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Clinical effects of spinal morphine

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Summary

Introduction. Spinal morphine was introduced in Poland a few years ago and now is the most commonly used spinal opioids that enables to extend the duration spinal block and postoperative analgesia. The aim of the study was to evaluate the effectiveness of the spinal morphine in patients operated on inguinal hernia, hemorrhoid varices and perianal fistulas. ***Material and methods.*** The study was carried out in a group of 59 patients. In the 1st group (n=29) bupivacaine was injected spinally (Marcaine Heavy Spinal 0,5%) while in the 2nd group 0,2 mgs morphine (Morphini Sulfas Spinal 0,1%) was added to a bupivacaine solution. The periods between observations were 30, 60 and 120 minutes after procedure and at 7 p.m., 10 p.m., at midnight and 24 hours after operation. The effect of postoperative analgesia was measured by using Visual Analogue Score (VAS). Patients were also observed in case of side effects: nausea, vomiting, pruritus, retention of urine and respiratory depression. ***Results.*** The study has shown that intensity of pain was significantly higher in a group of patients anesthetized only with bupivacaine. The spinal morphine in dose 0,2 mgs provided better postoperative analgesia and cardiovascular stability. Side effects as nausea, vomiting, retention of urine or respiratory depression were not significant. Pruritus was observed when spinal morphine was added. ***Conclusions.*** Small doses of spinal morphine (0,2 mgs) used in subarachnoid anaesthesia enabled effective and safe postoperative analgesia after surgery of hernias, haemorrhoidal varices and anal fistulas. Patients did not requesed any other analgetic agents in the first 24 hours after surgery. The only side effect was small pruritus localized on face, hands, chest and abdomen. *Anestezjologia i Ratownictwo 2008; 2: 372-377.*

Keywords: spinal morphine, spinal anesthesia, postoperative analgesia

Introduction

Spinal anaesthesia is one of the oldest kinds of the induction of the anaesthesia. Subarachnoid anaesthesia was introduced in 1898 by famous Germany surgeon August Bier [1,2].

The end of XXth century brought the development of performing analgesia due to the new local anaesthetics. Now they can be combined with other therapeutic agents that have different chemical structure and pharmacodynamics. The main role in this regimen play opioids that give high analgetic effectiveness without paraesthesia, motoric and symphatic disorders [3,4]. Combined use of opioid and local anaesthetic allows for using the analgetic synergism of both agents. It is connected with common analgetic effect and special influence on opioids receptors in spinal cord and brain. Combined drugs administration into the spinal compartment allows for reducing the doses and concentration of particular agents. That minimizes the risk of side effects and extends the duration of analgesia. That kind of drugs combination is used in order to control sever pain, especially the postoperative one.

There are three derivatives of morphine used in the subarachnoid anaesthesia: fentanyl, sufentanyl and morphine. In Poland the first solution of morphine that

could have been used in the subarachnoid anaesthesia was registered in 2004. Until that year fentanyl had been used in subarachnoid anaesthesia in our hospital. Spinal morphine has been also used for about one year. Due to our previous clinical observation we can say that in postoperative pain after abdominal surgery morphine sulfate gives better analgetic effect than other agents.

There are many foreign publications in this subject [5-10]. In Polish competent literature we could have found only few publications [11]. Thus the aim of our study was to investigate the effectiveness of spinal morphine used to subarachnoid anaesthesia.

We have evaluated spinal morphine in subarachnoid anaesthesia during operations on the abdomen and in postoperative period. The influation on cardiovascular system was examined during operation. Intensity of pain (measured by using Visual Analogue Score) and analgetic agents´ requirement were evaluated in the postoperative period. Side effects of spinal morphine like depression of breath, nausea, vomiting, pruritus and retention of urine were also examined.

The study was approved by The Research Ethics Committee of the University of Medical Sciences (Poznan, Poland). All patients were informed about the study and written consent was obtained.

Material and methods

The study was realized in a group of 59 patients scheduled for abdomen surgery, who signified consent for participation in the study and subarachnoid anaesthesia. The patients were divided into two groups: control group (No 1) and test group (No 2). In group 1 there were 29 patients who received bupivacaine (Marcaine heavy spinal 0,5%) in subarachnoid anaesthesia. In group 2 there were 30 patients who received bupivacaine (Marcaine heavy spinal 0,5%) with 0,2 mgs of morphine (Morphine Sulphas Spinal 0,1%).

In group 1 - 11 women and 18 men were selected. Average age was 47,2±10,8.

In group 2 - 10 women and 20 men participated in the study. Average age was 50,8±11,4.

The patients assessed the intensity of pain according to Visual Analogue Score (VAS) in the range between 0 to 10, where 0 indicates no pain and 10 indicates pain beyond sufferance.

The study was realized in two randomized group of patients with ASA I-II (three patients with ASA III). Demographic data in both groups were comparable (Table 1.). All operations were planned. In all cases midazolam was given for premedication in dose adjusted to body weight. In 30-60 minutes after premedication patient was transported to the operating suite. Basic life functions (ECG, blood pressure, saturation) were observed during surgery and results were registered in anaesthetic card. After surgery patients were leaving in recovery room and then were transported to surgical ward.

In both groups the following parameters were measured: intensity of pain, side effects, parameters of cardiovascular system (blood pressure, heart rate) and respiratory system and analgetic agents´ requirement.

The researchers measured requirement the parameters: 30 minutes after surgery in recovery room, 60 minutes after surgery in surgical ward, 120 minutes after surgery, at 7 p.m., 10 p.m., at midnight and in 24 hours after surgery.

All data are presented as mean ± SD. The differences in the values of parameters were analyzed by chi-square test. p-values <0,05 were considered statistically significant.

Results

The study was performed in a group of 59 patients (100%). There were 37,9% women and 62,1% men in control group; and 33,3% women and 66,7% men in test group. The average age of women in control group was 48,8±8,6; of men in control group was 45,6±12,0. In the tested group the average age of women was 50,8±9,7 and of men 50,8±12,4. The average height of women and men was comparable in both groups (for women it was 160,7±4,0 and for men 177,9±4,0).

Analgetic effect

In the 30th and 60th minute after surgery there were no differences in perception of pain in both groups.

In 27,6% of patients from group 1 (control group) pain increased in time of 120 minutes after surgery. In group 2 (test group) 3,3% of patients felt pain 120 minutes after surgery. At 7 p.m. many more patients of group 1 (82,8%) than from group 2 (46,7%) felt pain. At 10 p.m. the pain in group 1 was severe and all the patients felt the pain. In group 2 at 10 p.m. only 9 patients (30%) felt severe pain. At midnight 27 patients from group 1 (93,1%) still felt severe pain. In

Table 1. Characteristic of patients´ group

Criterion		Group 1 (control group) n=29	Group 2 (test group) n=30	All
Sex	women	11	10	21
	men	18	20	38
Age	women	48,8±8,6	50,8±9,7	49,8±9,0
	men	45,6±12,0	50,8±12,4	48,2±12,4
	average	47,2±10,8	50,8±11,4	49,0±11,2
Weight (kg)	women	65,6±13,0	69,7±10,6	67,6±11,8
	men	82,8±7,1	81,3±11,9	82,0±9,8
	average	74,2±12,7	75,5±12,5	74,8±12,5
Height	women	160,6±9,7	160,8±4,3	160,7±5,0
	men	178,2±3,4	177,6±4,5	177,9±4,0
	average	169,4±9,7	169,2±9,2	169,3±9,3
Body Mass Index	women	18,6	16,9	35,6
	men	30,5	33,9	64,4
	all	49,2	50,8	100
ASA	I	12	14	26
	I/II	3	0	3
	II	11	14	25
	II/III	1	1	2
	III	2	1	3
	average	1,6	1,6	1,6

Table 2. Average Visual Analogue Score (VAS) in following periods of time.

Average VAS	30 minutes	60 minutes	120 minutes	7 p.m.	10 p.m.	Midnight	24 hours later
group 1	0,07	0,17	0,86	3,41	4,14	2,48	2,83
group 2	0,00	0,00	0,03	0,93	0,53	0,27	1,57

group 2 only 5 patients (16,7%) still felt pain. In group 2 severe pain increased to the highest level 24 hours after surgery (76,7%).

According to Visual Analogue Score (VAS) the most severe pain in group 1 was felt at 10 p.m. (4,14 points), and in group 2 – 24 hours after surgery (1,57 points in VAS). Data are presented in table 2.

Observation of the intensity of pain according to Visual Analogue Score shows figure 1 and variations in VAS in postoperative period shows figure 2.

The requirement for analgetics was definitely higher in group 1 (89,7%). Patients received metamizol, ketoprofen and tramadol. In group 2 requirement for analgetic agents was lower (33,3%). Patients from that group received only ketoprofen.

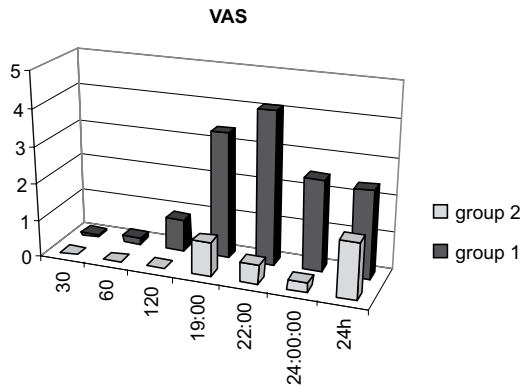

Figure 1. Variations in VAS in group 1 and group 2 in the postoperative period

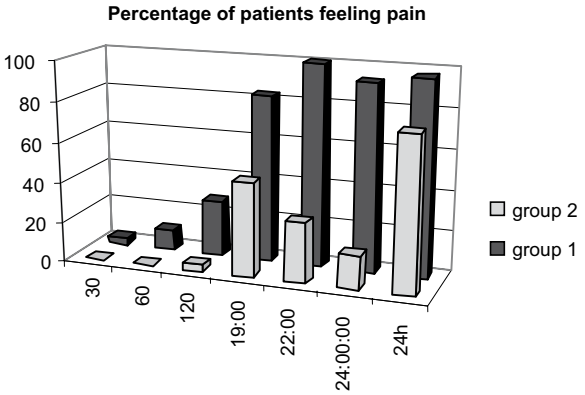

Figure 2. Percentage of patients from group 1 and 2 feeling pain in following periods of time

Side effects

- Pruritus

Such side effect as pruritus was observed only in group 2. Pruritus appeared in 10 patients from group 2 (33,3%) (Figure 3).

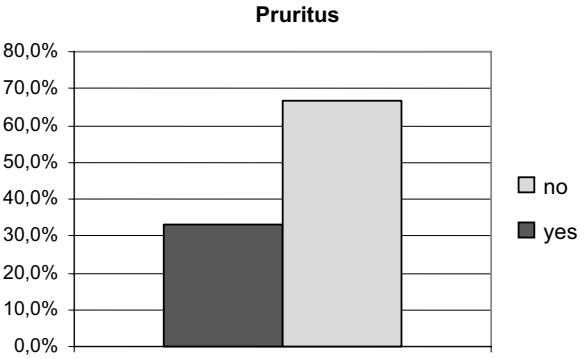

Figure 3. The intensity of pruritus in group 2 (%)

- Nausea and vomiting

Vomiting was not observed in group 1, and in group 2 it appeared only in 4 patients (13,3%). The intensity of nausea was small in both of groups (group 1 – 6,9%; group 2 – 10,0%) (Figure 4).

- Retention of urine

In both of groups patients passed urine spontaneously or had ureteral catheter introduced before surgery.

- Depression of breath

In patients from group 2 the depression of breath or deceleration of breath frequency below 12 per minute were not observed.

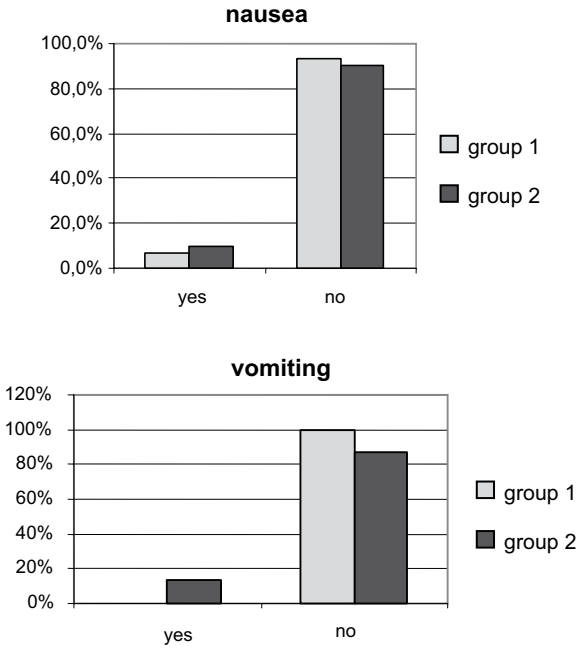

Figure 4. The intensity of nausea and vomiting in group 1 and group 2 (%)

- Influence on cardiovascular system

Influence on cardiovascular system was observed due to heart rate and mean arterial pressure (MAP). 60 minutes after surgery MAP in group 1 was 92,3 and in group 2 was 84,1. 120 minutes after surgery MAP in group 1 was 92,1 and in group 2 was 84,9. In all other MAP´s measurements no differences could be noted (Figure 5).

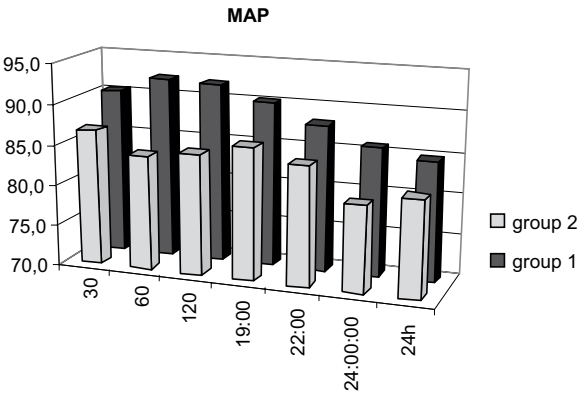

Figure 5. Mean arterial pressure (MAP) in following periods of time

Discussion

Opioids' use in regional anaesthesia is now the most frequent form of analgesia. It improves the quality of anaesthesia, extends the influence of local anaesthetics and reduces the frequency of side effects [12]. Many studies have shown the improvement of analgesia after combined use of opioid and local anaesthetic. The most frequent combinations are bupivacaine and fentanyl or bupivacaine and morphine [13]. Morphine (opposite to other lipophile opioids (fentanyl, sufentanyl), is the most frequent opioid used in subarachnoid anaesthesia. It extends significantly the duration of the postoperative analgesia (5-24 hours) [14,15].

This study proves a relationship between the intensity of pain and its duration and the dose of bupivacaine or bupivacaine with 0,2 mgs of morphine in subarachnoid anaesthesia to abdominal surgery (surgery of hernias, haemorrhoidal varices and anal fistulas). In group 1 postoperative pain appeared 2 hours after surgery (27,6%) and was increasing. The most severe pain appeared at 10 p.m. in the whole group 1. The requirement for analgetic agents was definitely higher than in group 2. The most severe pain in patients of group 2 appeared over 24 hours after surgery (76,7%) and patients from that group described their pain as much lower according to Visual Analogue Score than in group 1. 0,2 mgs of morphine has got not significant influence on nausea and vomiting. In group 2 vomiting was observed in 13,3% of patients and nausea in 10% of patients. Different publications about morphine in subarachnoid anaesthesia give inconsistent information. According to the literature even very small doses of spinal morphine (0, 15- 0,25 mgs) could induce side effects [16].

Pruritus (localized at face, hands, chest and abdomen) was the most annoying side effect in group 2 and appeared in 33,3% of patients. It was cured with naloxon in dose 0,1 mg, calcium and hydrocortisone.

The risk of breath depression in spinal anaesthesia depends on the dose of spinal opioids [17]. The frequency of breath depression in huge test groups is 0,1- 0,5%.

Conclusions

1. 0,5% Bupivacaine with 0,2 mgs of spinal morphine in subarachnoid anaesthesia proved to be better analgetic method beside only bupivacaine in planned abdominal surgery.
2. Morphine provides better stability of cardiovascular system.
3. 0,2 mgs of morphine does not provoke breath depression and does not increase nausea and vomiting.
4. Pruritus was the most annoying side effect and appeared in 1/3 of patients.
5. There is statistical difference between the intensity of pain in following periods of time and requirement for analgetic agents.
6. Spinal morphine can be ordered to spread clinical use because of easy dosage, fast and sure analgetic effect and small doses.

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