Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i2.4479

COMPARE EFFECTIVENESS OF EPIDURAL BUPIVACAINE WITH TRAMADOL & ROPIVACAINE WITH TRAMADOL IN CASES OF INTRA ABDOMINAL SURGERIES FOR PROVIDING POST OPERATIVE ANALGESIA.

Dr. Shweta S Mehta[1], Dr. Aditiba Gohil[2*], Dr. Nikunj H. Patel[3], Dr. Rohit L. Chauhan[4]

[1]Professor, Department of anesthesiology, Narendra Modi medical College, L.G. hospital , ahemdabad
[2*]Resident, Department: anesthesiology , Narendra Modi medical College
[3]2nd year Resident, Department of Anaesthesiology, Narendra Modi Medical college
[4]1st year Resident, Department of Anaesthesiology, Narendra Modi Medical college

[*]**Corresponding Author:** Dr. Aditiba Gohil
[*]Resident, Department: anesthesiology , Narendra Modi medical College

Background:
Central neuraxial blockade in form of epidural anesthesia is considered as a good technique to provide complete and dynamic anesthesia. Its benefit include suppression of stress response by sympatholysis, stable Hemodynamic's with reduction in cardiac morbidity, reduction in pulmonary compression due to its allowance for active physiotherapy, early mobilization, reduced blood loss and decrease in thromboembolic complication following surgery . It also avoids thin disadvantage associated with general anesthesia such as airway manipulation, poly-pharmacy, etc.
Epidural analgesia is often used with General anesthesia for surgical procedure in patient of all ages with moderate to severe comorbid disease. Use of epidural anesthesia technique using local anesthetic agent along with adjuvant drugs gaining popularity due to better success rate, patient satisfaction, faster recovery.
Aim: of this study is to study efficacy and safety of Bupivacaine and Ropivacaine with tramadol in providing analgesia, duration of analgesia, any side effect or complication following administration & any hemodynamic instability following administration.
Materials and methods: Comparative observation study was carried out in 60 patients between age of 18-75 years of age, A,SA grade 1/2 undergoing abdominal surgeries.
Randomly two groups :
1.Received injection 10 ml of 0.125 % of Bupivacaine + 50 mg tramadol.
2.Received injection 10 ml of 0.125 % of Ropivacaine + 50 mg tramadol.
Results: Epidural analgesia have been demonstrated to improve post-operative outcome, improve pain relief, patient satisfaction, and reduced morbidity in patient operated for abdominal surgeries.
Conclusion: -Ropivacaine is a long acting compare to Bupivacaine , it is equally effective for Epidural anesthesia and less cardiotoxic. Use of opioid with local anesthesia for epidural analgesia has been associated with decreased pain scores and reduced anesthetic requirement in post-operative period.
-Stable intraoperative hemodynamic parameters and duration of sensory blockage was more with Ropivacaine than in Bupivacaine .
-VAS was significantly higher with Bupivacaine than in Ropivacaine.

-However incidence of side-effects where observed in patients like bradycardia and hypotension. Overall both groups have no significant changes in of vitals. Also hypertension was common with Bupivacaine .

Keywords: Bupivacaine, Ropivacaine**,** Tramadol**,** General anesthesia with central neuraxial blockade**,** Epidural anesthesia and analgesia**,** Post operative analgesia

INTRODUCTION

Pain is an unpleasant effect associated with significant psychological and physiological changes.This can be overcome by the use of suitable anaesthesia and analgesia techniques. Multimodal Anesthesia Techniques are available for abdominal surgeries.

Clinical indications for Central neuraxial blockade have expanded significantly over past several decades.Central neuraxial blockade in the form of epidural anesthesia and analgesia is considered as a good technique to provide complete and dynamic anesthesia. Its benefits include suppression of stress response by sympatholysis, stable hemodynamics with reduction in cardiac morbidity, reduction in pulmonary complications due to its allowance for active physiotherapy,early mobilization, reduced blood loss and decrease in thromboembolic complications following surgery. It also avoids the disadvantages associated with general anesthesia such as airway manipulation, poly-pharmacy etc[1,2,3].

Epidural analgesia is often used with general anesthesia for surgical procedures in adult patients even with moderate to severe comorbid diseases.

In recent years, use of epidural analgesia technique using local anesthetic agents along with adjuvant drugs gaining popularity due to better success rate, patient satisfaction and faster recovery. Various adjuvants prolong its duration of action and decrease its requirement as well as to prevent high dose related toxicities of local anesthetic agents and to decrease requirement of rescue analgesia[7].

Bupivacaine is the most commonly used local anesthetic agent having satisfactory sensory and motor blockade with limited duration of action.

Ropivacaine, a newer long acting amide local anesthetic, is the stereoisomer of Bupivacaine. Being an S-enantiomer, it has lesser side effects compared to Bupivacaine and is increasingly replacing Bupivacaine because of its similar analgesic profile and lesser cardiotoxicity[4,5,6.]

Tramadol hydrochloride is a weak centrally acting analgesic commonly used as adjuvant with local anesthetic agents in epidural anesthesia[8,9].

AIMS AND OBJECTIVES

The present study was designed to compare effectiveness of epidural Bupivacaine with Tramadol and Ropivacaine with Tramadol in cases of intra-abdominal surgeries under general anesthesia for providing post-operative analgesia.

The Aims and Objectives of this study is as follow,

1)To study efficacy and safety of these durgs for providing analgesia in given doses.

2)To study duration of analgesia provided by these drugs.

3)To study any side effects or complications following administration of these drugs.

4)To study Hemodynamic stability following administration of these drugs.

MATERIALS AND METHODS

The comparative observational study was carried out in a total 60 patients between the age group of 18-75 years of age, American Society of Anesthesiologists (ASA) Grade I / II, undergoing abdominal surgeries. The patients were randomly divided into two groups (n=30).

- Group B: received injection 10 ml of 0.125% Bupivacaine + 50mcg Tramadol.
- Group R: received injection 10 ml of 0.125% Ropivacaine + 50mcg Tramadol.

DURATION OF STUDY- June 2022 to December 2023.

Exclusion criteria
- Patient's refusal.
- Patients with coagulopathy, spinal deformity and infection at the site of anaesthesia.
- Patients with a history of drug allergy.
- Patients with a history of alcohol or drug abuse,head injury or psychiatric illness.
- ASA grade 3 or more.
- Patients using any drug that modifies pain perception & on anticoagulants.

Pre-anesthetic assessment
All patients included in the study were thoroughly examined on the day prior to surgery and detailed pre-anesthetic examination was carried out. A history of any present or past illness and detailed general as well as systemic examination was done and routine blood investigations and chest radiograph and ECG were noted. The procedure & VAS score was explained and written informed consent was taken. Patients were advised to maintain nil by mouth for 6 to 8 hours prior to surgery.

Operation theatre
Preparation
Monitoring gadgets were attached to patienst like ECG, Non-Invasive Blood Pressure (NIBP) and SpO_2.
Baseline vitals like Pulse, Blood Pressure, Respiratory Rate and SpO_2 were recorded.
An IV cannula was inserted and Lactated Ringer's solution or Normal Saline was started at the rate of 10 ml/kg/hour.

Procedure
- **Position of the patient**: Sitting

Under all aseptic and antiseptic precautions, via a midline approach, epidural space was located at the L3-L4/L2-L3 level with the help of an 18G Tuohy needle using the hanging drop & loss of resistantance method. The space is confirmed by negative aspiration and Epidural catherter is inserted and fixed properly.
The patients were then positioned in supine position and general anesthesia given.

Premedication
Inj. Ondansetron 4 mg i.v.
Inj.Glycopyrrolate 0.004mg/kg i.v
Inj. Fentanyl Citrate 1mcg/kg i.v
Inj.Lignocaine hydrochloride 1mg/kg i.v given.

Induction
Inj. Propofol 2mg/kg iv given.
Inj.Suxamethonium Chloride 2mg/kg i.v
Maintainance-50% O_2+50% N_2O+sevoflurane
Inj.Atracurium 0.5mg/kg loading dose followed by 0.1mg/kg maintainance dose.
At the time of skin closure Epidural injection of Ropivacaine 0.125% or Bupivacaine 0.125%,both along with 50mcg Tramadol 10ml given.Later these patinets were examined on 5 mins,10 mins,15 mins 30 mins and 1 hour after giving these drugs for any changes in vital parameters and side effects. The patients were reversed with Inj.Neostigmine 0.05mg/kg and Glycopyrrolate 0.008mg/kg.After completion of reversal these patients then shifted to post-operative ward.There in post-operative ward all monitoring gadgets including pulse oximetry,non-invasive blood pressure monitoring and ECG were attached and patients were examined post-operatively for any complications and vital parameters.

In post operative ward these patients were examined every hourly starting from 2 hours of epidural injection for complain of pain.The pain was assessed by Visual Analogue Scale(VAS) and the time for the demand for analgesia was noted.
All 60 patients were extubated within 30 minutes after giving Epidural doses of These drugs.Pain assessed using VAS score after extubation till VAS score reaches at the level of 4.
No analgesia was given unless requested by the patient or VAS score≥4.After which,Injection Diclofenac 75mg IM was given as rescue analgesia.

STATISTICAL ANALYSIS:
Data were collected,tabulated & then analysed using Graphed PR
Numerical variables were presented as Mean & Standard Deviation(SD).While categorical variables were presented as percentage(%).
As regard numerical variables;unpaired student-t test was done.
The inferences based on value were made as follows:

p>0.05	Not significant
P<0.05	Significant
P<0.001	Strongly Significant

OBSERVATION AND RESULT
The study was done on 60 patients divided into 2 groups, Group R (Ropivacaine+Tramadol) and Group B(Bupivacaine + Tramadol) by random allocation. They belonged to the age group between 18-75 years and were undergoing elective Intra-abdominal surgeries under General anesthesia like umblical Hernia,inguinal Hernia,laparotomy for ruptured appendix etc. which lasted for 2 or 3 hours

Table 1-Demographic data

	Group-R	Group-B	P-value
Age(years)	32.13±5.49	31.83±5.81	0.8379
Weight(kg)	56.63±6.12	58.77±3.70	0.1066
Height(cm)	156.33±8.44	160.13±8.34	0.0847
BMI	23.21±2.08	23.11±2.96	0.8802

The demographic data is comparable for all groups of patients.

Table 2-Sex and ASA grading

Group-R		Group-B		Total patients
Males-13	Females-17	Males-12	Females-18	30
ASA Grade I-8	ASA Grade II-22	ASA Grade I-7	ASA Grade II-23	30

Table 3-Duration of Surgery

	Group-R	Group-B	P-value	Significance
Duration of surgery	117.5±21.45	121.67±15.50	0.3917	Not Significant

Duration of surgery was comparable among both Groups.

Table 4-Pulse Rate

Time	Group-R		Group-B		P value	Significance
	Mean	SD	Mean	SD		
Pre-operative pulse	78.90	4.59	78.43	5.96	0.7334	Not Significant
Before giving Drugs	80.90	4.22	78.67	5.33	0.0776	Not significant
5 Minutes	78.60	3.38	77.27	4.43	0.1963	Not Significant

10 Minutes	78.00	4.31	77.87	5.03	0.9148	Not Significant
15 Minutes	77.80	4.69	76.37	6.64	0.3393	Not significant
30 Minutes	79.17	4.03	77.33	4.37	0.0954	Not Significant
60 Minutes	79.00	4.13	77.37	4.26	0.1378	Not Significant
120 Minutes	79.03	3.46	77.37	4.66	0.1227	Not Significant
180 Minutes	79.47	3.50	77.63	4.66	0.0891	Not Significant
240 Minues	78.93	4.24	77.43	4.02	0.1650	Not Significant
300 Minutes	79.47	3.30	77.83	3.68	0.0743	Not Significant
360 Minutes	79.33	4.51	80.43	3.11	0.2760	Not Significant
420 Minutes	80.03	4.44	78.43	3.04	0.1088	Not Significant
480 Minutes	79.27	3.32	78.37	3.06	0.2794	Not Significant
540 Minutes	78.27	3.70	79.77	3.00	0.0899	Not Significant
600 Minutes	79.00	3.38	79.17	2.41	0.8233	Not Significant

Table 4 shows changes in Pulse Rate after giving Ropivacaine with Tramadol and Bupivacaine with Tramadol.

Table-4 shows changes in pulse rate that is comparable in both the groups($p>0.05$).

Table 5-Systolic Blood Pressure

Time	Group-R		Group-B		P value	Significance
	Mean	SD	Mean	SD		
Pre-operative SBP	123.47	8.58	122.33	6.28	0.5593	Not Significant
Before giving Drugs	122.53	6.76	123.27	6.20	0.1824	Not Significant
5 Minutes	121.40	8.46	120.93	5.84	0.8031	Not Significant
10 Minutes	122.73	6.74	121.20	7.75	0.4179	Not significant
15 Minutes	122.47	7.00	119.40	7.76	0.1130	Not Significant
30 Minutes	120.47	5.53	117.47	6.97	0.0699	Not Significant
60 Minutes	121.93	5.42	120.33	6.15	0.2895	Not Significant
120 Minutes	121.40	5.01	120.40	5.42	0.4610	Not Significant
180 Minutes	121.73	5.72	121.00	5.94	0.6296	Not Significant
240 Minues	121.07	5.06	120.73	5.34	0.8011	Not Significant
300 Minutes	121.60	5.37	121.73	5.58	0.9271	Not Significant
360 Minutes	121.67	4.67	121.53	4.63	0.9076	Not Significant
420 Minutes	121.93	5.74	122.33	5.44	0.7827	Not Significant
480 Minutes	120.93	4.66	122.27	4.63	0.2685	Not Significant
540 Minutes	122.20	4.99	122.13	4.75	0.9558	Not Significant
600 Minutes	122.27	4.19	122.53	4.42	0.8159	Not Significant

Table 5 shows changes in Systolic Blood Pressure before and after giving above mentioned drugs.

Table 5 shows changes in Systolic Blood Pressure,that is comparable among both the study group($p>0.05$).

Table 6-Diastolic Blood Pressure

Time	Group-R		Group-B		P value	Significance
	Mean	SD	Mean	SD		
Pre-operative DBP	78.60	4.43	80.07	4.74	0.2196	Not Significant
Before giving Drugs	78.07	4.56	80.07	4.35	0.0875	Not Significant
5 Minutes	79.07	3.96	79.60	3.42	0.5812	Not Significant
10 Minutes	79.73	3.47	79.80	4.71	0.9480	Not Significant
15 Minutes	79.47	3.52	79.20	4.74	0.8031	Not Significant
30 Minutes	78.87	3.78	78.07	4.15	0.4382	Not significant
60 Minutes	80.47	3.27	80.07	3.58	0.6531	Not Significant

120 Minutes	80.40	2.90	79.33	3.25	0.1837	Not Significant
180 Minutes	79.27	3.54	80.13	3.32	0.3358	Not Significant
240 Minutes	80.33	3.33	80.33	3.11	1.0000	Not Significant
300 Minutes	80.80	3.35	79.67	2.58	0.1487	Not Significant
360 Minutes	80.40	2.90	80.00	2.41	0.5635	Not Significant
420 Minutes	80.33	3.11	79.80	3.08	0.5098	Not Significant
480 Minutes	81.00	1.95	80.60	2.58	0.5008	Not Significant
540 Minutes	80.47	2.86	80.13	2.57	0.6300	Not Significant
600 Minutes	80.47	3.05	80.33	2.58	0.8485	Not Significant

Table 6 shows changes in diastolic Blood Pressure that is comparable among both the groups($p>0.05$).

Table 7-Mean Blood Pressure

Time	Group-R		Group-B		P value	Significance
	Mean	SD	Mean	SD		
Pre-operative MBP	92.02	5.54	94.01	4.77	0.1414	Not Significant
Before giving Drugs	93.33	3.97	94.32	4.37	0.3622	Not Significant
5 Minutes	93.04	4.65	93.24	3.69	0.8542	Not Significant
10 Minutes	93.92	3.84	93.46	5.27	0.7006	Not Significant
15 Minutes	93.66	3.51	92.47	5.09	0.2962	Not Significant
30 Minutes	92.59	3.65	91.07	4.03	0.1312	Not Significant
60 Minutes	94.15	3.29	93.35	3.59	0.3719	Not Significant
120 Minutes	93.93	2.63	93.93	2.63	1.0000	Not Significant
180 Minutes	93.28	3.50	93.62	3.83	0.7210	Not Significant
240 Minutes	93.67	2.95	93.78	3.46	0.8950	Not Significant
300 Minutes	94.26	3.28	93.55	3.16	0.3967	Not Significant
360 Minutes	94.02	2.94	93.71	2.74	0.6742	Not Significant
420 Minutes	94.06	3.39	93.84	3.57	0.8075	Not Significant
480 Minutes	94.18	2.29	94.35	2.85	0.7999	Not Significant
540 Minutes	94.24	2.91	93.99	2.76	0.7340	Not Significant
600 Minutes	94.26	3.05	94.26	2.41	1.0000	Not Significant

Table 7 shows variation in Mean Blood Pressure that is comparable in both these groups($p>0.05$).

Table 8-Side Effects

	Group-R	Group-B
Hypotension	0	1
Bradycardia	0	2
Dryness of Mouth	0	0
Itching	0	0
Nausea/Vomiting	0	0
Headache	0	0
Giddiness	0	0
Sedation	0	0

Group-R:Ropivacaine with Tramadol,Group-B:Bupivacaine with Tramadol

In study,No side effects seen in Group-R patients(Ropivacaine with Tramadol) and very few side effects(Hypotension,Bradycardia) seen in Group-B patients(Bupivacaine with Tramadol).

Table 9-Duration of analgesia

Parameter	Group-R(n=30)	Group-B(n=30)	Significance
Time(mins)	412±46.56	278±40.12	P<0.0001,Extremely Significant

Table 9 shows that there is a significant difference between duration of analgesia provided by these drugs.Ropivacaine+Tramadol is having much longer duration of post-operative analgesia as compared to Bupivacaine+Tramadol.

DISCUSSION

- Epidural analgesia have been demonstrated to improve post-operative outcome,improve pain relief,patient satisfaction and reduced morbidity in patients operated for abdominal surgeries.Rodger A et al shows reduction of post-operative mortality and morbidity with epidural anethesia[17].
- Ropivacaine is a long-acting amide-type local anesthetic. In comparison with bupivacaine, it is equally effective for epidural analgesia. Ropivacaine because of its pure S-enantiomer form is less cardio toxic than Bupivacaine[18]. The use of opioids with local anesthetic for epidural anesthesia has been associated with decreased pain scores and reduced analgesic requirement in the post-operative period . Gunion et al reported that opiate analgesia provide effective pain relief and are widely used for control of mild to severe pain[19,20].
- The demographic data were comparable in both the groups of our study[21].
- In this study all the hemodynamic parameters (Pulse & Blood pressure) of both the groups were comparable and were clinically & statistically insignificant[39]. BHAVANA R et al, mentioned that stable intraoperative hemodynamic parameters were achieved with epidural Ropivacaine 0.75% as compared to bupivacaine 0.5%.
- Duration of sensory blockade was longer in group R compared to group B which was clinicaly significant. Finucane BT et al have also shown that increasing the concentration of ropivacaine (from 0.5 to 0.75%) resulted in greater degree & longer duration of sensory block, a positive correlation between the total dose of ropivacaine and the sensory block profile have also been demonstrated[23].
- The time for first request of analgesic (duration of analgesia) was between 365-450 min(408±41.9)min in group R which was significantly higher as compared to 245-300 min(275.0±33.5)min in Group-B. ($P < 0.0001$).
- VAS was significantly higher value in Group-B than Group-R. There was significantly prolonged duration of analgesia in all the patients enrolled in the group R over group B[20,25].
- A low incidence of side effects was observed in our study. One patient (3.33%) had hypotension, two patients (6.66%) had bradycardia. Overall,patients remain stable in both groups and no statistically or clinically significant changes were obsereved among both the groups. SARA K et al, also noted that vital sign were stable in all the patients throughout the study. They also noted that hypotension was the most common side effect with bupivacaine.

CONCLUSION

From our study we have concluded that Tramadol can be safely used along with local anesthetics for epidural analgesia. Ropivacaine is better agent then Bupivacaine for providing post operative analgesia with longer duration, less side effects and hemodynamic stability in patients operated for elective intra abdominal surgeries under general anesthesia.

BIBLIOGRAPHY

1. SM, N., Benefit and outcome after epidural analgesia. Contin Educ Anaesth Crit Care Pain, 2004. 4: p. 44-7.
2. Park WY, T.J., Lee KK, Effect of epidural anesthesia and analgesia on perioperative outcome: A randomized, controlled Veterans Affairs cooperative study. Ann Surg, 2001. 234: p. 560-9.

3. Moraca RJ, S.D., Thirlby RC, The role of epidural anesthesia and analgesia in surgical practice. Ann Surg, 2003. 238: p. 663-73.
4. Santos AC, A.G., Pedersen H, Morishima HO, Finster M, Covino BG, Systemic toxicity of Ropivacaine durine ovine pregnancy. Anesthesiology, 1991. 75: p. 137-41.
5. McClellan KJ, F.D., Ropivacaine, an update of its use in regional anesthesia. Drugs 2000. 60: p. 1065-93.
6. Feldman HS, C.B., Comparative motor-blocking effects of Ropivacaine and Bupivacaine, a new amino amide local anesthetic, in the rat and dog. Anesth Analg, 1988. 67: p. 1047-52.
7. Hindle A.Intrathecal opioids in the management of acute post-operative pain.Continuing Education in Anesthesia,Critical Care & Pain.2008;8:82-85.
8. Vikers MD,O'Flaherty D,Szekely SM,Read M,Yoshizumi J.Tramadol:pain relief by an opioid without depression of respiration.Anesthesia.1992;47:291-6.
9. Senel AC,Akyol A,Dohman D,Solak M.Caudal Bupivacaine-Tramadol combination for post-operative analgesia in pediatric herniorrhaphy.Acta Anesthesiol scand.2001;45:786-9.
10. Morgan Clinical Anesthesiology;4th edition:chapter 18:359-372.
12. Miller's Anesthesia,Eighth Edition,Volume 1;chapter 36:page-1028-1052.
13. Madsen H, Moller R J, Brosen K. Interaction between tramadol and phenprocoumon. Lancet. 1997;350:637.
14. Boeijinga JK, van Meegan E, van den E R, Schook CE, Cohen AF. Is there interaction between tramadol and phenprocoumon. Lancet. 1997;350:1552. 1
15. Reus VI, Rawitscher L. Possible interaction of tramadol and antidepressants . Am J Psychiatry. 2000;157:839.
16. Bernard JM, e.a., Comparison of intravenous and epidural Clonidine for postoperative patient controlled analgesia. Anesth Analg, 1995. **81**: p. 706-12.
17. Robert J Moraca,MD David G Sheldon MD,Ann surgery 2003,Nov,238(5):663-637.
18. Butterworth JF 4th,Strichartz GR. Molecular mechanism of local anesthesia: A review. Anesthesiology 1990;72:711-34.
19. Rajib bhattacharya, Indian journal of anaesthesia 2007:51(5):409-414.
20. Gunion MW, Marchionne AM, Anderson CTM. Use of the mixed agonist- antagonist nalbuphine in opioid based analgesia. Acute Pain 2004;6:29-39.
21. Binay Kumar, Aparna Williams et al. Anesth Essays Res 2011;5:190-5.
22. BhawnaRastogi, Kumkum Gupta et al. Saudi J Anaesth. 2013; 7: 142-5.
23. Finucane BT, Sandler AN, Mckenna J, Reid D, Milner AL, Friedlander M, et al. A double blind comparison of ropivacaine 0.5%, 0.75%, 1.0% and bupivacaine 0.5% injected epidurally in patients undergoing abdominal hysterectomy. Can J Anaesth 1996;43:442-9.
24. Sara Korula, Grace Maria George et al. Saudi J Anaesth 2011;5:277-81.
25. Ruchi Gupta, SimmerpreetKaur et al. J AnaesthesiolClinPharmacol. 2011 Jan- Mar; 27(1)