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Effect of bupivacaine versus bupivacaine plus intrathecal dexmedetomidine in postoperative pain

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Abstract

Background: Pain is defined as "unpleasant sensory and sensory experience", associated with actual or potential tissue damage or described in terms of such damage

Objective: To assess the effect of bupivacaine versus bupivacaine plus intrathecal dexmedetomidine in postoperative pain.

Patients and Method: An experimental design was made of a controlled clinical trial type, in patients scheduled for lower abdomen surgery or lower extremities. A sample of 60 patients was studied during the period from October 1 to December 15, 2018, who agreed to participate in the study through of signing consent under information.

Results: It was observed that the time of the rescue analgesia was prolonged in more than 120 min in the case of dexmedetomidine when compared with bupivacaine ($p < 0.0001$); also VAS scores at the time of analgesia rescue for the group with dexmedetomidine were 3.71 ± 1.27 and in the bupivacaine group of 5.7 ± 1.59 , the difference of two points of the VAS ($p = < 0.001$) was significant, which demonstrates that dexmedetomidine is effective for prolong postoperative analgesia and decrease the analgesia requirements

Conclusions: Dexmedetomidine at a dose of $5 \mu\text{g}$ associated with bupivacaine administered intrathecally is more Effective in postoperative analgesia compared with this substance alone in abdominal surgery inferior and lower extremities.

Keywords: Dexmedetomidine, bupivacaine, postoperative pain, intrathecal

Introduction

Pain is defined as "unpleasant sensory and sensory experience", associated with actual or potential tissue damage or described in terms of such damage" [1]. According to the different classifications of pain, our pain is the object of our attention in postoperative period, which appears as a consequence of the nociceptive stimulation resulting from the surgical intervention on the different organs and tissues, whose duration is limited and its intensity maximum occurs in the first 24 hours with a progressive decrease [2, 3].

Surgical aggression, besides activating the nociceptive pathways, it originates a generalized neurohumoral response, mediated by the hypothalamic-pituitary adrenal axis, a reaction of defense of the organism against tissue injury. The immune system and hormonal changes (release of corticosterone, progesterone, catecholamine, etc.) transmit information between the periphery and the nervous system, this bidirectional communication its function is to protect the integrity of organism [4].

The temporary absence of sensitivity for a surgical intervention is provided by sedation, general, regional or local anesthesia, depending on the type of procedure that is carried out. [5] In the case of spinal regional anesthesia has been observed effectiveness, speed, safety and better pain management [6] associated with the use of local anesthetics [7] as bupivacaine [8].

Previous studies show that the dexmedetomidine applied intravenously before the anesthesia decreased the intensity of pain and consumption of analgesics in postoperative period, [9] which its addition to ropivacaine administered intrathecally prolongs the duration of motor and sensory block [10] and there is also evidence of fastest start of anesthesia, no presence of adverse effects [11].

Derivative From the foregoing, the objective of the present study was quantifying the analgesic effect of bupivacaine vs. Bupivacaine plus intrathecal dexmedetomidine in the control of postoperative pain

Aim of the study: To assess the effect of bupivacaine versus bupivacaine plus intrathecal dexmedetomidine in postoperative pain.

Materials and Methods

An experimental design was made of a controlled clinical trial type, in patients scheduled for lower abdomen surgery or lower extremities.

A sample of 60 patients was studied during the period from October 1 to December 15, 2018, who agreed to participate in the study through of signing consent under information. The subjects who participated in the study were divided in two groups randomly assigned; Group A: received 0.5% bupivacaine in a dose of 0.2mg / kg intrathecally with 0.5ml of physiological solution, and Group B: received 0.5% bupivacaine in a dose of 0.2 mg / kg intrathecally with 5 µg of dexmedetomidine in 0.5 ml of physiological solution.

After the surgery they remained in the area of recovery, to avoid bias; in the collection of data was appointed trained personnel from outside to research with instructions to register vital signs every hour during the first 4 and then every 4 until it leaves the area. The presence of pain was also evaluated postoperatively by means of the analogous visual scale, heart rate, systolic blood pressure and diastolic when entering the room recovery and at 15, 30, 45, 60, 120, 240, 480, 720, 1080, 1440 min; Finally, it was recorded if the personnel of nursing used rescue analgesia drugs in the postoperative period for pain management at the site of the

operation.

The information was recorded on a base of data in Microsoft Excel 2010 and analyzed by IBM-SPSS, version 23, through descriptive statistics as measures of central tendency and dispersion. The analysis of intensity of postoperative pain was affected through the visual analog scale (VAS) through of non-parametric statistics by Mann-Whitney statistics test. For possible differences between quantitative variables we used the *unpaired* Student *t* test. Finally, for assess the presence and absence of pain this done by performed the chi-square test with $p < 0.05$ as statistically significant.

Results

Sixty patients, who were submitted to our hospitals, were included to surgery of lower abdomen and lower extremities. The patients were divided into two groups; 30 for each group. From Group A was obtained an average age of 48 ± 12.49 years, 53.3% ($n = 16$) female, with an average of 78.17 ± 13.64 kg of weight, 1.64 ± 0.074 m for height, 28.93 ± 4.06 of BMI and in what corresponds to the characteristics of the Group B an average age of 51.30 ± 12.32 was obtained years, 53.3% ($n = 16$) female, 73.7 ± 11.43 kg of weight, 1.61 ± 0.077 m for height, 28.32 ± 3.39 of BMI, such as seen in Table 1.

Table 1: Demographic data

Variables	Bupivacaine alone group ($n = 30$)	Bupivacaine with Dexmedetomidine group ($n = 30$)	P value
Age (years)	48 ± 12.49	51.30 ± 12.32	0.307
Gender (F: M)	16:14	16:14	1
Weight (kg)	78.17 ± 13.64	73.70 ± 11.43	0.1744
Height (m)	1.64 ± 0.074	1.61 ± 0.077	0.14
IBM	28.93 ± 4.06	28.32 ± 3.39	0.5286

Anesthesia parameters

Table 2 shows that the duration of the surgery for the bupivacaine group was 64.4 ± 23.3 min and of 69.3 ± 17.4 min for the dexmedetomidine group. On the other hand, the start time of the blockade appeared in the group with

dexmedetomidine at 8.5 ± 1.0 min, the regression time of the block in the group with dexmedetomidine was 92.0 ± 15.82 min and the completion time of the block in the group treated with dexmedetomidine 161.8 ± 14.20 , compared with 100.6 ± 27.44 min of the group with bupivacaine

Table 2: Intraoperative and anesthetic parameters

Variables	Bupivacaine alone group ($n = 30$)	Bupivacaine with Dexmedetomidine group ($n = 30$)	P value
Surgery duration (min)	64.4 ± 23.3	69.3 ± 17.4	0.1375
Start of block (min)	9.9 ± 1.81	8.5 ± 1.01	<0.001
Blocking regression (min)	59.1 ± 15.45	92.0 ± 15.82	<0.001
Block term (min)	100.6 ± 27.44	161.8 ± 14.20	<0.001

In the evaluation of postoperative pain by mean of the Visual Analog Scale, patients treated with dexmedetomidine reported pain until 30 min postoperatively, while in those treated with bupivacaine the pain was presented immediately in the postoperative period; to make Student's *t* test was found different significant ($p = 0.0230$), same when comparing the areas under the curve (AUC) between the treatment groups ($p < 0.0260$).

The analgesic rescue after the operation (Table 3) was performed on 26 patients in the group with bupivacaine, while in the group with dexmedetomidine only in 14, which

resulted statistically significant ($p < 0.0022$), of the same way it was observed that the time of the rescue analgesia was prolonged in more than 120 min in the case of dexmedetomidine when compared with bupivacaine ($p < 0.0001$); also VAS scores at the time of analgesia rescue for the group with dexmedetomidine were 3.71 ± 1.27 and in the bupivacaine group of 5.7 ± 1.59 , the difference of two points of the VAS ($p = <0.001$) was significant, which demonstrates that dexmedetomidine is effective for prolong postoperative analgesia and decrease the analgesia requirements.

Table 3: Postoperative analgesic rescue

Variables	Bupivacaine alone group ($n = 30$)	Bupivacaine with Dexmedetomidine group ($n = 30$)	P value
Rescued patients (%)	26 (86.7)	14 (46.7)	0.002
Rescue time	15.58 ± 12.36	197.1 ± 59.67	<0.001
Intensity of pain (EVA) at moment of rescue	5.7 ± 1.59	3.7 ± 1.27	<0.001

The frequency of adverse effects in both groups was similar for the two groups, as shown in Table 4.

Table 4: Adverse effects

Adverse effect	Bupivacaine alone group (n = 30)	Bupivacaine with Dexmedetomidine group (n = 30)	P value
Sickness	0 (0)	3 (10)	0.23
Threw up	0 (0)	0 (0)	1
Bradycardia	2 (6.7)	1 (3.3)	1
Hypotension	4 (13.3)	6 (20)	0.7

Discussion

In the current study, the administration of bupivacaine alone intrathecal route in patients undergoing surgery of lower abdomen and lower extremities, we suggests that dexmedetomidine is effective for prolong postoperative analgesia and decrease the analgesic requirements.

It was found that the group treated with dexmedetomidine showed a more rapid onset of motor and sensory block, while the times of regression and term of the blockade were prolonged significantly when compared with the group with bupivacaine, this agrees with reported by Gupta *et al.* (2011), since they found results similar to those in this study [10].

In the case of the effect of dexmedetomidine about post-operative analgesia, several authors have reported decreases in the score of the visual analog scale, lower requirements in the doses of rescue analgesia and an extension in the time of administration necessary for it in patients who has been treated with dexmedetomidine [12]. The current study showed an increase of almost 2 h in the rescue analgesia administration time and a smaller number of patients who required analgesic rescue.

The adverse effects presented by the Patients treated with dexmedetomidine were nausea, bradycardia and hypotension; but nevertheless, the frequency of these adverse effects did not significant difference when compared with the anesthetized with bupivacaine; the above results similar to that reported by the other works, which shows that the administration of the Dexmedetomidine in a dose of 5 µg intrathecally It is safe and effective for pain management studied [10-12].

Even with evidence of the role of the addition of dexmedetomidine to bupivacaine in the control of pain after surgery is recommends carrying out more studies than value the effectiveness, safety and costs to have a overview of the benefits and impacts that will have about the institutional dynamics and the possibility to apply the recommendation.

Conclusions

Dexmedetomidine at a dose of 5 µg associated with bupivacaine administered intrathecally is more Effective in postoperative analgesia compared with this substance alone in abdominal surgery inferior and lower extremities, presents a time longer period of postoperative analgesia, with Rescue analgesia requirement up to 2 h after that in the group with bupivacaine.

Conflicts of interest: No

Source of funding: self

Ethical clearance: was taken from the scientific committee of the Iraqi Ministry of health

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