Brief Report

Patient anxiety scores after low-dose ketamine or fentanyl for epidural catheter placement

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Purpose: To compare the effect of low-dose ketamine with that of low-dose fentanyl on patient anxiety during the identification of the epidural space and catheterization.

Methods: Sixty patients were randomly assigned to one of three groups: saline group (n=20), saline 2 ml; ketamine group (n=20), 5 mg ketamine; or fentanyl group (n=20), 50 µg fentanyl. Each drug was administered intravenously (iv) five to ten minutes before the epidural procedures began. After epidural catheter placement had been accomplished, anxiety and pain were rated using a visual analog scale.

Results: The anxiety scores given for ketamine (20.2 ± 18.5 , mean $\pm$ SD) and fentanyl (24.6 ± 20.3) were similar, and both were lower than that for saline (44.1 ± 32.7) ($P=0.0034$ and 0.0153 vs saline group, respectively). Pain scores were similar for all three groups. A decrease in hemoglobin oxygen saturation during the procedure was only observed in the fentanyl group, and two patients in fentanyl group had $SpO_2 < 90\%$.

Conclusion: Ketamine, 5 mg iv, is as effective as 50 µg fentanyl, iv, in alleviating patient anxiety and in providing adequate sedation during the procedures necessary for epidural catheter placement, without inducing severe complications.

Objectif : Comparer l'effet d'une faible dose de kétamine avec celui d'une faible dose de fentanyl sur l'anxiété du patient pendant l'identification de l'espace péridurale et la pose d'un cathéter.

Méthode : Soixante patients ont été répartis au hasard en trois groupes et ont reçu : 2 ml de solution saline (n = 20) ou 5 mg de kétamine (n = 20) ou 50 µg de fentanyl. Cinq à dix minutes avant le début des manœuvres péridurales, on a procédé à l'administration intraveineuse (iv) de chacun des médicaments. Une fois le cathéter installé, on a mesuré l'anxiété et la douleur au moyen de l'échelle visuelle analogique.

Résultats : Les patients qui ont reçu de la kétamine ($20,2 \pm 18,5$ moyenne $\pm$ écart type) et du fentanyl ($24,6 \pm 20,3$) ont présenté des scores d'anxiété similaires, mais plus bas que chez ceux qui ont reçu la solution salée ($44,1 \pm 32,7$) ($P = 0,0034$ et $0,0153$ vs la solution salée, respectivement). Les scores de douleur n'ont pas présenté de différence intergroupe. Pendant l'intervention, une baisse de la saturation de l'hémoglobine en oxygène a été observée seulement chez les patients qui ont eu du fentanyl. Deux de ces patients montraient une $SpO_2 < 90\%$.

Conclusion : L'effet de 5 mg de kétamine iv est comparable à celui de 50 µg de fentanyl iv pour soulager l'anxiété et fournir une sédation adéquate pendant les manœuvres nécessaires à la mise en place d'un cathéter péridural, et ce, sans provoquer de complications importantes.

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EPIDURAL catheter placement is performed behind the patients' back and some patients feel anxiety during the procedure. It is important to reduce anxiety in the clinical setting. Previous reports have indicated the potential advantage of ketamine during a painful nerve block.^{1,2} However the patients' anxiety during epidural catheter placement was not evaluated in detail. We investigated the effect of low-dose of ketamine or fentanyl in improving patient anxiety during the procedures necessary for the accurate placement of an epidural catheter.

Methods

After approval by the Institutional Human Investigation Committee, and after informed consent had been obtained from each patient, 60 adult patients, ASA physical status I and II, who were scheduled to elective surgery under general anesthesia with epidural anesthesia were studied in a randomized, double-blind fashion.

All patients were premedicated with 0.5 mg atropine *im* 30 min before the epidural procedures. The patients were assigned to one of three groups using random number tables: saline group, saline 2 ml *iv*; ketamine group, 5 mg ketamine dissolved in 2 ml of saline *iv*; fentanyl group, 50 µg fentanyl dissolved in 2 ml of saline *iv* (n=20 in each group). Blood pressure was measured intermittently and an electrocardiogram and hemoglobin oxygen saturation (SpO₂) (by pulse oximetry; Model 88S, Hewlett-Packard, Andover, MA) were measured continuously. After baseline vital signs were taken, each patient received one of the three injections in the supine position (five to ten minutes before the epidural procedures). Then, with the patient in the lateral position, 1.5 ml lidocaine 1% was injected in the region in which epidural catheterization was to take place. A 17 gauge Tuohy needle (Hakko, Tokyo, Japan) was inserted at thoracic (T₆₋₁₂) or lumbar (L₁₋₃) level by the loss-of-resistance technique, and a polyethylene catheter was inserted. An observer continuously recorded SpO₂ and systolic blood pressure during the procedures. After the epidural procedures, the patient was placed in the supine position with their glasses on if required, and one anesthesiologist (blinded to the patient group) evaluated patient anxiety and pain during the epidural procedures, and noted any complications. Each patient rated his or her anxiety and pain scores on a visual analog scale (VAS; sliding cursor 100 mm scale) (anxiety scores: 0=not anxious, 100=extremely anxious; pain scores: 0=no pain, 100=worst pain imaginable). We had informed about VAS to each patient on

the day before operation and just before VAS evaluation. We used a VAS to measure patient anxiety since it has been widely used as observational measure of anxiety.³ Exclusion criteria included time for epidural catheter placement >5 min and need for the Tuohy needle to be inserted more than five times.

All values are expressed as mean ± SD. The patients' demographic and clinical data were analyzed using an analysis of variance followed by Bonferroni/Dunn, with *P* < 0.05 being considered significant.

Results

There were no differences among the three groups with regard to age, height, weight, time to place epidural catheter, or number of needle insertions (Table I). Eight patients were excluded on the basis of the above criteria.

There were no differences in pain scores among the three groups (saline group: 27.7 ± 24.3, fentanyl group: 28.9 ± 26.9, ketamine group: 28.3 ± 27.8) (Figure 1A). Anxiety scores were lower in ketamine (20.2 ± 18.5) or fentanyl groups (24.6 ± 20.3) than in saline group (44.1 ± 32.7) (Figure 1B). There was no difference between the ketamine and fentanyl groups in anxiety scores. In the fentanyl group, SpO₂ decreased compared with saline and ketamine groups during the catheterization procedures (Table II). Two patient in the fentanyl group needed oxygen because of a decreased SpO₂ <90%. One patient in the fentanyl group complained of nausea and one patient in the ketamine group complained of vertigo, but they improved without treatment.

TABLE I Patients' Demographic Data

	<i>saline</i>	<i>fentanyl</i>	<i>ketamine</i>
n	20	20	20
Age (yr)	53 ± 10	49 ± 16	54 ± 10
Height (cm)	158 ± 8	160 ± 10	160 ± 9
Weight (kg)	52 ± 9	55 ± 11	53 ± 8
Male/Female	10/10	9/11	7/13
Surgery			
Total hysterectomy	9	7	5
Gastrectomy	3	4	9
Colectomy	7	7	4
Cholecystectomy	1	2	2
Thoracic vs lumbar catheter placement (thoracic/lumbar)	16/4	12/8	14/6
Time to place the catheter(sec)	203 ± 87	185 ± 85	178 ± 92
Number of needle insertion	1.65 ± 1.18	1.85 ± 1.46	2.00 ± 1.52

Values are mean ± SD or simple numbers.

TABLE II Systolic blood pressure and hemoglobin oxygen saturation values

		saline	fentanyl	ketamine
Systolic blood pressure (mmHg)	control	132 ± 13	128 ± 22	126 ± 18
	highest	126 ± 14	128 ± 23	127 ± 16
Hemoglobin oxygen saturation (%)	control	97.4 ± 1.64	97.3 ± 1.84	97.4 ± 1.39
	range	93-99	94-99	94-99
SpO ₂ during epidural procedure (%)	lowest	96.3 ± 1.98	94.5 ± 2.42*†	96.6 ± 1.99
	range	91-99	89-99	92-99
Patient number of SpO ₂ <90%		0	2	0

Values are mean ± SD or simple numbers. * $P=0.010$ vs saline group. † $P=0.0036$ vs ketamine group.

FIGURE 1 (A) Pain scores during epidural catheter placement. Values are mean ± SD. n=20 for each group. There was no difference among the three groups. (B) Anxiety scores during epidural catheter placement. Values are mean ± SD. n=20 for each group. * $P=0.0153$ vs saline group. † $P=0.0034$ vs saline group.

Discussion

The results of the present study indicate: (i) that 5 mg ketamine *iv* can improve patient anxiety during the epidural procedures without inducing severe complications, and (ii) that although 50 µg fentanyl *iv* can produce a similar degree of anxiolysis, it may cause a severe decrease in SpO₂. Thus, low-dose ketamine could be useful during epidural catheter placement for reducing patients' anxiety.

During the performance of painful or uncomfortable procedures, it is important to provide analgesia and anxiolysis without inducing cardiorespiratory problems. Intravenous or intramuscular administration of 1.5 mg·kg⁻¹ ketamine alone⁴ or of 0.4–1.6 mg·kg⁻¹ ketamine combined with other agents^{5,6} has been used to provide balanced sedation while avoiding respiratory depression or significant changes in blood pressure. However, such subanesthetic doses of ketamine have been reported to cause upper airway obstruction, and also disorientation when combined with agents such as opioids, benzodiazepine, etc.^{4,5,6} Kortilla *et al.*⁷ found that patients who received 0.5 mg·kg⁻¹ ketamine *iv* combined with 0.15 mg·kg⁻¹ diazepam *iv* before nerve-conduction anesthesia experienced no more side effects and had no more need for postoperative care than unpremedicated controls, while patient-acceptance was higher in the ketamine group. However, the patients given those doses of ketamine and diazepam showed an increase in systolic blood pressure, and 50% of those patients did not stay awake during the operation.

In a previous study, Lauretti *et al.*⁸ felt that there were advantages in 0.2 mg·kg⁻¹ ketamine *iv* with intrathecal bupivacaine and neostigmine, because while this combination produced prolonged postoperative analgesia similar to that produced by 1 µg·kg⁻¹

fentanyl *iv* with intrathecal bupivacaine and neostigmine, the low-dose of ketamine resulted in less nausea and vomiting than the low-dose of fentanyl. Furthermore although low-dose fentanyl can provide adequate sedation similar to that produced by ketamine during nerve block, 100 µg fentanyl *iv* tends to cause complications as respiratory depression, nausea, and vomiting.⁹ In addition, although ketamine is known to induce nausea, vomiting, cardiovascular effects, and emergence phenomena characterized by vivid dreams,¹⁰ we did not find any such complications in any of the patients received 5 mg ketamine *iv* without benzodiazepine.

In conclusion, the present results suggest that 5 mg ketamine *iv* is as effective as 50 µg fentanyl *iv* in alleviating patient anxiety during epidural catheter placement, without inducing severe complications.

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