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Original Article

Abdominal Pain after Cataract Surgery with Remifentanil Based Anesthesia

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Abstract

Remifentanil is an ultra short acting opioid that is suitable for many operations and is wildly used for induction and maintenance of anesthesia. In this article we have reported the incidence of abdominal pain after cataract surgery in patients with remifentanil based anesthesia. This study is a randomized single blind clinical trial on 300 patients who were candidates for elective cataract surgery under general anesthesia. Patients were randomly divided into two groups. In the control group (N=150) after routine monitoring, general anesthesia was induced by fentanyl, propofol and atracurium. Anesthesia was maintained by propofol infusion and 60% N_2O inhalation. In remifentanil group, general anesthesia was induced by remifentanil, propofol and atracurium. Anesthesia was maintained by remifentanil infusion and 60% N_2O inhalation. Abdominal pain was observed in 79 patients (52.6%) of the remifentanil group. Abdominal pain was severe in 10 cases (6.7%), which indicated a therapeutic intervention. Abdominal pain was observed in 3 cases (2%) of control group patients. Abdominal pain incidence was significantly higher in remifentanil group (P=0.0001). Postoperative nausea and vomiting (PNOV) was reported in 7 patients (4.7%) in remifentanil group and in 10 cases (6.7%) of the control group (P=0.454). Briefly, remifentanil based anesthesia caused high incidence of abdominal pain in cataract surgery patients.

Keywords: Remifentanil; Side effect; Abdominal pain; Cataract surgery.

Introduction

Remifentanil is the first opioid metabolized by non-specific esterases in blood and tissues and is therefore very short acting (1). The half-life of remifentanil is only 3-10 min and does not appear to be dependent on the duration of administration, while traditional opioids tend to accumulate in peripheral body compartments before they are transported through the bloodstream and then metabolized by the liver (2-4).

Remifentanil is a selective μ-opioid receptor agonist that provides intensive analgesia with rapid onset and very short duration (5) and has been shown to be effective in preventing sympathetic responses induced by tracheal intubation and surgical stimuli (6, 7). Because of its unique pharmacokinetic and pharmacodynamic profiles, it is ideally suitable for many minor & major operations and is wildly used for induction and maintenance of anesthesia. According to vast recent usage of remifentanil in different anesthetic regimens, it is very important to know about its likely side effects.

Previously known remifentanil side effects include bradycardia, hypotension, dizziness, drowsiness, nausea, vomiting, shivering, headache and allergic reactions (8).

Cataract surgery is a common surgery

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especially in old patients. Considering the short duration of operation it is highly desirable to use anesthetic with short-term effects if necessary. Thus, remifentanil is an acceptable choice for this surgery. In our clinical experiences, abdominal pain was very common after remifentanil based anesthetic. Therefore we planned this investigation.

Experimental

Patients

After obtaining approval and written informed consent, we enrolled 300 ASA class I or II patients who were candidates for cataract surgery under general anesthesia. All cases with positive history of abdominal discomfort or peptic ulcer disease or opium addiction were excluded. After informing the patients about consequences of our study and obtaining informed consent, they were randomly divided into two equal groups (n=150) using a randomized numbers table.

Anesthesia

Upon arrival in the operating room standard monitoring was performed in both remifentanil and the control group. Oxygen saturation and ECG were monitored continuously and non invasive blood pressure monitoring was also performed every 5 min. After establishing a venous access by a 20-22 gauge intravenous cannula, prior to induction of anesthesia, a bolus of 3-5 ml/kg lactated Ringer's solution was given intravenously followed by a constant rate of 6 ml/kg/h. In the control group, after 3 min pre oxygenation, induction of anesthesia was done using 1-2 μg/kg fentanyl and 1-1.5 mg/kg propofol and 0.5 mg/kg atracurium. Patients were then intubated. Continuous infusion of 50-150 μg/kg/min propofol and inhaling 60% N_2O were used to maintain anesthesia. In remifentanil group, patients also underwent standard monitoring and preoxygenation prior to induction of anesthesia. Induction was performed by 2 μg/kg remifentanil, 1-1.5 mg/kg propofol and 0.5 mg/kg atracurium. Patients were then intubated. Anesthesia was maintained by 0.3-0.6 μg/kg/min remifentanil infusion and 60% N_2O inhalation. Remifentanil was a product of GlaxoSmithKline (gsk-Italy) company with the brand name of Ultiva.

At the end of surgery, administration of anesthetic agents was terminated without tapering and atropine and prostigmin were infused in order to reverse the effects of muscle relaxant agents. The patients were extubated when adequate spontaneous ventilation (V_T>4 ml/kg) was established.

Patients were directly transferred to Post Operative Care Unit (POCU) where further evaluation including pulseoximetry, ECG monitoring and NIBP measurements were done. Hemodynamic state was also assessed by heart rate, systolic and diastolic blood pressure evaluation and Mean Arterial Pressure (MAP) at the time of arrival to the operating room, after induction of anesthesia, after intubation, and then every 5 min until the discharge of patients from recovery room.

Presence of abdominal pain, nausea and vomiting in POCU was asked and scored as bellow:

0. Any abdominal pain
1. Mild abdominal pain
2. Moderate abdominal pain.
3. Severe abdominal pain that require therapeutic intervention.

The intervention was the administration of 20 mg intramuscular hyoscin if needed.

Nausea and vomiting were also scored as:

0. Absence of Post Operative Nausea and vomiting (PONV)
1. Mild nausea
2. Severe nausea
3. Vomiting.

Minimum post operative care in recovery room was 30 min and hemodinamicaly stable patients were then transferred to the ward.

Statistical analysis

Statistical analyses includind student t test and Chi-square were carried out using SPSS 15.0 (SPSS Inc. Il, USA). P values less than 0.05 were considered significant difference.

Results

Three hundred patients were enrolled in this study, 150 patients in remifentanil group and 150 cases in the control group. Demographic data

Table 1. Comparison of demographic characteristics hemodynamic indexes in remifentanil and control group.

Variable	RG (n=150)	CG (n=150)	P value
Gender (M/F)	86/64	79/71	0.1550
Age (year)	68.3±12.6 (43-87)	66.3±11.1 (40-78)	0.1505
Weight (kg)	62.7±9.8 (51-95)	64.2±11.2 (50-95)	0.2157
Systolic Blood Pressure (mmHg)	152±18.4 (114-180)	137±20.2 (110-176)	0.3658
Diastolic Blood Pressure (mmHg)	87±12.1 (53-96)	89±11.3 (60-102)	0.1401
Mean Arterial Pressure (mmHg)	106±15.4 (83-138)	109±17.5 (80-141)	0.1160
Hart Rate (beat/min)	98±13.4 (71-121)	95±16.3 (66-110)	0.0827

RG: remifentanil group; CG: control group.
Data other than those of gender are presented as mean±standard deviation.

including age, sex, weight and hemodynamic indexes did not show any significant difference between the two groups (Table 1).

Mean anesthesia time in control group was 34.3±16.8 min and in remifentanil group was 36.7±13.1 min (P=0.168). Abdominal pain was observed in 79 (52.6%) patients in remifentanil group and in 3 cases (2%) in the control group during post operative period. The rate of abdominal pain in remifentanil group was significantly higher than the control group (P=0.001) (Figure 1).

Severe abdominal pain that indicated therapeutic interventions was not reported in the control group, although 10 patients (6.7%) in remifentanil group had severe abdominal pain which was treated medically (Table 2 and Figure 2).

PONV was observed in 7 cases (4.7%) in remifentanil group and in 10 cases (6.7%) of the control group during recovery room stay (P=0.454) (Figure 3). The comparison of PONV in remifentanil and the control group is shown in Table 3 and Figure 4.

Mild to moderate abdominal pain was managed by reassurance and awaring the patients about transient pattern of this pain. This method was effective in most of patients and abdominal pain was recovered during recovery stay mostly. Severe abdominal pain was treated by 20 mg intramuscular hyoscin, which successfully controlled pain in most of the patients.

Discussion

Opioids are among routine anesthetic agents almost in all anesthesia regimens. Perfect intra and post operative analgesia and better control of hemodynamic changes are among opioids advantages but they have also some side effects

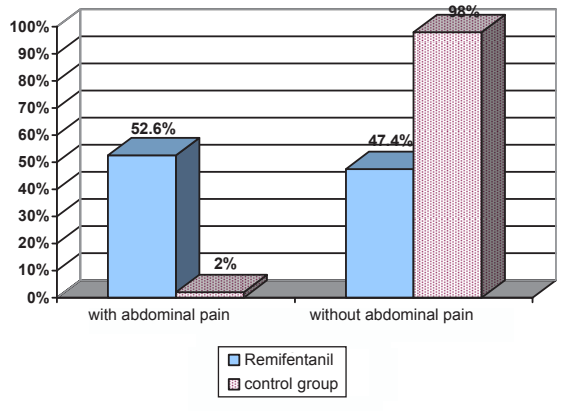

Figure 1. Comparison of the number of patients with abdominal pain in the two study groups.

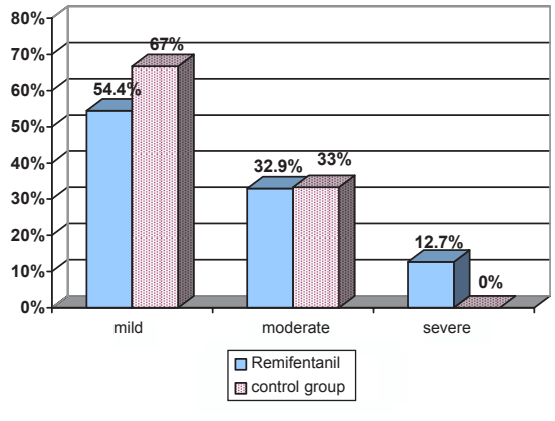

Figure 2. Comparison of the number of patients with abdominal pain and its severity in the two study groups.

Table 2. Comparison of the number of patients with abdominal pain and its severity in the two study groups.

Study group	Total (%)	Mild (%)	Moderate (%)	Severe (%)
Remifentanil	79 (52.6%)	43 (54.4%)	26 (32.9%)	10 (12.7%)
Control	3 (2%)	2 (66.7%)	1 (33.3%)	0 (0.0%)

Data are presented as number (%).

such as respiratory depression, illeus and PONV (8-10). Although according to some articles, incidence of PONV are expressed to be less using remifentanil than fentanyl (11, 12), but it is not confirmed by other studies (13). Also in our study, the rate of PONV in both groups was significantly different. Low rate of PONV in our patients seems to be related to propofol administration at the induction of anesthesia. We detected a high rate of abdominal pain in patients receiving remifentanil. This side effect maybe masked in many patients who have been administered analgesics in post operative period for pain control e.g. abdominal surgery. But as cataract surgery is a minor, less invasive surgery without surgical site severe pain, there was no need for analgesics after surgery so, abdominal pain as a side effect of anesthetic agent became more prominent in these patients. After using narcotics, abdominal pain appeared can possibly be induced by spasm of the Sphincter of Oddi,; however duration of spasm is reported to be shorter after remifantanil than other narcotics (14). Therefore it cannot justify the higher rate of abdominal pain in remifantanil cases.

The mechanism of abdominal pain after anesthesia with remifentanil is unknown although there is some reports about post operative remifentanil induced hyperalgesia in animal models and human (15). Postulated mechanisms for acute tolerance, included alterations of N-methyl-D-aspartate (NMDA) receptors (16) or down regulation of opioid receptors and decoupling from the transduction system (17, 18). That could be controlled by adding a low dose of ketamin to the anesthetic regimen (19, 20) but our cases presented an obvious visceral and obscure abdominal pain that was different from remifentanil induced hyperalgesia or acute tolerance. So we suggest further investigations about the exact etiology of remifentanil induced abdominal pain and its prevalence and management. Consumption of neostigmine for reversal of non depolarizing muscle relaxant at the end of surgery can induce abdominal pain and cramp through its vagolytic effects. In patients who received fantanyl it is possible that the abdominal pain be covered because of longer analgesic effect of fantanyl in comparison with remifantanil.

In conclusion, the occurence of

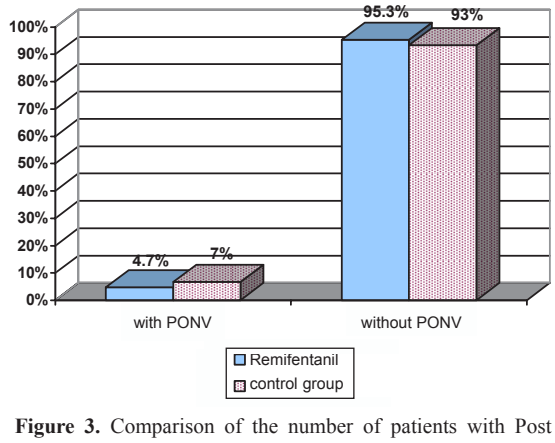

Figure 3. Comparison of the number of patients with Post Operative Nausea and vomiting (PONV) in the two study groups.

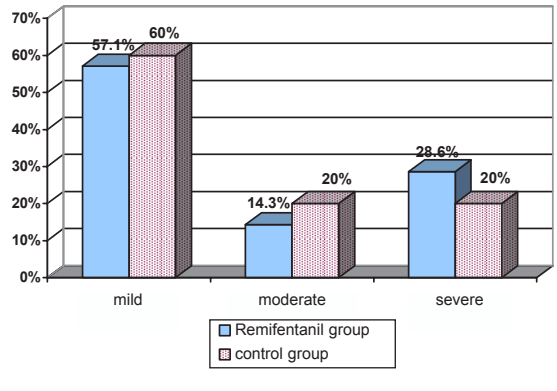

Figure 4. Comparison of Post Operative Nausea and vomiting (PONV) severity in the two study groups.

Table 3. Comparison of the number of patients with Post Operative Nausea and vomiting (PONV) and its severity in the two study

Study group	Total (%)	Mild (%)	Moderate (%)	Severe (%)
Remifentanil	7 (4.7%)	4 (57.1%)	1 (14.3%)	2 (26.6%)
Control	10 (8.7%)	6 (60%)	2 (20%)	2 (20%)

Data are presented as number (%).

abdominal pain after remifentanil based anesthesia for cataract surgery in our study was significant whose etiology, preventive methods and treatments should be assessed more precisely by future studies.

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