. The nitrous oxide flow was 3.5 liters per minute and the oxygen flow was 1.5 liters per minute used in a semiclosed circle absorption system. Relaxing agents were used as needed. They consisted of either curare or succinylcholine. Respirations were aided when relaxing agents or the demerol or pentothal had depressed the respiration. Efforts were made to give as little as possible of either pentothal or demerol to maintain satisfactory anesthesia and have the patient responding soon after the end of surgery.

**TABLE 1**

| Recovery Time After Demerol or Pentothal Supplements to Nitrous Oxide Anesthesia |
|-------------------------------------------|-----------|
|                                          | 82 Patients | 142 Patients |
| Pentothal for induction (mg.)            | 0    | 475  | 328  |     |      |     |
| Demerol (mg.)                            | 50   | 500  | 163  |     |      |     |
| Pentothal (mg.)                          | 150  | 2,200| 800  |     |      |     |
| Age (years)                              | 11   | 80   | 35   | 13  | 87   | 35   |
| Weight (pounds)                          | 90   | 270  | 148a | 100 | 220  | 140c |
| Interval last dose to end (min.)         | 5    | 105  | 31b  | 2   | 75   | 23f  |
| Duration of anesthesia (min.)            | 25   | 290  | 145c | 15  | 320  | 108g |
| Recovery period (min.)                   | 0    | 120  | .43.6d | 0  | 300  | 107h |

a-c Not significant at .05.
b-f Not significant at .05.
c-g Significant at .001.
d-h Significant at .001.
b-d r = +.425 (82 patients). Significant at .02.
f-h r = .117 (70 patients). Not significant.
Recovery Time

Results

Table 1 indicates that the average recovery period was 43.5 minutes in those patients who had received demerol to supplement nitrous oxide anesthesia and 107 minutes for patients who had received pentothal. The average duration of anesthesia was 145 minutes in the demerol series and 108 minutes in the pentothal series. The average age of the patients in each series was 35 years. The average weight of the patient in the 2 series was very close to each other. The average interval between the last dose and the end of the procedure was within the same range.

One striking observation about the 2 series of patients was that, after the patients who had had demerol responded, they continued to remain alert, while many of the patients in the pentothal series would give an adequate response and then undergo a secondary depression during which they would sleep for considerable periods. They could be roused from this sleep but were definitely more drowsy than the patients of the demerol series had been after waking.

Discussion

The difference in recovery times in the 2 series of patients who had been supplemented with demerol and pentothal, respectively, is highly significant ($p < .001$). This difference becomes even more definite when one observes that the patients who received pentothal had significantly shorter operative procedures than those who received demerol.

There was no correlation between the dose of pentothal used for induction in the demerol series and recovery time in that series.

The observations concerning postpentothal hypnosis is a repetition and confirmation of the experiences of others (7).

For reasons unknown to us, there was a positive mathematical correlation ($r = .425$) in the pentothal series (data available on only 82 patients) between waking time and the interval after the last dose to the end of the operation. No such correlation ($r = .117$) occurred in the demerol series (data from 70 patients). These figures rule out the possibility that the longer waking time after pentothal could be due to late administration of pentothal.

Since the average age was 35 in each of the 2 series, the differences in recovery time obviously could not be correlated with age. There was no significant difference in the weights of the patients in the 2 series at the 5 per cent level.

It is interesting to note that the recovery time after supplementation of nitrous oxide anesthesia with demerol was 43.5 minutes and that the recovery time of a similar series of 50 patients reported by Brotman and Cullen (5) was 45 minutes. In the earlier series, the
recovery time was considered to last "until the patient responded to
voice." The type of response was not described.

It has been observed frequently that nitrous oxide and pentothal
would not adequately "hold" patients for some operative procedures,
whereas the addition of small amounts of demerol would permit them
to be accomplished satisfactory. Presumably, this is because demerol
has a good analgesic action while the chief action of pentothal is that of
hypnosis.

**Summary**

Anesthesia was induced with pentothal in a series of 82 patients
who were to receive nitrous oxide. The only supplement given there-
after was demerol in divided doses. A similar series of 142 patients
induced with pentothal and receiving nitrous oxide anesthesia was
supplemented with pentothal only.

Bender's "face-hand" test was used to determine return to
consciousness by the patients of both series.

The average recovery time following repeated doses of pentothal
(107 minutes) was longer than after repeated doses of demerol (43.5
minutes). The difference was very highly significant (p < .001).

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