



## INTRATHECAL VERSUS INTRAVENOUS MORPHINE ON POST-OPERATIVE PAIN IN THORACOSCOPIC SURGERY

Hossein Travati<sup>1</sup>, Ali Barkhori<sup>1</sup>, Amir Hossein Mirafzal<sup>2</sup>, Mandana Mokhtare<sup>1</sup>,  
Morteza Hashemian<sup>1\*</sup>

1. Department of Anesthesiology and Pain Medicine, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Emergency Medicine, Kerman University of Medical Sciences, Kerman, Iran.

### ARTICLE INFO

#### Received:

03<sup>th</sup> Jan 2017

#### Received in revised form:

06<sup>h</sup> May 2017

#### Accepted:

17<sup>th</sup> May 2017

#### Available online:

29<sup>th</sup> May 2017

**Keywords:** Postoperative Pain,  
Morphine, Intrathecal Analgesia,  
Intravenous Morphine

### ABSTRACT

**Background:** We aimed to assess the effect of intrathecal morphine on postoperative pain after thoracoscopy. **Methods:** This double-blind randomized controlled trial was done on patients' candidate for thoracoscopy referring to Afzalipour and Shahid Bahonar Hospitals in Kerman, Iran, 2015. 60 patients were divided into equal intervention and control groups. The intervention group received intrathecal morphine with a dose of 3-5 micrograms/kg/BW using a 23G spinal needle between the L3-L4. Control group received intravenous morphine with a dose of 0.1 mg/kg/BW. Their vital signs were monitored and upon gaining their consciousness and discharge from recovery, their pain severity was measured. Pain severity was assessed using the Visual Analog Scale and scored from 0 (no pain) to 10 (highest perceived pain). Data were analyzed using SPSS software. Independent t, paired t, and repeated-measure analysis of variance tests were used as appropriated. **Results:** The mean±SD age of the patients in the intervention and control groups were 51.62±12.3 and 56±12.24 years. The male/female ration in the intervention and control groups were 17.13 and 21.9. The two groups did not differ significantly with respect to age and sex. Pain severity scores reduced significantly after discharge from the recovery room in intervention group compared with control group. No significant difference was found between the administration of intrathecal and intravenous morphine with respect to mean arterial pressure, heart rate, hemorrhage, and need for pain relievers, during surgery and recovery. **Conclusion:** The intrathecal administration of morphine significantly reduces postoperative pain compared with intravenous method in patients undergoing thoracostomy.

Copyright © 2013 - All Rights Reserved - Pharmacophore

**To Cite This Article:** Hossein Travati, Ali Barkhori, Amir Hossein Mirafzal, Mandana Mokhtare, Morteza Hashemian, (2017), "Intrathecal versus intravenous morphine on post-operative pain in thoracoscopic surgery", *Pharmacophore*, 8(4), 66-68.

### Introduction

Pain is a common complaint in the current modern society [1]. About 80% of the American population experiences chronic or postoperative pain annually [1]. Postoperative pain is related to the extent and location of surgery, underlying psychological and physiological background, and manipulation and tissue damage. Pain is an unpleasant physical and psychological experience accompanied by actual or potential tissue damage [1]. Postoperative pain that has not been sufficiently controlled could have various physiological side effects such as delay in the normal function of the gastrointestinal system and create problems such as nausea and vomiting [2]. Moreover, it triggers stress responses and affects the immune system and delays wound healing [3]. On the other hand, thoracic or upper abdominal surgeries are accompanied by cough and respiratory insufficiency disorder leading to reduced vital capacity, atelectasis and pneumonia [4]. Sometimes, the cardiovascular system is affected and patients exhibit elevated heart rate, vascular resistance, and cardiac ischemic events [5, 6]. There are several methods for maintaining suitable analgesia after surgery including the use of systemic analgesics such as opioids, steroids, or local anesthetics using different method such as regional nerve block therapy and epidural catheters [7]. All these methods have several advantages and disadvantages; for example, opioids have complications such as nausea, vomiting, deterioration of consciousness, constipation, and physical dependence [8]. Current approaches to reduce these side

events are focused on increasing the quality of analgesia after operations. In Intrathecal analgesia, analgesics are injected in the intrathecal region near the spinal cords and nerves leading to prolonged and more effective analgesia [9]. The use of opioids for postoperative pain relief has been extensively reported [10]. Frequent administration of opioids is a common practice for controlling postoperative pain [11]. Controlling postoperative pain leads to higher patient satisfaction and comfort and facilitates the patients' discharge from hospital, reduces hospital stay, and prevents complications such as delayed wound healing and respiratory problems. Few studies have been done on the effect of intrathecal morphine on pain reduction after thoracoscopy. Therefore, we aimed to assess the effect of intrathecal morphine on postoperative pain after thoracoscopy.

## **Patients and Methods**

This double-blind randomized controlled trial was done on patients candidate for thoracoscopy referring to Afzalipour and Shahid Bahonar Hospitals in Kerman, Iran, during 2015. The Ethics Committee approval of Kerman University of Medical Sciences ( IR.KUM.REC.1394.366) and the patients written informed consent were obtained prior to the study. No similar study had been done previously, so based on a relatively similar study [10], the sample size was determined to be at least 60 patients in Class I (patients without systemic disease) and II (patients with controlled systemic disease) of the American Society of Anesthesia (ASA). The patients were randomly divided into two equal groups using the random allocation table. The exclusion criteria were as follows: age below 18 or over 85, history of allergy to local anesthetics, chronic use of opioids and analgesics, use of steroids, pregnancy, breastfeeding, history of renal, hepatic, or cardiac failure, uncontrolled hypertension, endocrine disease, body mass index over 40 kg/m<sup>2</sup>, heart rate of less than 50 beats/min. We included patients who has undergone entire thoracoscopic surgery except thoracoscopic thymectomy and lobectomy. Those who underwent thoracoscopic surgery that progressed to thorotomy were also excluded. The patients of both groups were matched with respect to sex. The intervention group received intrathecal morphine with a dose of 3-5 micrograms/kg body weight using a 23G spinal needle in the L3-L4 region after anesthesia induction in lateral position. The control group received intravenous morphine with a dose of 0.1 mg/kg body weight after the induction of anesthesia and reaching hemodynamic stability before cutaneous incision. The method of anesthesia was similar in both groups except for the morphine administration. The patients and the were blind to the administered intrathecal data collectors morphine. All participants in both groups were operated by one surgeon team. The patients' vital signs (heart rate and blood pressure) were measured and recorded during surgery. General anesthesia was induced using the routine method (fentanyl 2 microgram/kg, sodium thiopental 4 mg/kg, atracurium 0.5 mg/kg, and midazolam 0.04 mg/kg body weight). Anesthesia was maintained similarly in both groups using isoflurane 1.2%. At the end of surgery after reverse muscle relaxants and extubation, the patients were transferred to the recovery. Their vital signs were monitored and upon gaining their consciousness and discharge from the recovery room, their pain severity was measured.

Pain severity was assessed using the Visual Analog Scale (VAS) and scored from 0 to 10 on a ruler numbered 0 to 10 which was shown to the patient before the induction of anesthesia. The patient was informed that the far left hand number (zero) showed no pain and the far right hand number (number 10) showed the highest perceived pain. The patients were ask to show the pain severity they felt on this ruler. With respect to the use of analgesics in the recovery room, pain relievers were prescribed after consulting with the surgeon and recovery room nursing staff. The amount of hemorrhage was also evaluated by weighing gauzes and volume of suction. We used double lumen for tracheal intubation and one lung ventilation technique for thoracoscopy as a routine. We sent all patients undergoing thoracoscopy to the intensive care unit as a routine.

Data were analyzed using SPSS software, version 11. Independent t, paired t, and repeated-measure analysis of variance (ANOVA) tests were used as appropriated. P<0.05 was considered as statistically significant.

## **Results**

The mean±SD age of the patients in the intervention and control groups were 51.62±12.3 and 56±12.24 years, respectively. The male/female ratio in the intervention and control groups were 17/13 and 21/9, respectively. The two groups did not differ significantly with respect to age and sex (P<0.05).

We found that the pain severity scores reduced significantly after discharge from the recovery room in the intervention group (1.82±0.17) compared with the control group (3.06±0.25) (P=0.01). Also, the mean arterial pressure before and during surgery was similar in both groups and lower in the intervention group in the recovery room. However, statistically no significant difference was seen between both groups with respect to mean arterial pressure before (107.05±11.91), during (101.43±11.61), and after (91.65±10.70) surgery (P>0.05).

Heart rate during surgery and in the recovery room was lower in the intervention group compared with the control group; but heart rate was statistically different between both groups only in the recovery room (P<0.05). Heart rate declined significantly in the recovery room (70.76±8.95 beats/min) compared with surgery time (76.23±10.09 beats/min) in the intervention group. In the intervention and control groups, 16 and 17 patients needed pain relievers in the PACU. The mean

hemorrhage amount did not significantly differ between the intervention ( $148.66 \pm 78.37$ ) and control ( $120 \pm 62.45$ ) groups ( $P > 0.05$ ).

### Discussion

We found that patients experienced more pain in ward (ICU) when morphine was administered intravenously, in compare with intrathecal more acute post operative pain, However, no significant difference was found between the administration of intrathecal and intravenous morphine with respect to mean arterial pressure, heart rate, hemorrhage, and need for pain relievers. Morphine is usually the first analgesic of choice in the intravenous method because compared with other compounds, morphine has been extensively studied. Although morphine creates suitable analgesia, researchers are searching for other alternatives and reducing its use because of complications such as nausea and vomiting, respiratory distress, drowsiness, confusion, and urinary retention. One of the alternative methods we assessed was the use of intrathecal morphine [12]. Some studies have reported that the possibility of epidural catheter placement failure was 2% [13] and 4.7% [14], while this was much lower in the spinal modality. Intrathecal morphine reduces pain at rest and movement for up to 24 hours after large surgeries [15]. Moreover, studies show that opioids can be used for definite pain control after surgery [11]. Yeager and colleagues found that morphine reduced the risk of myocardial ischemia and perioperative analgesia with morphine reduced heart rate and hypertension [16]. Moreover, in one study patients receiving morphine had lower pain severity than those receiving normal saline [17]. Other studies on the use of intrathecal opioids on pain severity on the first 24 hours after thoracic and cardiac surgeries [18, 19] showed that postoperative pain and morphine requirement reduced during this time. These findings are consistent with ours, except that we assessed pain during stay in the recovery room immediate postoperative pain. The advantage of using intrathecal opioids over epidural methods are simpler technique of injection, better postoperative evaluation, and rapid response because of the presence of the opioid in the cerebrospinal fluid and its effect on the dorsal spinal branch [20]. Moreover, the intrathecal method is more cost-effective [21]; and its cost are one third of the epidural method [21]. However, we did not assess costs in our study.

### Conclusion

The intrathecal administration of morphine significantly reduces postoperative pain compared with the intravenous method and patients feel less pain. Further research should be done on patients undergoing other types of surgery, with special attention to biopsychosocial aspects of pain.

### References

1. Waldman S D. Management of Acute and Postoperative Pain. Waldman 2007: Pain Management Saunders, Philadelphia, 225-55.
2. Wu CL, Raja SN. Treatment of acute postoperative pain. J L 2011; 377: 2215-25.
3. Rawal N. Postoperative pain treatment for ambulatory surgery. J BPRCA 2007; 21: 129-48.
4. El-Tahan MR, Warda OM, Diab DG, Ramzy EA, Matter MK. A randomized study of the effects of perioperative IV lidocaine on hemodynamic and hormonal responses for cesarean section. J A 2009; 23(2): 215-21.
5. Gildasio S, De Oliveira JR, Fitzgerald P, Streicher LF, Marcus RJ, McCarthy RJ. Systemic lidocaine to improve postoperative quality of recovery after ambulatory laparoscopic surgery. J AA 2012; 115: 262-7.
6. Woehick HJ, Otterson M, Yun H, Connolly LA, Eastwood D, Colpaert K. Acetazolamide reduces referred postoperative pain after laparoscopic surgery with carbon dioxide insufflation. J A 2003; 99: 924-8.
7. Kang JG, Kim MH, Kim EH, Lee SH. Intraoperative intravenous lidocaine reduces hospital length of stay following open gastrectomy for stomach cancer in men. J CA 2012; 24: 465-70.
8. Koppert W, Weigand M, Neumann F, Sittl R, Schuettler J, Schmelz M, et al. Perioperative intravenous lidocaine has preventive effects on postoperative pain and morphine consumption after major abdominal surgery. J AA 2004; 98: 1050-5.
9. Ness TJ. IV lidocaine inhibits visceral nociceptive reflexes and spinal neurons in the rat. J A 2000; 92: 1585-91.
10. Cousins M, Mather L. Intrathecal and epidural administration of opioids. Anesthesiology 1984; 61: 276-310.
11. Sophie S, Afshan G, Bashir S. Epidural Buprenorphine for postoperative Analgesia in Spinal Surgery. J Anaesth Clin Pharmacol 2005; 21(4): 385-386.
12. Kara I, Apiliogullari S, Oc B, Celik JB, Duman A, Celik C, Dogan NU. The effects of intrathecal morphine on patient-controlled analgesia, morphine consumption postoperative pain and satisfaction scores in patients undergoing gynaecological oncological surgery. J Int Med Res. 2012; 40(2): 666-72.
13. Watts RW. A five-year prospective analysis of the efficacy safety and morbidity of epidural anesthesia performed by a general partitioner anesthetist in an isolated rural hospital. Anaesth Intensive Care 1992; 20: 34-35.
14. Geric HJ, Kern F. Success and failure rate in epidural anesthesia. A 1-year study. Reg Anesth 1985; 8: 25-32.

15. Meylan N, Elia N, Lasakowski C, Tramer MR. Benefit and risk of intrathecal morphine without local anaesthetic in patients undergoing major surgery. *British J Anaesth* 2009;102(2),156-167.
16. Yeager MP, Glass DD, Neff RK. Epidural anesthesia and analgesia in high – risk surgical patients. *Anesthesiology* 1987; 66:724-746.
17. Movassaghi R, Dorosti AA, Agha-mohammadi D. Effect of epidural morphine in controlling the post operative pain in microdisectomy. *Journal of Anesthesiology and pain* 2010; 1(1): 38-44. [Persian]
18. Neustein SM, Cohen E. Intrathecal morphine during thoracotomy part II: effect on postoperative meperidine requirement and pulmonary function tests. *J Cardiovascular Anesth* 1993; 7: 157-9
19. Swenson JD, Hullander RM, Wingler K, Leivers D Early extubation after cardiac surgery using combined intrathecal sufentanil and morphine *J Cardiothoracic Anesth* 1994; 8: 509-14.
20. Stoletin RK. Intrathecal morphine: an underused combination for postoperative pain management. *Anesth Analg* 1989; 68: 707-9.
21. Gwartz KH. The safety and efficacy of intrathecal opioid with 5969 surgical patients at Indiana university hospital *Anesth. Analg.* 1999; 88: 599-604.