ISSN: 0975-5160

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2021; 11(4); 01-06

Original Research Article

An RCT: To Evaluate the Clinical Characteristics of Patients Having Spinal Anaesthesia with Intrathecal Bupivacaine and Clonidine, as well as Intrathecal Bupivacaine and Fentanyl

Satish Kumar

Assistant Professor, Department of Anaesthesiology, Katihar Medical College Hospital, Katihar, Bihar, India.

Received: 04-06-2021 / Revised: 11-07-2021 / Accepted: 07-08-2021
Corresponding author: Dr. Satish Kumar
Conflict of interest: Nil

Abstract

Aim: The aim of this study to assess the clinical profile of patients undergoing spinal Anesthesia with intrathecal bupivacaine with clonidine and intrathecal bupivacaine with fentanyl.

Methods: A prospective double blind randomized controlled study was conducted in the Department of anaesthesiology, Katihar medical college Hospital, Katihar, Bihar, India.for 1 year. 110 adult patients were randomly divided on an alternative basis into two groups of 55 each. Group **"**A**"**-Bupivacaine plus clonidine group. Group **"**B**"**-Bupivacaine plus fentanyl group. Patients with ASA grade 1 and 2 patients and age group of 18 –72 yrs. Those patients scheduled to undergo elective lower abdominal, lower extremity, gynaecological or urological surgeries under subarachnoid block were included in this study. Patients belonging to group 'A' received 3 ml (15 mg) of hyperbaric bupivacaine 0.5% plus 1 $\mu g.kg^{-1}$ of clonidine. Patients of group 'B' received 3 ml (15 mg) of hyperbaric bupivacaine 0.5% plus (25 µg) of fentanyl. After injection, patient was immediately turned to supine position.

Results: Majority of patients in the both the groups belonged to the group 30 to 40 years 34.54%. The number of males 43.64% and females 56.36%. Majority of female patients in the both the groups belonged to the group 160 to 170 cms and males 171 to 175 cms, Samples were height matched. Most of the patients 41.82 percent from gynaecology surgery followed by lower limb surgery 33.63 percent and Lower Abdominal Surgery 24.55 percent.

Conclusion: We concluded that the administration of local anaesthetics in combination with opioids intrathecally is an established technique for managing postoperative pain following abdominal, pelvic, thoracic or orthopaedic procedures on lower extremities. Local anaesthetics with opioids demonstrate significant synergy.

Keywords: Spinal anesthesia, bupivacaine, clinical profile

Introduction

Spinal anaesthesia and postoperative analgesia can be prolonged by using adjuvants to local anaesthetics like adrenaline, midazolam, opioids, neostigmine and clonidine.[1] Administration of opioids as adjuvants to local anaesthetics intrathecally results in both synergistic and multimodal analgesia. The clinical efficacy of intrathecal opioids to relieve visceral pain has also been demonstrated by several workers.[2,3] The addition of fentanyl 10 µg to hyperbaric bupivacaine 10.5-12.5 mg increases the intraoperative and early postoperative quality of subarachnoid block.[2] The technique of subarachnoid block is quite simple and single injection results in ideal operating conditions with complete analgesia, profound muscular relaxation, decreased blood loss and minimal ventilatory disturbances. Further, in a developing area like Bundelkhand, non availability of highly sophisticated anaesthetic equipment and compressed gases with their prohibitive cost makes spinal anaesthesia one of the major tools in the hands of an anesthesiologist. If we can extend its duration to include the postoperative period it will be unmatched. reasons to achieve optimal postoperative pain relief than any other surgical patients and they also present with unique challenges. Post cesarean delivery patients are at higher risk for thromboembolic events which may also be precipitated by immobility from inadequate pain control[4,5] or excessive sedation from opioids. Moreover these women need to ambulate, to be alert and energetic enough to care for, interact with and breastfeed their new born. Early breastfeeding is important immediately after childbirth to promote and improve mother bonding and enhances puerperal changes to regain prepregnancy state.[6,7] With these goals in mind, the analgesic of choice require minimal transfer in breast milk, little or no effect on neonates, minimal maternal side effects and minimal or no interference with caring for the newborn or discharge from hospital. The common modalities are systemic administration of opioids, either by intramuscular injection or i.v. injection, by patient controlled analgesia or by neuraxial injection of opioids as part of regional anaesthetic for postoperative analgesia in cesarean delivery. Fentanyl is a synthetic primary µ-opioid agonist. Chemically it is N-phenyl-N-(1-phenethyl-4- piperadenyl) and was first synthesized by Dr.Paul Janssen in 1959. In 1960 fentanyl was introduced as an intravenous anaesthetic under the name of sublimaze. In Mid 1990, duragesic patch of fentanyl was introduced in to clinical trial. Now fentanyl is given via various routes i.e. transdermal, i.v., i.m., oral, sublingual, buccal, intrathecal, epidural.[8]

Materials and Methods

A prospective double blind randomized controlled study was conducted in the Department of anaesthesiology, Katihar medical college Hospital, Katihar, bihar, India for 1 year. after taking the approval of the protocol review committee and institutional ethics committee.

110 adult patients were randomly divided on an alternative basis into two groups of 55 each. Group **"**A**"**-Bupivacaine plus clonidine group. Group **"**B**"**-Bupivacaine plus fentanyl group. Patients with ASA grade 1 and 2 patients and age group of 18 –72 yrs. Those patients scheduled to undergo elective lower abdominal, lower extremity, gynaecological or urological surgeries under subarachnoid block were included in this study.

In the pre operative room, intravenous line was secured and the patients were preloaded with

15 ml / kg Ringer's lactate,30 minutes prior to spinal anaesthesia.

In each case, spinal anaesthesia was performed under strict aseptic precautions by inserting 25 gauge Quincke's spinal needle into subarachnoid space at L_{2-3} or L_{3-4} interspace with patient in lateral position and the study solution was injected over 15-20 secconds.

Patients belonging to group 'A' received 3 ml (15 mg) of hyperbaric bupivacaine 0.5% plus 1 $\mu g.kg^{-1}$ of clonidine. Patients of group 'B' received 3 ml (15 mg) of hyperbaric bupivacaine 0.5% plus (25 µg) of fentanyl. After injection, patient was immediately turned to supine position.

Standard monitoring was carried out in the form of pulse oximetry, ECG and non invasive arterial blood pressure monitoring. Pulse rate, respiratory rate, arterial blood pressure and oxygen saturation were recorded every 3mins for first 10 mins, every 5 mins for next half an hour and thenevery 10 mins intra operatively. Bolus doses of injmephenteramine 6 mg i.v. were given to maintain arterial blood pressure within 20% of baseline and inj atropine 0.6 mg i.v. was given when the patient developed bradycardia (PR< 50 beats/min). No other sedative or analgesic was given in the study period. Sensory block was assessed by pin pricks in mid clavicular line bilaterally using 25 guage hypodermic needle. The onset of sensory block wasconsidered as the time taken from intrathecal injection to thehighest level of the sensory block. The duration of sensory block was taken from the time of intrathecal injection to regression of the level of sensory block to L_1 dermatome. Duration of motor block was recorded from onset time to time when the patient was able to lift the extended leg.

Modified Bromage Scale

- Grade 0 - Full flexion of knees and feet.
- Grade 1 - Just able to flex knees, full flexion of feet.
- Grade 2 - Unable to flex knees, but some flexion of feetpossible.
- Grade 3 - Unable to move legs or feet.

The duration of complete analgesia was taken from the time of intrathecal drug administration to the first report of pain

The duration of effective analgesia was taken from the time of intrathecal drug administration to the time of first supplementation with rescue analgesic. Injection diclofenac sodium 1.0 mg / kg intramuscular was the rescue analgesic given if VAS was found to be 5 or more.

Sedation scores were assessed every 15 minutes both intra and post operatively using a four point score described by Chernik et al.

Grade 0 – patient wide awake.

Grade 1 – patient is sleeping comfortably, but responding toverbal commands.

Grade 2 – deep sleep but arousable.

Grade 3 – deep sleep, unarousable.

Post operatively, monitoring of vital signs, VAS scores and sedation scores was continued every 30 minutes until the time of regression of sensory block to L_1 dermatome. The incidence of hypotension (arterial blood pressure < 20% of baseline), bradycardia (heart rate <50beats/min), pruritus, nausea, vomiting and urinary retention were monitored in the recovery room and then shifted to the ward.

Results

Table 1: Age distribution of patients

Age	Gender		Total
	Female	Male	
Below 20	6	10	16(14.54%)
20-30	12	20	32(29.09%)
30-40	26	12	38(34.54%)
40-50	15	5	20(18.18%)
Above 50	3	1	4(3.63%)
Total	62	48	110(100%)

Majority of patients in the both the groups belonged to thegroup 30 to 40 years 34.54%.

Table 2: Gender distribution of patients

Gender	Number of patients	Percentage
Male	48	43.64
Female	62	56.36
Total	110	100

The number of males 43.64% and females 56.36%.

Table 3: Height distribution of male and female

Height (cms)	Female	Male	Total
160-165	26	9	35(31.82%)
166-170	27	6	33(30%)
171-175	8	22	30(27.27%)
>176	1	11	12(10.10%)
Total	62	48	110

Majority of female patients in the both the groups belonged to the group 160 to 170 cms and males 171 to 175 cms, Samples were height matched.

Table 4: Type of surgery

Type of surgery	Frequency=110	Percent
Gynaecology	46	41.82
Lower Abdominal Surgery	27	24.55
Lower Limb Surgery	37	33.63

Most of the patients 41.82 percent from gynaecology surgery followed by lower limb surgery 33.63 percent and Lower Abdominal Surgery 24.55 percent.

Discussion

Clonidine, a selective partial agonist for α2 adrenoreceptors known to increase both sensory and motor block of local anaesthetics, after intrathecal administration exerts its analgesic effects through activation of post synaptic α2 receptors in substantia geletinosa of spinal cord.[9] Fentanyl and bupivacaine co-administration has a synergistic inhibitory

action on the Aδ and C- fiber conduction causing improved perioperative analgesia.[10]

The use of neuraxial opioids have increased dramatically over the last few years. They improve the quality of intraoperative analgesia produced by local anaesthetics, by binding directly with spinal opiate receptors and prolong the duration of postoperative analgesia. Opioids administered in the subarachnoid space appear to act principally on μ-receptor in the substantia geletinosa of the dorsal horn of spinal cord by suppressing excitatory neuropeptide release from cfibers.[11] The combination of local anaesthetic and opioids, allow for a reduction in doses of both classes of drugs, thus lessening the side effects attributable to each. Fentanyl, a lipophilic opioid has rapid onset of action following intrathecal administration, provides better intraoperative analgesia and is a safer alternative than morphine for management of early post operative pain as it does not migrate to fourth ventricle in sufficient concentration to cause delayed respiratory depression when administered intrathecally.[12]

The first neuraxial block was performed 8 months after the demonstration in Heidelberg of the local anaesthetic properties of cocaine. James Leonard Corning (1855-1923), a neurologist in New York City on October 12, 1885 injected a total of 120 mg of cocaine between the T11 and T12 spinous process in a 45 year old man and obtained loss of sensation of the legs and perineum. He concluded that this proved action of cocaine on spinal cord and suggestedits use in certain cases of spinal spasticity and for operations on the genito-urinary system.[13]

On August 15, 1898, August Bier and August Hildebrandt, surgeons at Kiel University, Germany used the Quinckemethod of entering the intrathecal space and injected between 5mg and 15 mg of cocaine to produce spinal anaesthesia in six cases for operations on lower part of the body. They also reported the results of spinal anaesthesia given to each other in what has become one of the classic clinical papers in the medical literature.[14]

The scientific study of spinal anaesthesia began within a fewyears after its introduction. Investigations were undertaken by Arthur E Barker (1850-1916) to determine the factors involved in spread of local anaesthetics within the subarachnoid space. His emphasis on gravity as an essential determinant of local anaesthetic spread remains an important facet of spinal anaesthesia technique today.[15]

Post spinal headache was an annoying problem for the first practitioners and their patients. However, study by Leroy Vandam and Robert Dripps confirmed Bier's original suggestion that CSF leakage through the dural rent was the causative factor. The use of small diameter spinal needles has decreased the incidence of post spinal headache. An innovative treatment of headache after dural puncture, epidural blood patch, was suggested by James B Gormley in 1960 and further described by Anthony J Digiovanni and Burdett S Dunbar in 1970.[16,17]

Conclusion

The study concluded that the administration of local anaesthetics in combination withopioids intrathecally is an established technique for managing postoperative pain following abdominal, pelvic, thoracic or orthopaedic procedures on lower extremities. Local anaesthetics with opioids demonstrate significant synergy.

Reference

1. Prakash S, Joshi N, Gogia AR, Prakash S, Singh R. Analgesic efficacy of two doses of intrathecal Midazolam with bupivacaine in patients undergoing cesarean delivery. Regional Anesthesia and Pain Medicine 2006; 31(3):221-226. PMid:16701187
2. Hunt CO, Naulty JS, Bader AM, Hauch MA, Vartikar JV, Datta S, et al. Perioperative analgesia with subarachnoid

fentanyl-bupivacaine for cesarean delivery. Anesthesiology 1989;71:535-40.
3. Singh H, Yang J, Thornton K, Giesecke AH. Intrathecal fentanyl prolongs bupivacaine sensory block. Can J Anaesth 1995;42:987-91
4. Frederick A, Anderson Jr, Frederick A, Spencer M. Four topics in venous thromboembolism. circulation 2003; 107:1-9-1-16.
5. Aaro LA, Juergens JL. Thrombophlebitis associated with pregnancy. Am J Obstet Gynecol. 1971:15;109(8):1128–113
6. Negishi H, Kishida T, Yamada H, Hirayama E et al; Changes in uterine size after vaginal delivery and cesarean section determined by vaginal sonography in the puerperium; Archives of Gynecology and Obstetrics;1999;263, (1-2):13-16 .
7. Kuguoglu S, Yildiz H, Tanir MK, Demirbag BC. Breastfeeding after a Cesarean Delivery, Cesarean Delivery, Dr. Raed Salim (Ed.), ISBN: 978-953-51-0638-8, Available from: http://www.intechopen.com/books/cesarean delivery/breastfeeding-after-a-cesarean-delivery.
8. Stanley TH. The history and development of the fentanyl series. J Pain Symptom Manage.1992;7(3suppl): S3-7.
9. Reddy SV, Yaksh TL. Spinal noradrenergic terminal system mediates antinociception. Brain Res 1980;189:391-401.
10. Wang C, Chakrabarti Mk, Whitwam JG. Specific enhancement by fentanyl of the effects of intrathecal bupivacaine on nociceptive afferent but not on sympathetic efferent pathways in dogs. Anaesthesiology 1993;79:766-73.
11. Verstraete S, Van de Velde M. Post-cesarean section analgesia. Acta Anaesthesiol Belg. 2012; 63(4):147-167.
12. Gehling M, Tryba M. Risks and side-effects of intrathecal morphine combined with spinal anaesthesia: a meta-analysis. Anaesthesia 06/2009 June; 64(6):643- 51.
13. Rudra P, Rudra A. Comparison of intrathecal fentanyl and midazolam for prevention of nausea – vomiting during caesarean delivery under spinal anaesthesia. Indian J. Anaesth 2004;48(6):461-464.
14. Srivastava U, Kumar A, Saxena S, Gandhi NK, DuttaD, Chandra P *et al*. Hyperbaric or plain bupivacaine combined with fentanyl for spinal anaesthesia during caesarean delivery. Indian J. Anaesth 2004;48(1):44-46.
15. Techanivate A, Urusopone P, Kiatgungwanglia P, Kosawiboonpol R. Intrathecal fentanyl in spinal anaesthesia for appendicectomy. J Med Assoc Thai 2004;87(5):525-530.
16. Tucker AP, Mezzatesta J, Nadeson R, Goodchild CS. Intrathecal midazolam II: Comparison with intrathecal fentanyl for labour pain. Anaesth Analg 2004;98:1521-1527.
17. Manaa EM, Faroug OE. Comparative study between intrathecal low dose bupivacaine versus lidocaine for anorectal surgery. Eg J Anaesth 2005;21:75-78.