International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article.

Comparison of Anaesthetic Efficacy of Dexmedetomidine with Bupivacaine Versus Fentanyl with Bupivacaine for Spinal Anaesthesia

Anit Kumar Kajala[1*], Prakash Gupta[2], D. D. Jethava[3], Priyambada Gupta[3], Durga Jethava[3]

[1*]PG Resident, [2]Senior Resident, [3]Professor,
Department of Anaesthesia, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India.

ABSTRACT

Background: Spinal anaesthesia is defined as "the regional anaesthesia obtained by blocking nerves in subarachnoid space", is a popular and common technique. Traditionally amide and ester linked local anaesthetics have been used in regional anaesthetic techniques, and bupivacaine has emerged as the most commonly used drug for spinal anaesthesia. This study is designed to compare the effect of dexmedetomidine with bupivacaine versus fentanyl with bupivacaine for spinal anaesthesia in lower abdominal and lower limb surgeries.

Materials and Methods: The study was conducted amongst subjects undergoing elective lower abdominal and lower limb surgeries under spinal anaesthesia in Mahatma Gandhi hospital, Jaipur. The study population was randomly divided into 2 groups with 45 patients in each group. Group BD received 0.5% hyperbaric bupivacaine 12.5mg + 5µg dexmedetomidine and Group BF received 0.5% hyperbaric bupivacaine 12.5mg + 25 µg fentanyl. Qualitative data was analyzed by chi-square test. Quantitative data was analyzed by student 't' test.

Results: A total of 90 subjects were enrolled with 61 males and 29 females. Majority of subjects were between 31-40 years of age. The mean onset in Group BD was 12.04+/- 1.79 with the upper bound interval 12.5 and lower bound interval 11.5. The mean duration in Group BD was 150.2+/- 13.7 with the upper bound interval 154.3 and lower bound interval 146.06. In 2 patients of Group BD and 3 patients of Group BF it was till T6. In 2 patients of Group BD and 3 patients of Group BF it was till T7.

Conclusion: The mean time of onset of both sensory and motor analgesia was less in group BD as compared to group BF, although not statistically significant. The duration of motor blockade was almost similar in both the groups.

Keywords: Analgesia, Bupivacaine, Motor.

***Correspondence to:**

Dr. Anit Kumar Kajala,
PG Resident, Department of Anaesthesia,
Mahatma Gandhi Medical College, Jaipur, Rajasthan, India.

Article History:

Received: 30-11-2017, **Revised:** 25-12-2017, **Accepted:** 20-01-2018

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2018.4.1.125	

INTRODUCTION

The sole essence of anaesthesia is relief of pain in peri and post-operative period. General anaesthesia is associated with higher risks therefore regional anaesthesia especially spinal anaesthesia is most suitable for lower abdominal and lower limb surgeries. Spinal anaesthesia is defined as "the regional anaesthesia obtained by blocking nerves in subarachnoid space", is a popular and common technique. It is simple to perform, offers rapid onset of action, relatively less side effect and rapid patient turnover has made this the choice of many surgical procedures.

Traditionally amide and ester linked local anaesthetics have been used in regional anaesthetic techniques, and bupivacaine has emerged as the most commonly used drug for spinal anaesthesia. Various adjuvants (morphine, midazolam, clonidine etc.) have been used with local anaesthetics in spinal anaesthesia to avoid intra operative visceral and somatic pain and to provide prolonged post-operative analgesia.

Bupivacaine was synthesized in 1957 by Ekemstan and was first clinically used in 1963 by L. J. Telivuo it is a local anaesthetic agent with long duration of action.[1] Lund et al,1970 conducted clinical and laboratory studies on bupivacaine in 500 cases and found that onset of analgesia is achieved in 21 min. The regression of analgesia varied from 2-4 hours and duration of analgesia was 4-7.5 hrs. Total concentration of bupivacaine in spinal fluid appeared after 30-40 min and low concentration remained in spinal fluid for prolonged period of time. The incidence of nausea, vomiting, headache, urinary retention was rare. No postoperative neurological complication was seen.[2] According to Nishiyama et al, epidural midazolam together with bupivacaine provides central analgesia, sedative and amnesic effects in addition to its spinally mediated analgesia. Thus it is useful in managing the post-operative pain.[3]

This study is designed to compare the effect of dexmedetomidine with bupivacaine versus fentanyl with bupivacaine for spinal anaesthesia in lower abdominal and lower limb surgeries.

MATERIALS AND METHODS

The study was conducted amongst subjects undergoing elective lower abdominal and lower limb surgeries under spinal anaesthesia in Mahatma Gandhi hospital, Jaipur. After institutional ethical committee approval, 90 patients aged between 18 and 60 years undergoing elective lower abdominal, lower limb surgeries under spinal anaesthesia were selected. A detailed history, complete physical examination and routine investigations were done for all patients followed by informed written consent. The study population was randomly divided into 2 groups with 45 patients in each group. Group BD received 0.5% hyperbaric bupivacaine 12.5mg + 5µg dexmedetomidine and Group BF received 0.5% hyperbaric bupivacaine 12.5mg + 25 µg fentanyl. Patients with medical complications like anaemia, heart disease, severe hypovolemia, shock, septicaemia, hypertension, coagulation disorders were excluded from the study.

Procedure: IV line was secured, preloading with 10ml/kg/hr of ringer lactate was done, under aseptic precautions lumbar puncture at L_3-L_4 interspace using a 25G spinal needle with patient in left lateral position was performed. The study drug was injected into the sub arachnoid space after noting the clear free flow of CSF at the rate of 1ml given in 3 secs with the operating table kept flat. Patients were turned supine immediately and are given supplemental oxygen 2-4L/min. Hemodynamics changes were assessed. Pin prick using hypodermic needle was used to assess the sensory blockage. Motor blockage was tested by modified bromage scale. Sedation was assessed using Ramsay sedation scale (RSS) before the block and then every 15 minutes. Duration of effective analgesia was assessed using visual analogue scale. All the patients are instructed about VAS and to point out the intensity of pain on the Scale 0-no pain, 10-worst pain. Side effects and complications were also noted. All the data was arranged in a tabulated form and analysed using SPSS software. Qualitative data was analyzed by chi-square test. Quantitative data was analyzed by student 't' test. Probability value less than 0.05 was considered significant.

Table 1: Onset of sensory analgesia

Group	N	Mean	Std Deviation	Std Error	Lower bound interval	Upper bound interval	Minimum	Maximum
BD	45	6.956	1.8210	.2715	6.408	7.503	4.0	12.0
BF	45	7.378	2.4054	.3586	6.655	8.100	4.0	12.0
Total	90	7.167	2.1319	.2247	6.720	7.613	4.0	12.0

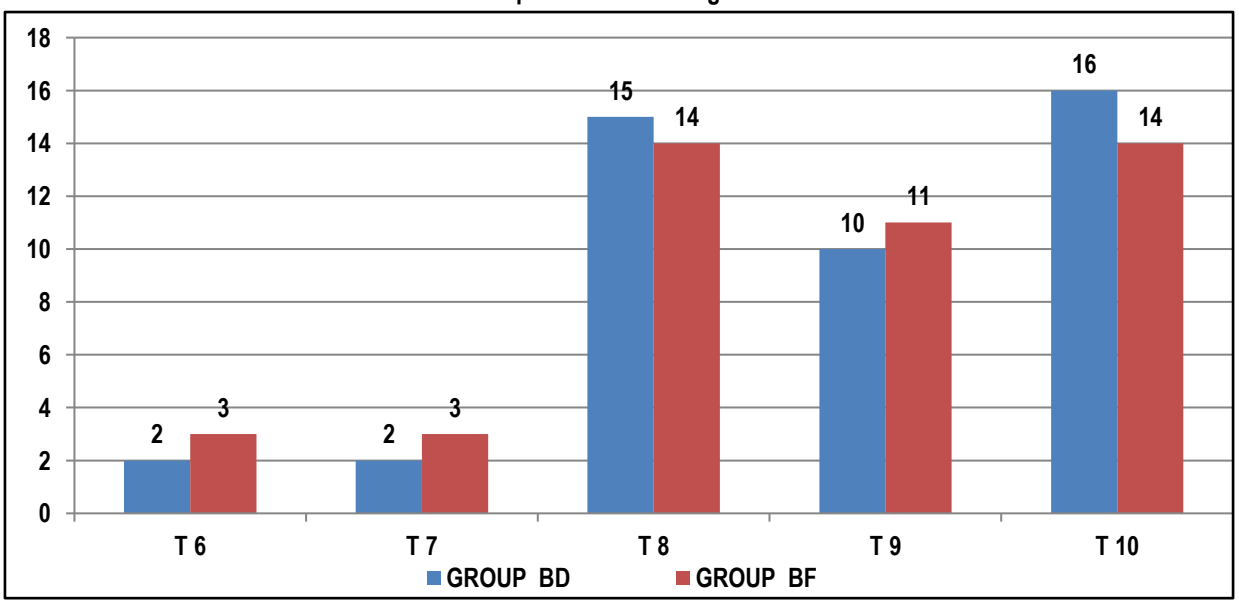
Table 2: Onset of motor blockade

Group	N	Mean	Std Deviation	Std Error	Lower bound interval	Upper bound interval	Minimum	Maximum
BD	45	12.044	1.7959	.2677	11.505	12.584	9.0	17.0
BF	45	12.000	1.2792	.1907	11.616	12.384	9.0	15.0
Total	90	12.022	1.5505	.1634	11.697	12.347	9.0	17.0

Table 3: Duration of motor blockade

Group	N	Mean	Std Deviation	Std Error	Lower bound interval	Upper bound interval	Minimum	Maximum
BD	45	150.200	13.7735	2.0532	146.062	154.338	112.0	174.0
BF	45	156.622	13.3012	1.9828	152.626	160.618	109.0	175.0
Total	90	153.411	13.8450	1.4594	150.511	156.311	109.0	175.0

Graph 1: Level of analgesia



RESULTS

A total of 90 subjects were enrolled with 61 males and 29 females. Majority of subjects were between 31-40 years of age.

Table 1 shows the onset of sensory analgesia. The mean onset in Group BD was 6.9+/- 1.8 with the upper bound interval 7.5 and lower bound interval 6.4. The mean onset in Group BF was 7.3+/- 2.4 with the upper bound interval 8.1 and lower bound interval 6.6. The minimum and maximum values in both the groups were 4 and 12 respectively. On applying chi square test, the P-Value was 0.49884. The result is not significant at $p > 0.05$

Table 2 shows the onset of motor block. The mean onset in Group BD was 12.04+/- 1.79 with the upper bound interval 12.5 and lower bound interval 11.5. The mean onset in Group BF was 12.00+/- 1.27 with the upper bound interval 12.38 and lower bound interval 11.6. The minimum value in both the groups was 9 and maximum values in both the groups were 17 and 15 respectively. On applying chi square test, the P-Value was 0.491878. The result is not significant at $p > 0.05$.

Table 3 shows the duration of motor block. The mean duration in Group BD was 150.2+/- 13.7 with the upper bound interval 154.3 and lower bound interval 146.06. The mean duration in Group BF was 156.6+/- 13.3 with the upper bound interval 160.6 and lower bound interval 152.6. The minimum value in both the groups was 112 and 109 respectively and maximum values in both the groups were 174 and 175 respectively. On applying chi square test, the P-Value was 0. 666022. The result is not significant at $p > 0.05$

Graph 1 shows the level of analgesia in both the groups. In 2 patients of Group BD and 3 patients of Group BF it was till T6. In 2 patients of Group BD and 3 patients of Group BF it was till T7. In 15 patients of Group BD and 14 patients of Group BF it was till T8. In 10 patients of Group BD and 11 patients of Group BF it was till T9. In 16 patients of Group BD and 14 patients of Group BF it was till T10.

DISCUSSION

Spinal anesthesia is the most preferred regional anesthesia technique as it is easy to perform, produces rapid onset of anesthesia and complete muscle relaxation and is also economical. These advantages are sometimes offset by a relatively short duration of action. The aim of intrathecal local anesthetic is to provide adequate sensory and motor block necessary for all infra-umbilical surgeries. Hyperbaric bupivacaine is the most commonly used intrathecal local anesthetic. Various adjuncts have been added to bupivacaine to shorten the onset of block and prolong the duration of block. In our study, the mean onset of sensory analgesia in Group BD was 6.9+/- 1.8 with the upper bound interval 7.5 and lower bound interval 6.4. The mean onset in Group BF was 7.3+/- 2.4 with the upper bound interval 8.1 and lower bound interval 6.6. The minimum and maximum values in both the groups were 4 and 12 respectively. On applying chi square test, the P-Value was 0.49884. The result is not significant at $p > 0.05$.These findings were in concordance with the results of a previous study Al Ghanem et al(2009)[4] where no difference in the onset time in patients receiving dexmedetomidine (7.5 ± 7.4 min) and fentanyl (7.4 ± 3.3 min) as adjuvants to isobaric bupivacaine ($P = 0.95$) was observed. Mahendru et al (2013)[5] also found that the time of onset of both, sensory and motor block was statistically insignificant in all the groups of the study comparing dexmedetomidine, clonidine and fentanyl. In the present study, the mean duration in Group BD was 150.2+/- 13.7 with the upper bound interval 154.3 and lower bound interval 146.06. The mean duration in Group BF was 156.6+/- 13.3 with the upper bound interval 160.6 and lower bound interval 152.6. The minimum value in both the groups was 112 and 109 respectively and maximum values in both the groups were 174 and 175 respectively. On applying chi square test, the P-Value was 0. 666022. The result is not significant at $p > 0.05$. Rajni gupta et al (2011)[6] found that Patients in dexmedetomidine group (D) had a significantly longer sensory and motor block time than patients in fentanyl group (F). They concluded that Intrathecal dexmedetomidine is associated with prolonged motor and sensory block, hemodynamic stability, as compared to fentanyl. Nayagam HA et al (2014)[7], in a similar study found that there to reach T10 segment block ($P > 0.05$) and TTSR ($P > 0.05$);time to reach PSBL ($P < 0.05$) and modified Bromage scales ($P < 0.05$) were significant. PSBL ($P = 0.000$) and time to first analgesic request ($P = 0.000$) were highly significant. Malinow AM et al[8] undertook a trial on eighty women for postpartum tubal ligation under spinal anaesthesia. They found that the simultaneous administration of epinephrine and fentanyl prolonged the duration of complete analgesia and the administration of epinephrine decreased the incidence of pruritis associated and intrathecal fentanyl. Egon Lanz et al[9] did a double blind study of epidural buprenorphine, for post-operative analgesia, in a randomized, double blind study of 158 patients given epidural anaesthesia with mepivicaine or bupivacaine for orthopedics surgery of the lower extremity. Analgesia after 0.15 mg buprenorphine was superior to that after no re-injection for 6 hours after surgery. Buprenorphine 0.3 mg was superior both to no re-injection and to 0.15 mg of buprenorphine until 12th hour. Neimi et al (1994) saw that intrathecal clonidine prolonged duration of spinal analgesia and motor block along with significant decrease in MAP and heart rate.[10] In a study by Kararmaz A. et al, evaluated the effects of low dose Bupivacaine plus Fentanyl administered intrathecaly in elderly patients undergoing transurethral prostatectomy. This study showed addition of Fentanyl to local anesthetic provides adequate analgesia with few side effects. Motor block was higher and duration was prolonged.[11] According to Kuusniemi et al concluded that addition of Fentanyl 25 µg to low dose Bupivacaine 5 mg resulted in short motor blocks whereas 25 µg Fentanyl with Bupivacaine 10 mg increased the intensity and duration of motor block.[12]

CONCLUSION

Dexmedetomidine seems to be an attractive alternative to fentanyl as an adjuvant to spinal bupivacaine in surgical procedures. The mean time of onset of both sensory and motor analgesia was less in group BD as compared to group BF, although not statistically significant. The duration of motor blockade was almost similar in both the groups.

REFERENCES

1. Robert K. Stoelting: Pharmacology and Physiology in Anaesthetic practice, 3rd Edition; Lippincott -Raven, 1999:158-79.
2. Lund, P. C., Cwik, J. C. and Gannon, R. T. (1974), Etidocaine (Duranest R): A Clinical and Laboratory Evaluation. Acta Anaesthesiologica Scandinavica, 18: 176–188. doi: 10.1111/j. 1399-6576. 1974. tb00858.x Anesth Analg. 1992 May;74(5):653-7.

3. Bengt Akerman, Ewa Arwestrom and Claase Post et al. Local anaesthetics potentiate spinal Morphine antinociception, Anesth Analg 1988 (67): 943-9.
4. Al-Ghanem SM, Massad IM, Al-Mustafa MM, Al-Zaben KR, Qudaisat IY, Qatawneh AM and Abu-Ali HM. Effect of Adding Dexmedetomidine versus Fentanyl to Intrathecal Bupivacaine on Spinal Block Characteristics in Gynecological Procedures: A Double Blind Controlled Study. Am J Appl Sci 2009;6:882-7.
5. Mahendru, et al. A comparison of intrathecal dexmedetomidine, clonidine, andfentanyl as adjuvants to hyperbaric bupivacaine for lower limbsurgery: A double blind controlled study Journal of Anaesthesiology Clinical Pharmacology October-December 2013; 29(4).
6. Gupta R, Verma R, Bogra J, Kohli M, Raman R, Kushwaha JK. A Comparative study of intrathecal dexmedetomidine and fentanyl as adjuvants to Bupivacaine. Journal of anaesthesiology, clinical pharmacology. 2011 Jul;27(3):339.
7. Nayagam HA, Singh NR, Singh HS. A prospective randomised double blind study of intrathecal fentanyl and dexmedetomidine added to low dose bupivacaine for spinal anesthesia for lower abdominal surgeries. Indian journal of anaesthesia. 2014 Jul;58(4):430.
8. Malinow AM, Naulty JS, Hunt CO, Datta S, Ostheimer GW. Precordial ultrasonic monitoring during cesarean delivery. Anesthesiology. 1987;66(6):816–819.
9. Lanz E, Simko G, Theiss D, Glocke MH. Epidural buprenorphine--a double-blind study of postoperative analgesia and side effects. Anesthesia and analgesia. 1984 Jun;63(6):593-8.
10. NIEMI L. Effects of intrathecal clonidine on duration of bupivacaine spinal anaesthesia, haemodynamics, and postoperative analgesia in patients undergoing knee arthroscopy. Acta anaesthesiologica scandinavica. 1994 Oct 1;38(7):724-8.
11. Kararmaz. A. Kaya S, Turhanoglu. S. et al., "Low dose bupivacaine Fentanyl spinal anaesthesia for transurethral prostetectomy", Anaesthesia 2003. 58 (6): 526 -30.
12. Kristiina S. Kuusniemi, Kalevi K. P. et al "The Use of bupivacaine and Fentanyl for spinal anaesthesia for urological surgery", Anesth Analg 2000 (91): 1452-1456.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Anit Kumar Kajala, Prakash Gupta, D. D. Jethava, Priyambada Gupta, Durga Jethava. Comparison of Anaesthetic Efficacy of Dexmedetomidine with Bupivacaine Versus Fentanyl with Bupivacaine for Spinal Anaesthesia. Int J Med Res Prof. 2018 Jan; 4(1):578-81.
DOI:10.21276/ijmrp.2018.4.1.125