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Title : RECOVERY FROM MIDAZOLAM USED FOR SHORT OPERATIONS

Authors : Robert J. Fragen, M.D., Nancy J. Caldwell, CRNA

Affiliation : Department of Anesthesia, Northwestern University Medical School
Chicago, Illinois 60611

This study compared the speed and quality of recovery after midazolam, a short acting, potent benzodiazepine, to that after thiopental when either drug was used as a hypnotic for induction and maintenance for short gynecological operations.

Methods: Participating in this approved study were 99 healthy, fasting women who signed consent forms. A control Trieger test was obtained. A memory card was shown to test for retrograde amnesia. Fentanyl, .0015 mg/kg or an equal volume of saline was given IV as acute premedication before IV induction with either midazolam .175mg/kg or thiopental 3.75 mg/kg. Time to loss of lid reflex and duration of apnea were measured. Maintenance doses of 1/4 the induction dose were given IV for signs of awakening. Patients spontaneously breathed 67% nitrous oxide in oxygen until the end of operation. Every 15 minutes in the recovery room, drowsiness was assessed until patients were completely awake, orientation questions asked until answered correctly, Trieger tests performed until the number of dots missed was within two of control and patients attempted to ambulate until they could walk six feet unaided. These were reassessed six hours later. Ten memory cards were shown for antegrade amnesia when patients were awake and oriented. The incidence of nausea and vomiting was determined and the IV site inspected.

Results: The groups were similar for age, height, weight, anesthesia time (mean 17 min) and operating time (mean 10-12 min). Prior fentanyl reduced the total dose requirements of midazolam by 40% and thiopental by 34%, and reduced the frequency of maintenance doses by 50%. The eyelid reflex disappeared a mean of 91 sec after midazolam and fentanyl, 143 sec after midazolam and saline, 36 sec after thiopental and fentanyl, and 56 sec after thiopental and saline. Apnea with a mean duration of 40 sec occurred in 11/25 receiving midazolam and fentanyl, 20 sec in 2/26 receiving midazolam and saline, 60 sec in 20/25 receiving thiopental and fentanyl, and 50 sec in 12/23 receiving thiopental and saline. The mean number of minutes required for correct orientation questions (Q), absence of

drowsiness (D), normal Trieger test (T), and the ability to walk in a straight line (W) are shown in the table.

| | M&F | M&S | T&F | T&S |
|---|------|-------|-----|-----|
| Q | 38*# | 50*# | 13 | 15 |
| D | 68* | 81*# | 33 | 46 |
| T | 79*# | 98*# | 50 | 46 |
| W | 80*# | 111*# | 65 | 51 |

*p < .05 vs T&F #p < .05 vs T&S

After midazolam and fentanyl, 24/25 patients had partial or complete antegrade amnesia, 23/25 after midazolam and saline, 10/25 after thiopental and fentanyl, and 15/23 after thiopental and saline. The mean time from the last dose of drug until the memory cards were shown was 44 min after midazolam and 14 min after thiopental. No retrograde amnesia occurred. There was no deterioration in recovery at six hours postoperatively. Nausea and vomiting occurred significantly more often after thiopental. No phlebitis occurred.

Discussion: Thiopental, as expected, produced a more rapid induction and awakening. Acute premedication with fentanyl improved induction and recovery with both hypnotics. Fentanyl and thiopental each increased the incidence and duration of apnea. Midazolam had a more pronounced effect on memory, causing antegrade amnesia of at least an hour and often more than two hours. The quality of anesthesia produced by only midazolam or thiopental plus nitrous oxide was unsatisfactory for most patients and these combinations of drugs are not recommended. A combination of fentanyl, midazolam and nitrous oxide produced a satisfactory balanced anesthetic technique similar to fentanyl, thiopental and nitrous oxide, a known satisfactory combination. Since all measurements returned to normal within four hours, midazolam could be used for outpatient anesthesia if four hours elapse before patients are discharged.