

Intrathecal Morphine as an Alternative for Epidural Analgesia for Postoperative Pain in a Resource Constrained Set-up: A Case Series

ANIL KUMAR NARAYAN¹, AJAY S SHANDILYA², HARINI KRISHNA³

ABSTRACT

Management of postoperative pain is a central piece in the jigsaw of postoperative care. This article reports a series of three patients who were managed with intrathecal morphine to provide postoperative analgesia, for major abdominal surgeries. Morphine was injected intrathecally before the induction of anaesthesia. The patients were pain free postoperatively, required minimal intravenous opioids on the first postoperative day. There was no incidence of postoperative nausea or vomiting, pruritus and respiratory depression. Intrathecal morphine improves the quality of postoperative analgesia, there is a reduction in pain scores in the first 24 hours after surgery and the need for rescue analgesia with intravenous opioids is less. Intrathecal morphine can be used as an alternative to continuous epidural analgesia in early postoperative period.

Keywords: Enhanced recovery after surgery, Laparotomy, Opioids, Postoperative analgesia, Spinal morphine

INTRODUCTION

Management of postoperative pain is a central piece in the jigsaw of postoperative care. Epidural analgesia is considered the standard of care and is strongly recommended in the Enhanced Recovery After Surgery (ERAS) protocol consensus for gastrointestinal surgeries [1], as a part of multimodal analgesia. Thoracic Epidural Analgesia (TEA) is the gold standard for pain control in patients undergoing open abdominal surgeries [2]. Due to logistical issues arising as an effect of the Coronavirus Disease 2019 (COVID-19) pandemic, the epidural catheters at the hospital were exhausted. Hence, other options to supplement the multimodal analgesia had to be explored. Intrathecal opioids have been used as an adjuvant for spinal anaesthesia and in patients undergoing general anaesthesia as an additional mode of analgesia. The technique to deposit intrathecal opioids is fairly simple with a very low risk of failure. Morphine was first used intrathecally in humans in 1979, as a treatment for intractable lower limb and back pain in patients with advanced genitourinary malignancies infiltrating the lumbar plexus [3].

Intrathecal morphine has been used in various surgeries like Caesarian sections [4], lower limb arthroplasties [5]. It has also been moderately recommended as a part of ERAS protocols in order to spare systemic opioids [1].

Intrathecal morphine although provides good postoperative analgesia, its use has an incidence of increased Postoperative Nausea And Vomiting (PONV), pruritus [6,7], urinary retention [8] and respiratory depression [7], and hence, necessitates care in the postanaesthesia care unit.

CASE SERIES

The present case series reports three patients. A 34-year-old male (ASA II, for pancreatico-jejunostomy), a 50-year-old female (American Society of Anaesthesiologists {ASA} I for cholecystectomy and common bile duct exploration), and a 44-year-old female (ASA II for

Whipple's procedure). The patients were given intrathecal morphine 300 µg diluted in 0.9% saline to a total volume of 1 mL, in L3-L4 space before the induction of anaesthesia. Intravenous induction with propofol, fentanyl 100 µg and atracurium was done. Intraoperatively, Electrocardiogram (ECG), SpO₂, End tidal carbon dioxide (EtCO₂), invasive blood pressure monitoring were done. Dexamethasone 8 mg, ondansetron 8 mg, paracetamol 1 gm and diclofenac 75 mg were given, intraoperatively. All patients were extubated on table and kept in the postoperative Intensive Care Unit (ICU) for observation.

Patients were assessed for pain at various time intervals using the Visual Analogue Scale (VAS) and a rescue analgesia with 4.5 mg morphine was decided to be given, whenever the patient has a VAS of >4. All patients were given paracetamol 1 gm 8th hourly and diclofenac 75 mg 12th hourly, ondansetron 4 mg 8th hourly. The average duration of the surgeries was 6 hours.

The pain scores of all patients were 2 at the 2nd hour, postoperatively. The pain scores of all the patients were similar at 2, 3, 3 at the end of 4 hours, 8 hours and 12 hours of surgery, respectively. At 16 hours postextubation patient 3 had a VAS of 7 needing rescue analgesia with 4.5 mg morphine. Patients 1 and 2 had VAS of 4 at 16 hours and at 24 hours [Table/Fig-1]. Postextubation patient 3 had a VAS of 6, rescue analgesia with morphine 4.5 mg was given. Patients 1 and 2 had a score of 5 needing rescue analgesia with morphine 4.5 mg. All patients were instituted with intravenous morphine 4.5 mg 6th hourly from 24 hour onwards, for the next two days.

The patients were started on incentive spirometry from postoperative day 1 and they were comfortable with the exercise. Patients 1 and 2 could be mobilised on to a chair from postoperative day 1. Patient 3 was mobilised on postoperative day 3.

There was no incidence of pruritus, PONV or respiratory depression in any of the patients. Arterial Blood Gas (ABG) was recorded at 6, 12 and 24 hours for all patients with no carbon dioxide retention.

Patient number	Age (years)/ Gender	American Society of Anaesthesiologists (ASA)	Body Mass Index (BMI) (kg/m ²)	Type of surgery	Duration of surgery (hours)	VAS at various time intervals (2,4,8,12,16,20 and 24 hours)	Total morphine rescue dose (24 hours)
1.	34/M	II	19.5	Pancreatico-jejunostomy	6	2,2,3,3,4,4,5	4.5 mg
2.	50/F	I	23	Common bile duct exploration	4.5	2,2,3,3,4,4,5	4.5 mg
3.	44/F	II	20	Whipple's procedure	7.5	2,2,3,3,7,4,6	9 mg

[Table/Fig-1]: Summary of patient details and postoperative VAS scores.

DISCUSSION

Management of postoperative pain is a very crucial aspect of surgical care and is central to the progress of the patient after surgery. Multimodal analgesia is associated with a reduction in the length of hospital stay [9]. Thoracic Epidural Analgesia (TEA) forms a very important part of the multimodal analgesia strategy [1] and has been described as the gold standard for analgesia in upper abdominal surgeries and was regularly being used in the study hospital setting. The coronavirus pandemic created some unexpected logistical issues due to which we had to contend with unavailability of epidural catheters for a while. The number of open abdominal surgeries also increased at the same time due to logistical issues with the laparoscopic equipment. This nudged the decision to use intrathecal morphine as a part of multimodal analgesia.

Intrathecal morphine is known to provide prolonged postoperative analgesia [7], although safety has been a concern as morphine is a hydrophilic opioid having a propensity to stay at higher concentrations in the CSF and reach rostral sites as compared to other opioids causing delayed respiratory depression [10]. Other significant side effects of morphine include PONV, pruritus [6,7] and urinary retention [8].

Wang JK et al., had used a dose of 0.5 mg diluted in physiological saline in eight patients with intractable pain due to genito-urinary malignancies and found that it provided near complete pain relief as compared to placebo. There was no increase in the quality of analgesia when the dose was increased from 0.5 mg to 1 mg [3]. Morphine was first used intrathecally in 1979 [3] and has since been used in varying doses ranging from 4 mg [11] to 50 µg [12]. A meta-analysis done to find out the analgesic efficacy and side effect profile of intrathecal morphine done by Gonvers E et al., [5] in patients undergoing total knee arthroplasties found that a dose of 100 µg best balanced the analgesia and side effects and that the incidence of postoperative nausea vomiting increased when the dose was more. A meta-analysis by Meylan N et al., showed that intrathecal morphine reduced the need for intravenous fentanyl intraoperatively and also reduced the total doses of intravenous morphine needed postoperatively [7]. A dose of around 300 µg was used in many studies where the subjects were undergoing major abdominal surgeries [13-16].

A dose of 300 µg was chosen because the surgeries were major abdominal surgeries with large incisions either subcostally or midline and it was felt that a dose of 100 µg would be too little. A dose of 300 µg of morphine diluted in 1 mL normal saline which was deposited in the subarachnoid space before the induction of general anaesthesia. All patients were given a standard intravenous induction, maintenance of anaesthesia was by inhalational anaesthetics. All patients were given paracetamol. Ondansetron 8 mg and dexamethasone 8 mg were given as preventive measures for pruritus [17] and PONV.

The patients were pain free postoperatively, required minimal intravenous opioid on the 1st postoperative day. There was no incidence of PONV or pruritus. Urinary retention could not be assessed all the patients were catheterised due to the nature of the surgery. There was no incidence of respiratory depression which

authors defined as a respiratory rate less than 10/min. There was also no carbon dioxide retention as evidenced in the Arterial Blood Gas test (ABGs).

CONCLUSION(S)

The administration of intrathecal morphine preoperatively helps in improving the quality of postoperative analgesia and also reduces the need for intravenous opioid administration as rescue analgesia. Intrathecal morphine is as an effective method of pain relief in the early postoperative period and can be used as an alternative to continuous epidural analgesia in major abdominal surgeries.

REFERENCES

- [1] Feldheiser A, Aziz O, Baldini G, Cox BPBW, Fearon KCH, Feldman LS, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: Consensus statement for anaesthesia practice. *Acta Anaesthesiol Scand*. 2016;60(3):289-34.
- [2] Wu CL, Cohen SR, Richman JM, Rowlingson AJ, Courpas GE, Cheung K, et al. Efficacy of postoperative patient-controlled and continuous infusion epidural analgesia versus intravenous patient-controlled analgesia with opioids: A meta-analysis. *Anesthesiology*. 2005;103(5):1079-88; quiz 1109-10.
- [3] Wang JK, Nauss LA, Thomas JE. Pain relief by intrathecally applied morphine in man. *Anesthesiology*. 1979;50(2):149-51.
- [4] Sultan P, Halpern SH, Pushpanathan E, Patel S, Carvalho B. The effect of intrathecal morphine dose on outcomes after elective cesarean delivery: A meta-analysis. *Anesth Analg*. 2016;123(1):154-64.
- [5] Gonvers E, El-Boghdady K, Grape S, Albrecht E. Efficacy and safety of intrathecal morphine for analgesia after lower joint arthroplasty: A systematic review and meta-analysis with meta-regression and trial sequential analysis. *Anaesthesia*. 2021;76(12):1648-58.
- [6] Aly M, Ibrahim A, Farrag W, Abdelsalam K, Mohamed H, Tawfik A. Pruritus after intrathecal morphine for cesarean delivery: Incidence, severity and its relation to serum serotonin level. *Int J Obstet Anesth*. 2018;35:52-56.
- [7] Meylan N, Elia N, Lysakowski C, Tramèr MR. Benefit and risk of intrathecal morphine without local anaesthetic in patients undergoing major surgery: Meta-analysis of randomized trials. *Br J Anaesth*. 2009;102(2):156-67.
- [8] Tomaszewski D, Białkota M, Truszczyński A, Machowicz A. Intrathecal morphine increases the incidence of urinary retention in orthopaedic patients under spinal anaesthesia. *Anesthesiol Intensive Ther*. 2014;46(1):29-33.
- [9] De Roo AC, Vu JV, Regenbogen SE. Statewide utilization of multimodal analgesia and length of stay after colectomy. *J Surg Res*. 2020;247:264-70.
- [10] Giovannelli M, Bedford N, Aitkenhead A. Survey of intrathecal opioid usage in the UK. *Eur J Anaesthesiol EJA*. 2008;25(2):118-22.
- [11] Aun C, Thomas D, St John-Jones L, Colvin MP, Savege TM, Lewis CT. Intrathecal morphine in cardiac surgery. *Eur J Anaesthesiol*. 1985;2(4):419-26.
- [12] Hur MJ, Kim YJ, Kim JH. Effect of intrathecal morphine for total knee replacement arthroplasty elderly patients. *Korean J Anesthesiol*. 2007;52(2):172-78.
- [13] Boonmak S, Boonmak P, Bunsangjaroen P, Srichaipanha S, Thinchee-long V. Comparison of intrathecal morphine plus PCA and PCA alone for post-operative analgesia after kidney surgery. *J Med Assoc Thai Chotmaihet Thangphaet*. 2007;90(6):1143-49.
- [14] Devys JM, Mora A, Plaud B, Jayr C, Laplanche A, Raynard B, et al. Intrathecal + PCA morphine improves analgesia during the first 24 hr after major abdominal surgery compared to PCA alone. *Can J Anaesth*. 2003;50(4):355-61.
- [15] Blay M, Orban JC, Rami L, Gindre S, Chambeau R, Batt M, et al. Efficacy of low-dose intrathecal morphine for postoperative analgesia after abdominal aortic surgery: A double-blind randomized study. *Reg Anesth Pain Med*. 2006;31(2):127-33.
- [16] Beaussier M, Weickmans H, Parc Y, Delpierre E, Camus Y, Funck-Brentano C, et al. Postoperative analgesia and recovery course after major colorectal surgery in elderly patients: A randomized comparison between intrathecal morphine and intravenous PCA morphine. *Reg Anesth Pain Med*. 2006;31(6):531-38.
- [17] Charuluxananan S, Somboonviboon W, Kyokong O, Nimcharoendee K. Ondansetron for treatment of intrathecal morphine-induced pruritus after cesarean delivery. *Reg Anesth Pain Med*. 2000;25(5):535-39.

PARTICULARS OF CONTRIBUTORS:

1. Professor and Head, Department of Anaesthesiology, Andaman and Nicobar Islands Institute of Medical Sciences, Port Blair, Andaman and Nicobar Islands, India.
2. Assistant Professor, Department of Anaesthesiology, Chandramma Dayananda Sagar institute of Medical Education and Research, Ramanagar, Karnataka, India.
3. Assistant Professor, Department of Anaesthesiology, Chandramma Dayananda Sagar institute of Medical Education and Research, Ramanagar, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Ajay S Shandilya,
Assistant Professor, Department of Anaesthesiology, Chandramma Dayananda Sagar institute of Medical Education and Research, Harohalli,
Kanakapura Taluk, Ramanagar, Karnataka, India.
E-mail: ajay.anaesthesia@gmail.com

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

PLAGIARISM CHECKING METHODS: [Jan H et al.]

- Plagiarism X-checker: Mar 28, 2022
- Manual Googling: Jun 22, 2022
- iThenticate Software: Sep 06, 2022 (6%)

ETYMOLOGY: Author Origin

Date of Submission: **Feb 25, 2022**

Date of Peer Review: **Apr 20, 2022**

Date of Acceptance: **Jun 23, 2022**

Date of Publishing: **Oct 01, 2022**