

Intrathecal pethidine as a sole anesthetic agent for lower limb surgery: a case report

Abstract

Spinal anesthesia is the most preferred method for lower extremity surgery owing to rapid onset, predictable and reliable block, and excellent postoperative analgesia. Pethidine is the only opioid that can be used as a sole anesthetic agent in spinal anesthesia, because of its local anesthetic activity which is unique. As there are scant articles about pethidine as a sole anesthetic agent in spinal anesthesia, this encouraged us to report intrathecal pethidine used for two old patients for their femoral fractures repair. Spinal anesthesia was carried out using 1.6 mL pethidine (50 mg/mL) in the sitting position in the midline approach by a 24-gauge, Quincke point needle. The patients were successfully managed with this method. This report emphasizes that in some situations, intrathecal pethidine technique is a safe, and good alternative inexpensive technique over spinal anesthesia with local anesthetics.

Keywords: Meperidine, Spinal Anesthesia, pruritus, Analgesia, Bupivacaine

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Masoud Tarbiat MD, PHD,¹ Sayed Ahmad Reza Salimbahrami MD, PHD,² Gholamreza Ghorbani Amjad MD, PHD,³ Mahmoud Rezaei MD, PHD⁴

¹Cardiac Anesthesiologist, Fellowship of Cardiac Anesthesia, Associate professor of anesthesia, Department of Anesthesiology, School of Medicine, Hamadan University of Medical Sciences, Iran

²Cardiac Anesthesiologist, Fellowship of Cardiac Anesthesia, Assistant Professor, Department of Anesthesiology, School of Medicine, Hamadan University of Medical Sciences, Iran

³Orthopedic Surgeon, Assistant professor, Department of Orthopedics, School of Medicine, Hamadan University of Medical Sciences, Iran

⁴Assistant professor, Anesthesiologist, Department of Anesthesiology, School of Medicine, Hamadan University of Medical Sciences, Iran

Correspondence: Dr. Mahmoud Rezaei, Department of Anesthesiology, Basat Hospital, Hamadan University of Medical Sciences, Shahid Fahmedeh Street, Hamadan, Iran, Post Code 6514845411, Tel 009891811519369, Email mrezae1961@yahoo.com

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Introduction

Spinal anesthesia is the most preferred method for lower extremity surgery owing to rapid onset, predictable and reliable block, and excellent postoperative analgesia without the risks of general anesthesia such as airway difficulties and pulmonary aspiration. Pethidine, also known as meperidine is the only opioid that can be used as a sole anesthetic agent in spinal anesthesia, because of its local anesthetic activity (sensory and motor blocks) which is unique. It was also the first synthetic opioid which used for analgesia in humans. Its analgesic property is due to structural similarities to morphine and cocaine. In comparison to local anesthetics, it has lower price and more availability in some of countries.¹⁻³ As bupivacaine (Marcaine) or any other type of local anesthetics agents were not available in our hospital due to our country's sanctions and politics, therefore pethidine as a sole anesthetic agent was chosen. Accordingly, this encouraged us to share our experience about anesthesia management in two old patients who received intrathecal pethidine for their surgeries.

Case report

Two old female patients candidated for pertrochanteric femoral fractures repair. The criteria of patients showed in Table 1. After receiving 300 ml crystalloid solutions, spinal anesthesia was carried out using pethidine (preservative-free, abureyhan, 50 mg/mL) in the sitting position in the midline approach. In both patients, dural puncture were performed at the L₃₋₄ invertebral spaces using a 24-gauge, Quincke point needle with the first attempt. An intrathecal injection of 1.6 mL pethidine was injected and immediately, they were then placed supine. Oxygen 5 liters per minute was given by a simple face mask. For motor block evaluation, the bromage score of 4 was confirmed after 10 minutes in both patients. The patients did not receive any intra-operative sedation medications. They also had no episode of hypotension or bradycardia during the surgery. However, a patient had a mild pruritus which was tolerable and treated with 100 mg intravenous hydrocortisone and her symptom resolved. Upon completion of surgeries, they were transferred to the recovery room and then orthopaedic ward without any problems.

Table 1 Criteria, complications and intraoperative events of patients

| Patient | Age/ years | Weight/ Kg | Height/ cm | Post Medical History | Ejection Fraction (EF) | Nausea or vomiting | Shivering | Pruritus | Duration of surgery/ minutes | Using vasopressor during surgery |
|---------|------------|------------|------------|----------------------|------------------------|--------------------|-----------|----------|------------------------------|----------------------------------|
| Case 1 | 96 | 54 | 160 | Hypertension | 50% | NO | No | Yes | 180 | NO |
| Case 2 | 84 | 61 | 167 | Nil | 50%-55% | NO | No | No | 150 | NO |

Discussion

Pethidine is a phenylpiperidine-derived and lipid-soluble opioid that possesses local anesthetic (LA) activity. It is an agonist for μ - and κ -opioid receptors and unique as the only opioid that is effective as the sole agent for spinal anesthesia. Pethidine has similar physicochemical properties (molecular weight, pKa, lipid solubility) to conventional LA and its analgesic and LA properties are related to structural similarities to cocaine and morphine. The LA effect of pethidine was first demonstrated by Way in 1946. Pethidine can block nerve conduction completely and reversibly. In contrast to LAs that act at sodium channels on the dorsal root or mixed spinal nerve to stabilize nerve membranes, pethidine acts at potassium and calcium channels associated with opioid receptors located in the substantia gelatinosa. The *commercial solution* of a concentration of 50 mg/ml and preservative free pethidine has a specific gravity of 1.009 which is close to the upper limit of specific gravity of cerebrospinal fluid and has the properties of a hyperbaric agent. Because of high lipid solubility of pethidine that causes it diffuses rapidly into lipid-rich areas of the spinal cord, the cephalic spread in the cerebrospinal fluid is unlikely. However, following intrathecal pethidine (ITP) administration, patients should remain at least overnight in the ward. Like bupivacaine, ITP can provide analgesia into the postoperative period. Mean duration of analgesia following ITP has been reported 3-4 hours after hip surgery. Earlier mobility and ambulation after ITP are possible because of rapidity of recovery of sensory and motor function. Doses of pethidine used for spinal anesthesia have ranged from 0.5 to 1 mg/kg or different fixed doses (50 mg, 60 mg and etc). Because of variation in patient populations, positioning during injection and additives used, a wide range of different fixed doses have been reported. The advantage of intrathecal pethidine is related to its hemodynamic stability, lower shivering (due to activation of kappa-opioid receptors), better postoperative analgesia and a useful inexpensive technique. The side effects of ITP include pruritus, nausea and vomiting, bradycardia, hypotension, intra-operative sedation and respiratory depression. Although the incidence of pruritus of ITP is higher than LAs, lower incidence of shivering and better postoperative analgesia was significantly superior to LAs.²⁻⁵

Conclusion

In some situations, such as allergy to local anesthetics or unavailability of other drugs for intrathecal injection, intrathecal pethidine technique is a safe, and good alternative inexpensive technique over spinal anesthesia with local anesthetics.

Acknowledgments

None.

Conflicts of interest

None.

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