Experiences With the Use of Ketamine for Parturition: I. Primary Anesthetic for Vaginal Delivery

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Ketamine was used as the sole anesthetic agent for vaginal delivery in 80 women. Complete analgesia occurred in 78, partial analgesia in one, and one had no effects. Administered intravenously immediately before delivery in doses of 12.5 to 25 mg. (0.2 to 0.4 mg./kg.) with a dosage limit of 100 mg., ketamine administration resulted in no significant maternal or newborn complications.

THE use of ketamine for surgical anesthesia has been widely investigated. However, to date relatively little has been reported regarding its use for obstetric anesthesia. The intravenous (I.V.) administration of ketamine for pain relief in vaginal delivery forms the basis of this report.

MATERIALS AND METHODS

Doses of from 12.5 to 25 mg. of ketamine were administered I.V. to 80 normal parturients at term with vertex presentations when it was obvious that rapid and profound analgesia was necessary for the relief of pain for vaginal delivery. Every parturient was forewarned of the sensation of "floating" and vertigo and possible loss of consciousness that would accompany the pain relief. Dosage was based on the patient's response to impending delivery, independent of body weight, and was administered at crowning. This dose was repeated if indicated by patient response at the onset of subsequent contractions to a total dosage of 100 mg. (table 1). No additional ketamine was given for the delivery of the placenta or for the repair of the episiotomy, the latter being performed under local anesthesia. While ketamine was the sole anesthetic given during delivery, 12 parturients received either 50 mg. of meperidine or 50 mg. of meperidine with 5 mg. of diazepam I.V. approximately 1 hour before delivery.

The anesthetic effects of the ketamine upon the parturient were evaluated by the anesthesiologist at the time of delivery and for 1 hour after delivery, and a follow-up evaluation was made during the additional 2 days of hospitalization. The condition of the newborn at delivery was rated according

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TABLE 1
Patient Population (80 Parturients) and Drug Dosage

Parity		None 28	One or more (mean, 1.7) 52
Age	Range	13 to 26	16 to 40
	Mean	18	24
Body weight, kg.	Range	53.7 to 116.1	58.4 to 124.2
	Mean	73.8	76.3
Ketamine dosage, mg.	Range	12.5 to 100	12.5 to 50
	Mean	38.3	32.4
Ketamine dosage, mg. per mean body weight		0.5	0.4

to Apgar criteria at 1 and 5 minutes and followed up by the pediatrician in the newborn nursery during the next 48 hours.

RESULTS

Seventy-eight of the 80 parturients who received ketamine reported obtaining complete relief from pain and were content with the technic. One parturient had no relief of pain, while one had only partial relief. Amnesia for the events following the ketamine administration was reported by all parturients who had complete relief. Retrograde amnesia was noted in approximately 75 percent of the cases, but its occurrence and degree appeared unrelated to the amount of drug used. No maternal complications were noted except for a transient 10 to 20 percent elevation in systolic and diastolic blood pressure, with spontaneous remission shortly after delivery.

Recovery was rapid, as evidenced by the patient response to the delivery of the placenta. There was, however, no recall for this event except in the two women who had no pain relief. All parturients moved unassisted from the delivery table to the transportation cart, and none had to remain in the delivery room or required special observation or "seclusion" during recovery.

There was no noticeable effect of ketamine administration on the neonates (table 2). Although no newborn had a 1-minute Apgar of less than 7, one (Apgar 7 at 1 minute) required initial positive-pressure ventilation with oxygen. This infant had a 5-minute Apgar of 9 and did well during the remainder of its hospitalization.

DISCUSSION

The use of ketamine as an anesthetic for vaginal delivery has been reported with varying results. Chodoff and Stella[1] utilized 22 to 80 mg. of ketamine I.V. with nitrous oxide and oxygen with good results, observing no maternal or neonatal complications.

TABLE 2
Apgar Scores (80 Live Births)

	1 minute	5 minutes
Range	7 to 10	7 to 10
Mean	8.0	8.9

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Stolp and coworkers[2] and Langrehr and associates[3] administered ketamine early in labor and in much larger doses (1 to 8 mg./kg. body weight) than reported here, and found a significant number of depressed newborns. However, they attributed this to previous intrauterine asphyxia and surgical manipulation and not to the drug itself.

Little and coworkers[4] utilized priming doses of 1.5 and 2.2 mg./kg. body weight, followed by a continuous infusion of ketamine (0.11 and 0.08 mg./kg./min.). This technic resulted in maternal complications such as apnea, laryngospasm, nausea, increased uterine tone, and hypertension, and a significant number of neonates were markedly depressed at delivery, requiring positive-pressure ventilation. Those investigators concluded that the lower dosages of ketamine were effective as an anesthetic agent with fewer complications, but that its use for obstetric anesthesia was questionable.

Previously, we reported on the use of ketamine in dosages described here as an adjunct to incomplete regional anesthesia for vaginal delivery.[5] As in this report, analgesia and amnesia were prominent and no maternal or fetal-newborn complications were noted, a mild, transient elevation in maternal blood pressure being the only consistent change encountered. Because of the presence of a partial analgesic block in these patients, it was not possible to determine the analgesic potency of ketamine, although administration of the drug allowed the obstetrician to intervene and effect delivery.

In the present investigation, ketamine was the sole agent used for vaginal delivery, and its effectiveness is apparent by the number of parturients who had complete analgesia for delivery. Surprisingly low dosages were effective, regardless of body weight.

As in the previous report, the presence of a "dream state" universally accompanied the analgesia. Only one patient found the dream state unpleasant. However, this was due to her religious beliefs and not to any untoward hallucination. Unpleasant hallucinations, reported following the use of ketamine as a surgical anesthetic, are presumably related to the higher dosage of agent administered per unit of operative time.[6,7]

Routine bilirubin determinations were not obtained in these neonates; however, there was no clinical evidence of neonatal jaundice or hyperbilirubinemia. In vitro studies have demonstrated that there is no albumin binding by ketamine or displacement of bilirubin from albumin by ketamine or by metabolites 1 or 2; however, tritium residue has been found in plasma protein fractions, the significance of which has not been determined.[8]

From this investigation, it can be concluded that a priming dose of 12.5 to 25 mg. (0.2 to 0.4 mg./kg.) of ketamine, followed by incremental doses to a total of 100 mg. results in profound analgesia of short duration, sufficient for vaginal delivery. Likewise, at these dosages, no untoward effect was encountered in mother or infant.

Generic and Trade Names of Drugs

Ketamine—Ketalar
Meperidine—Demerol
Diazepam—Valium

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Guest Discussion

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The paper by Dr. Akamatsu and his associates indicates that small I.V. doses of ketamine (0.2 to 0.4 mg./kg.) can be used to produce safe, transient analgesia for vaginal delivery. The paper wisely points out the