

Sensory Disturbances Following Ketamine Anesthesia: Recurrent Hallucinations

JOSEPH FINE, M.D.

STEPHEN C. FINESTONE, M.D.

Pittsburgh, Pennsylvania*

IN THE late 1950s, Greifenstein and associates,¹ studying the anesthetic properties of phenyl-cyclohexylamine derivatives, reported that these chemicals produced amnesia, analgesia, catatonia, and catalepsy. Phencyclidine was the first of these drugs to be used in clinical anesthesia, but convulsive movements, as well as excitatory and maniacal behavior, discouraged the use of this agent in human beings.

Ketamine hydrochloride, chemically related to both phencyclidine and cyclohexamine, proved to be more satisfactory for clinical anesthesia. Clinical investigations were begun in 1965 by Domino's group,² who first used the term "dissociative anesthesia."

As noted by Pender,³ the clinical signs of anesthesia with ketamine are completely different from those seen with conventional agents. During anesthesia with a conventional anesthetic, patient movement is usu-

ally interpreted as evidence of "lightness" of anesthesia. During dissociative anesthesia, however, purposeless movements may be present with or without surgical stimuli. These movements are not necessarily a sign of lightness, and additional doses of the agent are ineffective in stopping them, if the initial intravenous (I.V.) dose has been sufficient (1 to 1.5 mg./kg.). It is speculated that ketamine exerts its effect in regions above the medulla and hypothalamus.^{4,5} Because of its minimal depressant effect on the cardiovascular and respiratory systems, ketamine has achieved widespread use.

A significant proportion (18 percent)⁶ of patients receiving ketamine have vivid and colorful dreams, frequently of "outer space" or "floating." Ketamine appears to produce only visual perceptual distortions.

In our experience of 1400 cases, 20 percent had no dreams. Of the remaining 80 percent who dreamed, 50 percent reported

*Department of Anesthesiology, Montefiore Hospital, Pittsburgh, Pennsylvania 15213.

pleasant dreams and 30 percent unpleasant dreams. Patients were interviewed postoperatively; if they reported dreams, they were questioned as to their content and asked if they would mind having the same dream again. We were prompted to report 3 cases because of the frightening nature of recurrent hallucinatory experiences in apparently stable patients. LSD, another drug that may produce the same phenomenon,^{7,8} has never, to the best of our knowledge, been taken by these patients.

Case 1.—This 42-year-old, 120 lb. woman was hospitalized for a dilatation and curettage in August 1971. Her past medical history indicates a questionable myocardial infarction in 1969, never confirmed by electrocardiogram. She had never taken any psychotropic medication. After premedication with 50 mg. of meperidine and 25 mg. of promethazine HCl, she was given 150 mg. of ketamine I.V., in increments of 20 mg., for 15 minutes of anesthesia. Following the surgical procedure, she dreamed in the recovery room of riding in a space ship or floating down in it.

A week later, while walking down a flight of steps, she perceived the same sensation as described in her recovery-room dreams; the sensation lasted until she was off the steps. This episode would recur each time she descended steps, over a 3-week time span. When questioned 10 months later, she had had no further recurrences.

Case 2.—This was a 63-year-old, 210 lb. man, who had undergone 10 anesthetic procedures during the preceding 6 years for operations on a recurrent bladder tumor. His past medical history included chronic bronchitis with pulmonary emphysema. The only medication taken were antibiotics.

Twelve months earlier, he had had a cystoscopy.

Premedication consisted of 150 mg. of meperidine and 0.4 mg. of atropine intramuscularly, 1 hour preoperatively. Sodium thiopental (125 mg.) was then followed by a total dose of 230 mg. of ketamine I.V., in 20 mg. increments. The procedure lasted 25 minutes. His dreams in the recovery room consisted of "floating" or "flying" in space, with his extremities "open like wings."

A week after discharge, while walking down a flight of steps, he experienced the same sensation for a few seconds. Interviewed a year later, he reported that he had not had any further recurrences of this episode.

Case 3.—This 60-year-old, 128 lb. woman was admitted in January 1972 for an operation on the flexor tendon of an index finger. Her past medical history was noncontributory. She reported no previous medication. The day of operation, she received 50 mg. of meperidine, 0.4 mg. of atropine, and 25 mg. of hydroxyzine as premedication. Anesthesia was induced with 75 mg. of thiopental I.V., followed by 100 mg. of ketamine.

In the recovery room, she dreamed of numerous faceless people surrounding her bed. She was discharged 2 days later. Thereafter, and for about a week, each time she lay down, she saw the faceless people around her bed, each such episode lasting for 5 or 6 seconds. Interviewed 4 months later, she had not had any recurrence of these episodes.

COMMENT

Dreams and other sensory disturbances of an abnormal nature have been reported following conventional general anesthesia.⁹

★ JOSEPH FINE, M.D., a native of Argentina, is a graduate of the University of La Plata in La Plata, Argentina. His internship was spent at St. Francis General Hospital in Pittsburgh, Pennsylvania, and his Residency in Anesthesiology at Vancouver General Hospital, Vancouver, British Columbia, Canada. Dr. Fine holds the position of Associate Anesthesiologist, Montefiore Hospital, and Clinical Instructor of Anesthesiology at the University of Pittsburgh, Pittsburgh, Pennsylvania.



The incidence of dreams in Crawford's series¹⁰ was 47 percent in patients premedicated with atropine and 42.5 percent in patients not so premedicated (57 obstetric patients received conventional anesthesia). Brice and associates¹¹ recorded 43 percent of dreams in their study. However, the incidence and quality of dreams following ketamine anesthesia—floating in space, splitting of the body image, and depersonalization—are far different from dreams previously described following conventional anesthetic agents. Also, emergence delirium and/or hallucinatory effects following ketamine are much more common than with any other general anesthetic.⁹

Hallucinatory states are to be expected with sensory deprivation; physiologic and pathologic disturbances, such as alkalosis, sleep deprivation, hypnosis, and fever; and by chemical agents such as atropine, scopolamine, narcotics, alcohol, and LSD. However, sudden, spontaneous, recurrent hallucinations, produced without drugs or evident pathologic disturbance, must be quite frightening.

We do not doubt the occurrence of hallucinations in the first 2 cases—the patients were awake, walking, and with other people when they occurred. Although the "dream" recurred in the third patient when *she* felt she was awake, this situation may occur in the hypnagogic state preceding sleep.

We are unaware of similar recurrent hallucinations following the use of other anesthetic agents. However, the incidence of this phenomenon is small—3 per 1400 cases of ketamine anesthesia; therefore, while further study seems indicated, this phenomenon should not preclude the use of ketamine.

SUMMARY

Of 1400 patients undergoing ketamine anesthesia, 80 percent reported dreaming

while in the recovery room. Three patients had recurrent hallucinations presumably related to the anesthesia.

Generic and Trade Names of Drugs

Hydroxyzine—Vistaril
Meperidine—Demerol
Promethazine—Phenergan
Succinylcholine—Anectine
Sodium thiopental—Pentothal® Sodium

REFERENCES

1. Greifenstein FE, DeVault M, Yoshitake J, et al: A study of 1-aryl cyclo hexyl amine for anesthesia. *Anesth & Analg* 37:283-294, 1958
2. Domino EF, Chodoff P, Corssen G: Pharmacological effects of CI-581, a new dissociative anesthetic, in man. *Clin Pharmacol Ther* 6:279-291, 1965
3. Pender J: Dissociative anesthesia. *JAMA* 215:1126-1130, 1972
4. Winters WD: The neurophysiology of anesthesia. *Anesthesiology* 28:65-80, 1967
5. Virtue RW, Alanis JM, Mori M, et al: An anesthetic agent: 2-orthochoyphenyl, 2-methylamino cyclohexanone HCl (CI-581). *Anesthesiology* 28:823-833, 1967
6. Stephen CR, Johnson E, Burleson J: Induction of anesthesia with ketamine. New York, American Society of Anesthesiologists Annual Meeting, October 21, 1970
7. Goodman LS, Gilman A: The Pharmacological Basis of Therapeutics. Fourth edition. The Macmillan Company, New York, New York pp 195-197, 1971
8. Smart GR, Bateman K: Unfavorable reactions to LSD. *Canad Med Assoc J* 96:1214-1221, 1967
9. Knox JWD, Bovill JG, Clarke RSJ, et al: Clinical studies of induction agents: ketamine. *Brit J Anaesth* 42:875-885, 1970
10. Crawford JS, Harley NF, Bland EP, et al: Awareness under anaesthesia. *Brit Med J* 1:508, 1969
11. Brice DD, Hetherington RR, Utting JE: A simple study of awareness and dreaming during anaesthesia. *Brit J Anaesth* 42:535-542, 1970

Old Doc Hess Says: Don't let frustrations take the fun out of your work.

—C.O.R.