

# Ketamine and the Obstetric Patient

Y. H. MAHOMEDY, J. W. DOWNING, A. J. COLEMAN, M. C. MAHOMEDY

## SUMMARY

Ketamine anaesthesia was administered to 135 mothers undergoing Caesarean section. The incidence of awareness, dream recall, and psychic disturbance in this group was compared with that occurring in 126 subjects anaesthetised with thiopentone and nitrous oxide. Factual recall was rare in both groups. Dreaming, although more frequent in the ketamine series, was usually pleasant in nature. Psychic phenomena occurred after ketamine anaesthesia, but were infrequent if ketamine dosage was limited, or anaesthesia supplemented with diazepam. It is concluded that ketamine may be used to advantage in obstetric anaesthesia, without significant dreaming or psychic disturbances.

*S. Afr. Med. J.*, 48, 734 (1974).

There is a well-defined incidence of maternal awareness<sup>1-4</sup> and fetal depression<sup>5-19</sup> associated with current popular anaesthetic techniques for Caesarean section. Supplementation of anaesthesia with halothane or methoxyflurane, as a means of obviating factual recall, has been advocated.<sup>4,11-22</sup> The use of intermittent intravenous injections of propanid, alfathesin, or ketamine, as substitutes for inhalational agents, has also been reported.<sup>14-17</sup>

Ketamine appears to offer some advantage to the obstetric anaesthetist; it is a drug which ensures maternal analgesia without significant fetal depression;<sup>5,15,22</sup> complete flexibility of inspired oxygen levels is assured;<sup>19,20</sup> and the drug seems to provide a useful degree of postoperative analgesia, thus obviating the need for immediate use of potent analgesic agents.<sup>5</sup> However, ketamine has been associated with a high incidence of dreams, which are often unpleasant in nature.<sup>15,21,22</sup> In addition, hallucination and delirium have been reported in patients recovering from ketamine anaesthesia.<sup>15,18,21,22</sup>

Because the incidence of these complications appears relatively lower in patients given ketamine for Caesarean section,<sup>5,15,18</sup> we decided to investigate the incidence of awareness, dream recall and mental disturbance in mothers undergoing Caesarean section at King Edward VIII Hospital, Durban.

## Department of Anaesthetics, University of Natal, Durban

Y. H. MAHOMEDY, M.B. CH.B., D.A., F.F.A., *Senior Anaesthetist*

J. W. DOWNING, M.B. B.Ch., F.F.A., *Principal Anaesthetist/Senior Lecturer*

A. J. COLEMAN, M.B. B.S., F.F.A., *Professor and Head*

M. C. MAHOMEDY, LL.M., D.A., F.F.A., *Senior Anaesthetist*

Based on a paper presented at the 49th South African Medical Congress (MASA), held in Cape Town on 23-27 July 1973.

## METHODS

The study included 261 unpremedicated mothers scheduled for abdominal delivery. The conventional anaesthetic sequence—thiopentone, muscle relaxants, nitrous oxide and oxygen given by controlled ventilation—was used in 126 subjects. The remaining 135 patients were given ketamine and muscle relaxants by intravenous injection, and ventilation was controlled with an oxygen-nitrogen admixture. After delivery of the fetus, in the latter group, anaesthesia was maintained with either nitrous oxide, nitrous oxide and ether, or further injections of ketamine. Diazepam (5-10 mg) was given intravenously to 35 of the mothers maintained on ketamine alone.

On the day after operation, each patient was interviewed in an attempt to elicit the incidence of factual and dream recall. In addition, the theatre, recovery room and ward nursing staff were asked to report abnormal behaviour during recovery from anaesthesia.

## RESULTS

The over-all incidence of awareness, painful or otherwise, was similar in the two groups (Table I).

TABLE I. PERCENTAGE INCIDENCE OF AWARENESS UNDER ANAESTHESIA

	Anaesthetic technique	
	Thiopentone N <sub>2</sub> O + O <sub>2</sub> (+ ether)	Ketamine (± adjuvants)
Total No. of cases	126	135
Definite factual recall		
Painful	1 (0,8%)	1 (0,8%)
Painless	1 (0,8%)	0
Doubtful recall	5 (4,0%)	4 (3,2%)

Dream recall was more frequent in the ketamine series, but most dreams seemed to be pleasant in nature (Table II).

TABLE II. DREAM RECALL AFTER ANAESTHESIA

	Anaesthetic technique	
	Thiopentone N <sub>2</sub> O + O <sub>2</sub> (+ ether)	Ketamine (± adjuvants)
Total No. of cases	126	135
Pleasant dreams	11 (8,8%)	45 (33,3%)
Unpleasant dreams	9 (7,2%)	14 (10,4%)
Total No. who dreamt	20 (16,0%)	59 (43,7%)

There were no psychic sequelae reported in the thiopentone group, but 7 cases occurred after ketamine anaesthesia (Table III).

TABLE III. PSYCHIC DISTURBANCE DURING RECOVERY FROM ANAESTHESIA

	Anaesthetic technique	
	Thiopentone N <sub>2</sub> O + O <sub>2</sub> (+ ether)	Ketamine (± adjuvants)
Total No. of cases	126	135
Confusion or hallucination	0	3 (2,2%)
Delirium	0	4 (3,0%)

Table IV illustrates the method of anaesthetic maintenance after delivery of the fetus in the ketamine patients.

Group I received nitrous oxide, group II nitrous oxide and ether, group III ketamine alone, and group IV ketamine and diazepam. The mean induction dose of ketamine was similar in the 4 groups, but the maintenance doses in groups II, III and IV were considerably greater, particularly in group III.

The incidence of factual recall (Table V) was similar in all groups, except group III who received ketamine alone; no awareness was reported in the latter group.

Dream recall was common to all ketamine groups (Table VI). Pleasant dreams were most frequent following unsupplemented ketamine anaesthesia. The incidence of unpleasant dreams was less after low doses of ketamine or after diazepam supplementation.

Table VII indicates the incidence of mental disturbance encountered in the ketamine series. Diazepam administration (group IV) or restriction of ketamine dosage (group I) appeared to reduce the incidence of psychic sequelae.

TABLE IV. KETAMINE ANAESTHESIA SUPPLEMENTATION AND DOSAGE

Anaesthetic supplementation after delivery	Low dose group I	High dose groups		
		II	III	IV
	N <sub>2</sub> O	N <sub>2</sub> O + ether	Ketamine alone	Ketamine + diazepam
No. of cases	68	15	17	35
Mean induction dose (± SD)	141,0 (31,3)	159,3 (52,9)	146,4 (24,8)	148,4 (21,7)
Mean maintenance dose (± SD)	70,9 (10,67)	135,0 (57,4)	260,3 (104,5)	230,0 (88,6)

TABLE V. AWARENESS DURING KETAMINE ANAESTHESIA

Anaesthetic supplementation after delivery	Low dose group I	High dose groups		
		II	III	IV
	N <sub>2</sub> O	N <sub>2</sub> O + ether	Ketamine alone	Ketamine + diazepam
No. of cases	68	15	17	35
Definite factual recall	1 (1,5%)	0	0	0
Painful	1 (1,5%)	0	0	0
Painless	0	0	0	0
Doubtful recall	1 (1,5%)	1 (6,6%)	0	2 (5,7%)

TABLE VI. DREAM RECALL FOLLOWING KETAMINE ANAESTHESIA

Anaesthetic supplementation after delivery	Low dose group I	High dose groups		
		II	III	IV
	N <sub>2</sub> O	N <sub>2</sub> O + ether	Ketamine alone	Ketamine + diazepam
No. of cases	68	15	17	35
Dreams				
Pleasant	25 (36,8%)	1 (6,6%)	8 (47,0%)	11 (31,4%)
Unpleasant	4 (5,8%)	3 (20,0%)	4 (23,5%)	3 (8,6%)
Total No. of dreams	29 (52,6%)	4 (26,6%)	12 (70,5%)	14 (40,0%)

TABLE VII. PSYCHIC DISTURBANCE DURING RECOVERY FROM KETAMINE ANAESTHESIA

	Low dose group	High dose groups		
	I	II	II	IV
Anaesthetic supplementation after delivery	N <sub>2</sub> O	N <sub>2</sub> O + ether	Ketamine	Ketamine + diazepam
No. of cases	68	15	17	35
Confusion or hallucination	0	1 (6,6%)	1 (5,8%)	1 (2,9%)
Delirium	2 (2,9%)	0	1 (5,8%)	1 (2,9%)

## DISCUSSION

Our results suggest that factual recall is not a serious problem with ketamine anaesthesia. Experience with the intravenous method of anaesthesia for Caesarean section<sup>14-17</sup> indicates that awareness can occur owing to technical error. A 16% incidence of intra-operative awareness during Caesarean section has been reported by Peltz and Sinclair,<sup>5</sup> using thiopentone-nitrous oxide anaesthesia at an altitude of 1700 metres. This problem was obviated by use of ketamine for anaesthetic induction.

Crawford<sup>4</sup> has suggested that patients who have unpleasant dreams may be on the brink of awareness. This study indicates that unpleasant dream recall is no more frequent following ketamine anaesthesia, provided the drug dosage is limited or diazepam supplementation is used. Peltz and Sinclair<sup>5</sup> have reported similar results after ketamine induction for Caesarean section at Baragwanath Hospital.

Although mental disturbances were not seen after thiopentone-nitrous oxide anaesthesia in our patients, the Baragwanath workers encountered an incidence of post-operative psychoses of the order of 4% using this technique. Postanaesthetic delirium may occur in 2% of patients receiving general anaesthesia, regardless of the anaesthetic technique used or the operation performed. These findings contrast with those presented by Collier,<sup>22</sup> who noted an unacceptably high incidence of mental phenomena in patients given ketamine for minor surgical procedures. Diazepam supplementation appears to reduce the incidence of psychic disturbances seen in her series.

Knox *et al.*<sup>21</sup> showed a relationship between the total dose of ketamine administered and the incidence of post-anaesthetic delirium. The mothers in group III, who received large unsupplemented doses of the drug, seemed to have the highest incidence of mental aberrations (Table VII).

## CONCLUSIONS

From these data on the use of ketamine anaesthesia for Caesarean section, it would appear that recall of unpleasant dreams and the occurrence of mental disturbance during recovery from the drug, are relatively infrequent in the obstetric patient.

Our report tends to confirm the observations made in similar studies in Northern Ireland by Moore *et al.*<sup>23</sup> and at Baragwanath by Peltz and Sinclair.<sup>5</sup> Provided dosage of the drug is limited, or anaesthesia supplemented with diazepam, ketamine may be used to advantage in obstetric anaesthesia, without a significant incidence of unpleasant dreams or psychic disturbance.

## REFERENCES

- Crawford, J. S. (1962): *Brit. J. Anaesth.*, **34**, 179.
- Hartridge, V. B. (1967): *Amer. J. Obstet. Gynec.*, **85**, 619.
- Wilson, J. and Turner, D. J. (1969): *Brit. Med. J.*, **1**, 280.
- Crawford, J. S. (1971): *Brit. J. Anaesth.*, **43**, 179.
- Peltz, B. and Sinclair, D. M. (1972): *Anaesthesia*, **28**, 37.
- Finster, M. and Poppers, P. J. (1968): *Anesthesiology*, **29**, 190.
- Stenger, V. L., Blechner, J. N. and Prystowsky, H. (1969): *Amer. J. Obstet. Gynec.*, **103**, 901.
- Marx, G. F., Joshi, C. W. and Orkin, L. R. (1970): *Anesthesiology*, **32**, 429.
- Kalappa, R., Ueland, K., Hansen, J. M. and Parek, J. T. (1971): *Amer. J. Obstet. Gynec.*, **109**, 411.
- Kosaka, Y., Takashi, T. and Mark, L. C. (1969): *Anesthesiology*, **31**, 489.
- Moir, D. D. (1970): *Brit. J. Anaesth.*, **42**, 136.
- Houle, G. L., Fox, G. S. and Gertel, M. (1969): *Anesth. Analg. Curr. Res.*, **48**, 1011.
- Pöntinen, P. J., Autere, T. and Jakubunski, M. (1972): *Excerpta Med. (Amst.)*, sect. XXIV, **261**, 154.
- Downing, J. W., Coleman, A. J. and Meer, F. M. (1972): *Brit. J. Anaesth.*, **44**, 1069.
- Meer, F. M., Downing, J. W. and Coleman, A. J. (1973): *Ibid.*, **45**, 191.
- Downing, J. W., Coleman, A. J. and Meer, F. M. (1973): *Ibid.*, **45**, 381.
- Downing, J. W. and Coleman, A. J. (1972): *Excerpta Med. (Amst.)*, sect. XXIV, **261**, 155.
- Moore, J., McNabb, T. G. and Dundee, J. W. (1971): *Brit. J. Anaesth.*, **43**, 779.
- Rorke, J. M., Davey, D. A. and Du Toit, H. J. (1968): *Anaesthesia*, **23**, 585.
- Marx, G. F. and Mateo, C. V. (1971): *Canad. Anaesth. Soc. J.*, **18**, 587.
- Knox, J. W. D., Bovill, J. G., Clarke, R. S. J. and Dundee, J. N. (1970): *Brit. J. Anaesth.*, **42**, 875.
- Collier, B. B. (1972): *Anaesthesia*, **27**, 120.