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## Effect of flunitrazepam (Rohypnol) on awareness during anaesthesia for Caesarian section

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### Summary

The incidence of awareness was compared in three groups of patients undergoing elective or emergency Caesarian section, using pethidine alone or pethidine plus flunitrazepam (Rohypnol), as adjuvants to nitrous oxide : oxygen, muscle relaxant technique of general anaesthesia. The use of 0.03 mg/kg body weight of flunitrazepam was associated with a low incidence (4%) of awareness, cardiovascular stability, postoperative sedation and anterograde amnesia. The reduced incidence of awareness is probably due to increased depth of anaesthesia and anterograde amnesic effect produced by the drug.

### Résumé

L'incidence de conscience a été comparée chez trois groupes de malades qui ont subi la chirurgie élektive ou des sections césariennes à chaud, en employant la péthidine seule ou en combinaison avec le flunitrazepam (Rohypnol) comme adjuvants à l'oxide nitreux : l'oxygene, la technique relaxante musculaire de l'anesthésie générale. L'application à 0.03 mg/kg poids corporel du flunitrazepam a été associée avec une petite incidence de conscience (4%), de stabilité cardiaque, la sédation postopérative et une amnésie antérograde. La réduction de l'incidence de conscience est probablement due à une augmentation de la profondeur de l'anesthésie et l'effet de l'amnésie antérograde produit par le médicament.

### Introduction

The problem of awareness during general

anaesthesia became more prominent after the introduction of the use of muscle relaxants with light general anaesthesia [1]. It is of greater concern to the anaesthetist during obstetric procedures as he endeavours to anaesthetize the mother while diminishing further depression of the baby, who may already be in distress. The incidence of awareness during obstetric anaesthesia varies from 20.9% when nitrous oxide (less than 75%) is used to maintain anaesthesia [2] to 2% or less when nitrous oxide is supplemented with morphine and diazepam, [3] halothane [4], methoxyflurane [5,6], trilete [6,7], or enflurane [8].

Flunitrazepam (Rohypnol) is a member of the benzodiazepine group of drugs with sedative and anterograde amnesic properties [9]. The purpose of this study is to compare the incidence of awareness during general anaesthesia for Caesarian section while employing pethidine (25 mg) and pethidine (25 mg) plus flunitrazepam (0.015 mg and 0.030 mg/kg body weight) as adjuvant.

### Patients and methods

One hundred and fifty unselected patients undergoing elective or emergency Caesarian section were included in the study. They were randomly divided into three groups of 50 patients each, according to dose schedule of flunitrazepam. Patients in group A were given 25 mg pethidine while patients in group B were given 25 mg pethidine plus flunitrazepam 0.015 mg/kg body weight, and group C patients received 25 mg pethidine plus flunitrazepam 0.030 mg/kg body weight. All patients were classified as ASA 1 or 2 [10] and no patient had received any previous sedation. Their age, weight, and parity are as shown in Table 1.

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Table 1. Mean age, weight and parity of patients

	Group A	Group B	Group C
Age (years)	Mean 28.44 s.d. 5.15	28.86 5.73	29.08 5.01
Weight (kg)	Mean 66.23 s.d. 9.96	65.50 10.46	64.88 11.57
Parity	Mean 2.7 s.d. 1.68	2.71 2.19	3.4 1.84

The patients were pre-oxygenated for 3-5 min. Anaesthesia was induced with 250 mg thiopentone sodium intravenously (i.v.), to which 0.6 mg atropine was added followed by 100 mg suxamethonium chloride. Laryngoscopy and orotracheal intubation was performed while cricoid pressure was applied. Anaesthesia was maintained with nitrous oxide ( $N_2O$ ) and oxygen ( $O_2$ ) 41:21/min, and pancuronium bromide or fazadinium bromide in appropriate doses. Patients were mechanically ventilated using the Manley-Servovent ventilator. Immediately after delivery of the baby, i.v. ergometrine (0.5 mg) or pitocin (10 units) were given and the dose repeated if necessary to achieve adequate uterine tone. This was followed by i.v. pethidine and flunitrazepam, according to the dose schedule. On completion of surgery, the relaxant was reversed with 1.2 mg atropine and 2.5 mg neostigmine. Patients were extubated after the return of pharyngeal and cough reflexes.

The observations carried out are as listed in Table 2. Records of pulse rate, blood pres-

sure, total blood loss and fluid replacement were used to assess cardiovascular stability. The patients were interviewed on the first, second or third post-operative day by one of the authors. The questions asked were:

- (i) What was the last thing you remembered before going to sleep?
- (ii) (a) Were you aware of any event that occurred during the operation?  
(b) If yes, what was it?
- (iii) What is your first recollection after awakening?

The drip site was inspected for signs of inflammation.

### Results

The patients in the three groups were comparable in age, parity, weight, the induction-delivery interval and duration of anaesthesia (Tables 1 and 2).

Fourteen (28%) of patients in group A had recall of events during the surgical procedure (Table 3). Ten of them heard voices of people talking but only five could recall what was said, e.g. 'baby is an elephant', 'this blade is not sharp', 'he's as noisy as the mother'. These statements were confirmed by the attendant surgeon or anaesthetist. Nine of these 14 patients heard the baby cry, six felt pain at the beginning of surgery while three felt pain throughout the procedure. Only two patients said they dreamt during the operation but could not remember the details.

Ten (24%) of the patients in group B heard either the baby's cry or some conversation.

Table 2. Time intervals

Time (min)		Group A	Group B	Group C
Induction of anaesthesia to delivery	Mean s.d.	15.77 4.9	16.08 5.00	16.58 5.43
Duration of anaesthesia	Mean s.d.	69.64 13.85	70.83 14.27	74.47 14.23
Time from extubation to first response	Mean s.d.	0 0	8.92 6.72	13.05 14.05
Time from extubation to first coherent speech	Mean s.d.	0 0	19.72 16.26	41.94 13.73



Table 3. Incidence of awareness

Groups	Total no. patients	No. patients who had recall of events	Percentage
Group A	50	14	28%
Group B	50	10	24%
Group C	50	2	4%

while six of them felt pain towards the end of the procedure. Two patients from group C (4%) heard voices during the operation but could not recall the details of the conversation and one felt pain towards the end of surgery.

All patients in group A responded to verbal command at extubation, while the time from extubation to the first response was 8.92 min (mean) in group B and 13.05 min in group C. The time from extubation to the first coherent speech in group B was 19.72 min and 41.94 min in group C. The incidence of post-operative vomiting, cardiovascular instability, poor uterine tone and thrombophlebitis at the drip site are given in Table 4.

## Discussion

Awareness and dreams during obstetrics anaesthesia always pose problems as light general anaesthesia is often employed until the delivery of the baby. Thus, it is not surprising that most of the cases of awareness in this study occurred during the early part of the surgical procedure. An incidence of awareness of 28% in group A and 24% in group B is, however, rather high, especially as the recall of pain was rather prominent. Famewo [11] reported an incidence of 4% (actual recall) and 17% dreams in a study

on the incidence of awareness in patients who had emergency Caesarian section using nitrous oxide : oxygen (2:1), and relaxant for maintenance. It was not indicated whether narcotics were administered in that study, although it was customary to administer narcotic analgesics during labour at the centre where the study was performed. From the study by Wilson and Turner [2], it would appear that opiate premedication is of considerable efficiency in preventing the recall of events during relaxant, N<sub>2</sub>O : O<sub>2</sub> anaesthesia. The fact that no sedative or narcotic analgesic was administered pre-operatively in the present study might have contributed to the higher incidence of awareness in groups A and B.

Awareness is an unacceptable complication of general anaesthesia and efforts should be made to reduce the incidence to the bare minimum. Tunstall [12] has suggested the isolated forearm technique to assess wakefulness during surgery. This will enhance early detection and prevention of awareness. The use of volatile anaesthetic agents such as halothane, trileone, methoxyflurane and enflurane to supplement the low concentration of nitrous oxide during obstetrics anaesthesia has been shown to reduce the incidence of awareness. However, the use of these agents can be associated with possible deleterious effects on uterine tone and the foetus. A better choice would be a drug that could be administered intravenously after the delivery of the baby to produce retrograde and anterograde amnesia. As shown by the incidence of awareness in group A, a single i.v. dose of 25 mg pethidine is not adequate to prevent pain and recall.

Flunitrazepam has been shown to produce a dose-related incidence of amnesia slightly longer than the equivalent (1 × 10) dose of diazepam [9], and when administered intravenously it affects the cardiovascular system mini-

Table 4. Other factors

	Group A	Group B	Group C
Post-operative vomiting	Nil	2 (4%)	Nil
Cardiovascular instability	Nil	2 (4%)	3 (6%)
Poor uterine tone	9 (18%)	8 (16%)	9 (18%)
Thrombophlebitis at drip site	Nil	Nil	Nil

mally [13]. Its use in this study shows that 0.03 mg/kg body weight significantly reduces the incidence of 'unpleasant recall', i.e. awareness, pain and/or dreams during obstetrics anaesthesia. This is probably due to increased depth of anaesthesia and anterograde amnesic effects produced by the drug. There was no deleterious effect on cardiovascular stability and uterine tone, while the incidence of post-operative vomiting was low and no patient complained of pain at the injection site. There was no evidence of retrograde amnesia as all patients remembered the routine pre-operative preparations and application of the face mask at the induction of anaesthesia.

The period from extubation to both the first response and the first coherent speech were longer in the flunitrazepam groups B and C compared with group A (Table 2). The use of the higher dose was particularly associated with a longer period of drowsiness and anterograde amnesia of 4–10 h. Although circulation respiration and protective reflexes were well maintained in these patients, it is necessary for them to be nursed and monitored in a post-operative recovery room until return of full consciousness. The use of a small dose of pethidine plus flunitrazepam, as shown in this study, could be a useful alternative to larger doses of narcotic analgesics customarily used in reducing the incidence of awareness.

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