KETAMINE FOR THE PREVENTION OF PAIN DUE TO INJECTION OF PROPOFOL
Propofole bağlı enjeksiyon ağrısını önlemede ketamin

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Summary: *Pain on injection of intravenous anaesthetic agents is usually not considered as a serious complication of anaesthesia. However, it may be distressing to patients and can reduce the acceptability of an agent. A double-blind, randomized, controlled study was undertaken to compare the efficacy of ketamine pretreatment in minimizing the pain during injection of propofol on induction of anaesthesia. In one group, venous drainage was occluded for one minute during the intravenous administration of 10 mg ketamine, and subsequently, propofol was administered. The second group received propofol one minute after the administration of ketamine. When those two groups were compared with the saline administered control group, ketamine was found to decrease the pain associated with the injection of propofol. No significance difference in experience of pain was observed between the ketamine groups. We conclude that ketamine pretreatment reduced pain on injection of propofol.*

Key Words: *Anaesthetics, Intravenous infusions, Ketamine, Propofol*

Özet: *İntravenöz anestezik ajanların kullanımında görülen enjeksiyon ağrısı genellikle ciddi bir komplikasyon olarak değerlendirilmemektedir. Fakat hastayı rahatsız etmekte ve ilacın kullanılabilirliğini azaltmaktadır. Anestezi indüksiyonunda propofol enjeksiyonuna bağlı oluşan ağrı üzerine önceden verilen ketaminin etkinliği rastgele, çift kör, kontrollu çalışma ile araştırıldı. Ketamin (10 mg) enjeksiyonu sırasında venöz drenaj bir dakika süre ile kesilen ve hemen sonra propofol verilen grup ile ketamin enjeksiyonundan bir dakika sonra direkt propofol enjekte edilen grup, salin grubu ile karşılaştırıldığında ketamin enjeksiyon ağrısını azaltmaktadır. Her iki ketamin grubu arasında enjeksiyon ağrısı arasında farklılık gözlenmedi. Propofola bağlı enjeksiyon ağrısının önceden verilen ketamin ile azaldığı sonucuna vardık.*

Anahtar Kelimeler: *Anestezikler, İntravenöz infüzyon, Ketamin, Propofol*

It is well recognised that propofol may cause pain or discomfort on injection when administered intravenously. The genesis of pain after injection of propofol may involve the activation of pain mediators such as kininogenes following exposure of the vein wall to drug (1). The incidence of pain was higher when propofol was injected into veins on dorsum of the hand compared with those on the forearm or antecubital fossa (1, 2). Pain of any severity has been reported in 25 to 74% of adult patients, while moderate to severe pain has been reported in 32 to 52% (1-5).

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Various methods have been described to reduce pain, including adding lidocaine to propofol, cooling, topical nitroglycerin, prior administration of opioid, lidocaine, cold saline, metoclopramide or application of a tourniquet (1, 3, 4, 6-11). The aim of our study was to determine the effect of ketamine pretreatment on propofol induced pain.

PATIENTS AND METHODS

After approval by the local Ethics Committee, we studied on 60 patients (ASA grades I and II) aged 17-65 yr, undergoing various elective surgical procedures. Patients who had received analgesia and sedation during the previous 24 h were excluded from the study. All patients were informed beforehand that propofol injection may cause pain

on injection and that they should report its occurrence. The study was conducted in a double-blind manner.

In the anaesthetic room, a 20- gauge cannula was placed in a vein on the dorsum of the nondominant hand. Patients were randomly divided into 3 equal groups (n= 20). No premedication was administered. Patients in group A received ketamine 10 mg (5 ml) pretreatment while venous drainage was occluded by sphyingmomanometer at mid forearm for one minute; after the release of the cuff, propofol was injected at a rate of 0.5 ml/sec until eyelash reflex was lost. Patients in group B received ketamine 10 mg (5 ml) without venous occlusion; one minute later propofol was injected at the same rate. Patients in group C (control group), received 5 ml of saline with venous occlusion as described in group A.

The level of pain was assessed by a second, independent anaesthetist who was unaware of the group to which the patient had been allocated. At the start of propofol injection patients were asked to report any discomfort and classify pain as being absent, mild, moderate or severe. Patients were questioned until they fell asleep. The degree of pain was subsequently scored as: no pain, 0; mild pain, 1; moderate pain, 2; severe pain, 3. During the recovery phase, when the patients had become alert after anaesthesia, they were asked to score the maximum pain a second time. Data were analyzed statistically with ANOVA and chi-square tests. Results were considered as statistically significant when $p<0.05$.

RESULTS

There was no statistically significant difference in age, sex, length, weight and induction dose of propofol distribution between the three groups ($p>0.05$) (Table I).

The pain scores were significantly lower in group A and group B when compared to group C ($p<0.05$). No significant difference was observed

Table I. Patient characteristics

	Age(yr) X±SD	Weight(kg) X±SD	Length(cm) X±SD	Dose(mg) X±SD	Sex(M/F) n
Group A	31.4± 7.9	65.7± 12.2	167.6± 8.1	173.4± 23.3	11/9
Group B	33.7± 14.2	65.6± 14.5	163.5± 10.1	175.5± 31.5	9/11
Group C	34.1± 11.0	68.8± 12.2	165.6± 7.6	176.5± 33.1	9/11
	F=0.4, p>0.05	F=1.2, p>0.05	F=0.1, p>0.05	F=1.7, p>0.05	X^2= 0.5, p>0.05

Table II. Incidence of pain reported at the time of induction of anaesthesia

Group	Pain								
	None		Mild		Moderate		Severe		
	No	%	No	%	No	%	No	%	Total
A	9	45	8	40	2	10	1	5	20
B	8	40	7	35	3	15	2	10	20
C	2	10	6	3 0	5	25	7	35	20

X^2= 6.62, p<0.05

in experiencing of pain between the groups A and B ($p>0.05$). Nine patients in group A, 8 patients in group B and two patients in group C did not experience any pain on injection (Table 2). In group A only one patient (5 %) felt drowsy after ketamine injection while in group B six patients (30 %) felt drowsy. Postoperative hallucination was not seen in any patient.

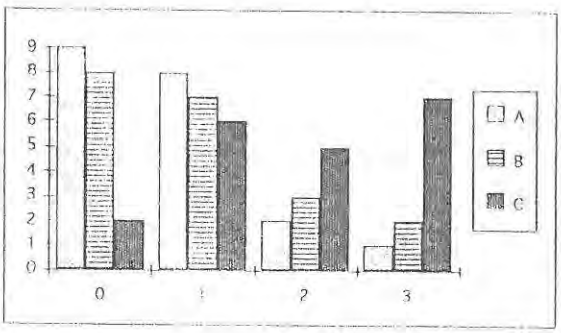

Figure 1. Pain scores for patients in each group during injection of propofol

DISCUSSION

Pain on injection of intravenous anaesthetic agents is usually not considered as a serious complication of anaesthesia. However, it may be distressing to patients and can reduce the acceptability of an otherwise useful agent. Propofol is a sedative hypnotic agent chemically unrelated to other intravenous hypnotic compounds. The most common adverse effect associated with propofol use is pain on injection (12).

There have been previous studies of this problem and its management. Pain associated with propofol can be reduced by concomitant use of a local anaesthetic agent, most commonly lidocaine. For effective use, however, lidocaine needs to be given 10 to 30 seconds before propofol or two agents need to be mixed immediately prior to administration (13).

Other methods reported to be effective in reducing propofol associated pain include administration of an opioid, lidocaine, cold saline, metoclopramide, topical nitroglycerin prior to propofol, administering propofol at a lower temperature or application of a tourniquet (1, 3, 4, 6-11).

Ketamine is the only hypnotic agent that possesses analgesic properties. Ketamine produce dose related analgesia. The peak action after intravenous administration occurs in 30 to 60 seconds (12). Finck et al (14), conclude that the analgesia produced by ketamine is mediated by local opioid receptors.

Khalid and Maroof (15), showed that ketamine (20 mg) proved to be effective in reducing pain caused by propofol: either by injecting ketamine while venous drainage is occluded for one minute or by direct injection of ketamine followed one minute later by propofol injection. In this study, we used the same method as Khalid and Maroof with 10 mg ketamine and we found that 10 mg ketamine reduced the pain associated with intravenous propofol while venous drainage was occluded for one minute or by direct injection of ketamine followed one minute later by propofol injection and we also found that the incidence of drowsiness was low and we did not encounter with sleepiness or loss of verbal contact.

We conclude that the incidence of pain on injection of propofol may be reduced by ketamine (10 mg) without producing any unpleasant side effects and this effect is mostly mediated through an action on the local opioid receptors.

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