Original Research Article

Comparative study of an effect of tramadol and buprenorphine as a post-operative epidural analgesia

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Abstract

Background: The effective relief of pain is of the utmost importance to anyone treating patients undergoing surgery. The mainstay of postoperative pain therapy in many settings is still opioids. The most important side effect of opioids is respiratory depression that could result in hypoxia and respiratory arrest. Tramadol is a centrally acting opiate agent and have has less sedative action. Incidence of respiratory depression is also said to be very low and the quality of analgesia is said to be very excellent. **Methods:** The present study was carried out in the Department of Anaesthesiology of a tertiary care teaching hospital located in Maharashtra. The study includes 30 cases each group posted for surgery with age group of 20-60 yrs during the period of January to March 2003 with ASA grade I and II. Preoperative and postoperative parameters like Pulse rate, Blood pressure, respiratory rate and SPO2 were recorded. Onset and duration of analgesia recorded after administration of epidural analgesia. Degree of pain after epidural analgesia was measured by McGill pain score. All the data entered and analysed using Microsoft Excel and Graph pad. **Results:** 60 participants were randomly divided into two Groups i.e. group I (Tramadol) and group II (Buprenorphine). SaO2 of the group II patients showing decrease in percentage from 93.9% (S.D=1.768) preoperatively to 89.95% (S.D.=0.912) post operatively (P<0.001). The mean of onset of analgesia in Group II was 18.96 min as compared to 13.79 min among group I patients (z=7.79 P=0.001). 19(63.3%) cases of group II observed side effects as compared to 8(26.6%) cases among group I cases. (X2= 6.734 df=1, P=0.0095). **Conclusion:** The epidural tramadol can provide adequate and prolonged postoperative analgesia, without respiratory depression. This is special importance in surgeries to maintain optimal effective ventilation in order to prevent pulmonary complications. Tramadol has also better advantage in regards to the onset of analgesia, pain relief and side effects as compared to buprenorphine.

Key Word: Buprenorphine, Comparison, Epidural analgesia, Post-operative, Tramadol

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INTRODUCTION

Pain is an inevitable component of the postoperative period. It is a sense of damage, hurt fear and punishment to the patient. More than 80% of patients who undergo surgical procedures experience acute postoperative pain and approximately 75% of those with postoperative pain report the severity as moderate, severe, or extreme.[1] Although postoperative pain is self-limiting ,Pain relief has significant physiological benefits; hence, monitoring of pain relief is increasingly becoming an important postoperative quality measure.[2] Pain is inherently subjective, patient self-report is the primary basis of all pain assessments.[3] The effective relief of pain is of the utmost importance to anyone treating patients undergoing surgery. Despite years of advances in pain management, the mainstay of postoperative pain therapy in many settings is still opioids. The opiate analgesic drugs in common use are i.e. Morphine, Pethidine Pentazocin, Buprenorphine. The most important side effect of opioids is respiratory depression that could result in hypoxia and

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respiratory arrest.[2] Degree of respiratory depression rather than analgesic property influence or limits the use of any particular analgesic after major surgeries. Tramadol is a centrally acting opiate agent. Tramadol has less sedative action. Incidence of respiratory depression is also said to be very low and the quality of analgesia is said to be very excellent.[5,6] Tramadol is proved to be efficacious for treatment of post-operative pain following surgery. Tramadol can be routinely used to give postoperatively analgesia. Epidural analgesia with opiates has recently gained importance over *parentral* route. Hence the present study was conducted to assess the effect of epidural administration of Tramadol and Buprenorphine in relieving post-operative pain.

MATERIALS AND METHODS

The present study was carried out in the Department of Anaesthesiology of a tertiary care teaching hospital B J Medical College, Pune located in Maharashtra, India. The study includes 30 cases each group posted for abdominal surgery, perineal surgeries, orthopaedic and gynaecology surgeries with age group of 20-60 yrs during the period of January to March 2003 with ASA grade I and II. Inclusion criteria for the study were absence of any cardiac, respiratory, renal or other pathological condition that may affect the parameters for clinical evaluation of cardiorespiratory performance for the purpose trial. Patient must be not on psychotropic drugs, analgesia, anti inflammatory or other drugs influence sensation of pain. The study excludes the cases beyond the selected age group, suffering from any major medical illness, having mental illness, or under treatment for the same. The institutional ethical committee approval was taken prior to the study. The routine and specific investigation was carried out to rule out any diseases. Preoperative and postoperative parameters like Pulse rate, Blood pressure, respiratory rate and SPO_2 were recorded. Premedication 06 mg atropine I.M. 30 min before surgery was given. All patients were operated under epidural anaesthesia using Lignocaine 2% with Soda-bicarb and Adrenaline (5ug/ml). In the postoperative period in the recovery room patient observed for vital sings and asked for pain with effect of epidural anaesthesia was weaning off pain appeared. Epidural analgesia given either single dose of tramadol (1-2 mg/kg diluted with10c of normal saline or distilled water in Group I and Inj. buprenorphine 2-3 ug/kg diluted with 10 ml of normal saline or distilled water injected epidural in group II among the randomly selected cases. 30 cases were included respectively for both the group. No systemic analgesia was administered in patient until they complained persistent pain. All patients were monitored for 24 hours. Onset of analgesia recorded in minutes after administration of epidural analgesia. Duration of analgesia score recorded in hours after onset of analgesia. Degree of pain after epidural analgesia measured by McGill pain score[7] (No pain =0, Slight pain =1, Moderate pain=2, Severe pain 3, Excrubating=4.). All the data entered cleaned and analysed using Microsoft Excel. Frequency distribution was used. Graph pad was used for statistical analysis.

RESULTS

The present study includes 60 participants which were randomly divided into two Groups i.e. Group I (Tramadol) and group II (Buprenorphine). As Table 1 shows the age-sex and weight wise distribution of the cases among two groups. The difference in the distribution was not statistically significant. The base line data was matching among both the group. It was seen from Table 2 that the change in parameters observed among two groups preoperative as well as postoperatively. The variation among the pulse, SBP, DBP and Respiratory Rate is comparable and not changed among both the groups pre-post operatively. However by comparing SaO2 of the group II patients i.e. Buprenorphine showing decrease in percentage from 93.9% (S.D.=1.768) preoperatively to 89.95% (S.D.=0.912) post operatively and statistically found significant ($P<0.001$). Onset of analgesia in Group II was observed at 18.96 min as compared to 13.79 min among group I patients averagely. Maximum cases i.e.17(89.5%) observed onset of analgesia in 10-14 minutes in group I as compared to 2(10.5%) among group II cases. The distribution among the two groups is statistically significant. ($z=7.79$ $P=0.001$). Duration of analgesia shows maximum cases have between 13-15 hrs while in group II 10 cases between 10-12 hrs. The average time of duration of analgesia was 12.09 hrs. (S.D.=3.140) while it was 14.06 hrs. (S.D.=3.140) among group II cases. The distribution was not statistically significant ($Z=1.462$, $p=0.149$). Comparison of degree of pain among two groups shows that 22 cases (73.3%) having no pain as compared to 21 cases (70.0%) in group II. 7 cases (23.3%) among group II have slight pain as compared to 5 cases (16.7%) in group I. The difference is not statistically significant (As shown in Table 3). During the period of analgesia, both the groups of patients were observed for side effects. 19(63.3%) cases observed side effects as compared to 8(26.6%) cases among group I cases. This difference was found statistically significant. ($X^2= 6.734$ df=1, $P=0.0095$) (As shown in Table 4). Side effect wise it has been observed that three patients (17.6%) were sedation as compared to 14 patients (82.4%) in group II. Nausea and vomiting reported more in group II (5 cases) as compared to group I (2 cases).

Table 1: Age and Sex wise distribution of the study participants among both the group

Group	Age Group	Sex		Weight
	Mean ± S.D.	Male (%)	Female (%)	Mean ± S.D.
Group I- Tramadol	37.3 yrs.± 11.09 yrs. (Range 22-60yrs)	12 (40.0)	18 (60.0)	25.3 ± 9.8Kg (14 kg -45 kg)
Group II- Buprenorphine	36.8 yrs ± 11.06 yrs (Range 21-58yrs)	11 (36.6)	19(63.4)	22.4 ± 9.4Kg (11 kg -45 kg)
Result	P=0.68(NS)*	P=0.79 (NS)		P=0.24(NS)

*t test , †Chi -Square Test, ǂNS= Not significant

Table 2: Comparison of change in parameter preoperatively and post operatively among both the groups

Particulars	Group I (Tramadol) (n=30)		Group II (Buprenorphine) (n=30)	
	Pre-operative Mean (Range)	Post-operative Mean (Range)	Pre-operative Mean (Range)	Post-operative Mean (Range)
Pulse/min	80.03 (60-96)	80.46 (61-96)	81.13 (60-64)	79.42 (60-92.2)
SBP (mmHg)	122.3 (108-30	121.41 (110-130)	121.79 (108-136)	118.61 (105.5-131.5)
DBP (mmHg)	79.7 (68-90)	78.97 (69-90)	79.4 (66-90)	76.53 (66-88.1)
Respiratory rate	17.9 (22-15)	18.4 (16-22)	18.73 (21-16	18.59 (21-16)
SaO_2	93.73 S.D.=1.760	93.64 S.D.=1.743	93.90 S.D.=1.768	89.95 S.D.=0.912

Table 3: Comparison of the output variables among the two groups

No.	Output variables	Group I Tramadol (n=30)	Group II Buprenorphine (n=30)	Results
1	Onset of analgesia in Min.			t=7.78, p=0.001(SS)*
	Mean	13.79	18.96	
	S.D.	2.076	2.984	
	SEM	0.379	0.544	
2	Duration of analgesia in Hrs.			t=1.462, p=0.149(NS)*
	Mean	12.9	14.06	
	S.D.	3.009	3.140	
	SEM	0.549	0.573	
3	Degree of pain			Z-Score-0.11828. P=0 .90448(NS)
	No pain (0)	22(73.3)	21(70.0)	
	Slight pain (1)	05(16.7)	07(23.3)	
	Moderate pain (2)	02(6.7)	02(6.7)	
	Severe pain (3)	01(3.3)	00(0.0)	

*t-test † Mann Whitney U test ǂSS=Statistically Significant, § NS=Not Significant

Table 4: Comparison of the presence of the side effects among the two groups

Group	Side effects		Total
	Present	Absent	
Group I (Tramadol)	8(26.6)	22(73.4)	30
Group II (Buprenorphine)	19 (63.3)	11(36.7)	30
Total	27(45.0)	33(55.0)	60

*X^2= 6.734, †df=1, ǂP=0.0095.

DISCUSSION

The main practical problem in effective management of postoperative pain is to ensure that the patient gets relief at the appropriate time without any complications/side effects. In the postoperative period tissue trauma causes reflex muscle spasm of intercostals and anterior abdominal musculature, this adds to the pain. Pain further cause the difficulty in coughing, moving about and taking deep breaths; resulting in hypoventilation, reduce functional residual capacity and intrapulmonary shunting leading to hypoxemia. Sometimes bronchospasm may result due to activation of cutaneous visceral reflex.[8] Epidural narcotics while effective in relieving postoperative pain in many patients were associated with respiratory depression, urinary retention ,vomiting and itching.[9] Vogel *et al* confirms that Tramadol hydrochloride a new synthetic opiate produces profound analgesia without respiratory depression and has no significant effect on respiratory rate, tidal volume, arterial Co2,and ventilator Co_2 response.[10] Tramadol induced anticipation is mediated by opioid(mu) and nonopoid component i.e. inhibition of nor epinephrine uptake.[11,12] Epidural route has the advantage that it has low incidence of side effect lack of potspinal headache, low risk of infection and serves the purpose of close proximity of the drug with opiate receptors. In the present study, patients with ASA grade I and II between the age group of 20 to 60 yrs. were selected and divided randomly for the two groups. The age sex and weight parameters were almost equally distributed among the two groups as shown in Table 1. The difference in the distribution was not statistically significant. In the present study, no significant change in pulse and blood pressure in tramadol group which was comparable with the other studies which showed that tramadol has a negligible effect on systemic and pulmonary circulation.[10,13] However in buprenorphine group there was slight decrease in pulse by 2-6 /min and BP by 2-10 mmHg SBP 7 2-8 mmHg DBP which was not clinically significant. Anis Baraka *et al*[14] in his study by comparing epidural tramadol and other epidural opiates found that unlike other opiates, epidural tramadol provided good analgesia without respiratory depression and respiratory rate was not affected in both the groups, but oxygen saturation decreased with epidural morphine. In the present study, respiratory rate remained unchanged in both the groups however oxygen saturation decreased significantly in Group II i.e. Buprenorphine [Preoperative 93.9(S.D.=1.768) and Post operatively 89.959(S.D.=0.912)]. Sao2 decreased in buprenorphine group from 2nd hour postoperatively. The maximum decrease in mean SaO2 was observed at 4th to 5th hrs. Post-operatively. The similar findings observed in Anis Baraka study[14]. Patient may be hypoxemic and or hypercarbic, yet have a normal respiratory rate. However, the body oxygen stores are limited compared with very large carbon dioxide stores. Therefore, acute alveolar hypoventilation can rapidly decrease the arterial Po2/Saturation while the PaCo2 may still be within the normal range. Also hypoxemia may trigger the hypoxic drive via the peripheral chemoreceptor and can partially counteract the decrease of respiratory rate. The limited body oxygen stores as well as activation of hypoxic drive may explain findings of this study which suggests that hypoxemia rather than decrease of respiratory rate may be an early signal of respiratory depression following epidural buprenorphine in patient s breathing room air without oxygen supplementation. Onset of analgesia after tramadol was 13.793 min (S.D. 2.076) as compared to 18.96 min (SD 2.984 min) among the cases of buprenorphine administration which was also found statistically significant. This was comparable with study of K.H. Simpson and co-worker in 1988.[15] Bullingham[16] in 1980 noted the onset of analgesia of intravenous buprenorphine in 5-15 minutes with peak effect in a variable range of 30 to 60 minutes .buprenorphine unlike other opioids has low rates of association and dissociation with opioid receptors.it takes about 30 minutes for the receptor building to achieve equilibrium. This explains the late onset of action among buprenorphine group. The difference in mean duration of analgesia (12.9 hrs. with SD 3.009 hrs. tramadol group while in buprenorphine group it was 14.06 hrs. with SD 3.140 hrs.) was not statistically significant. The duration in the present study was comparable with the other studies.[17,18] Excellent pain relief was observed among the tramadol group as compared to the buprenorphine group. Slight to moderate pain was observed among 9(55%) cases as compared to 7(45%) cases from tramadol group. Overall presence of any side effect was observed more in the buprenorphine group [19(63.3%)] as compared to tramadol group [8(26.6%)] which was statistically significant. Postoperative period whose who had tramadol seems to be smoother. V.O. Oviasu *et al*[19] in his study with oral tramadol observed minima side effect viz.nausea (14%), drowsiness (10%),Vomiting (3%) and didn't warrant for stopping drug. Similarly, with present study, epidural tramadol group, one (3.3%) patient had nausea, one (3.3%) patient had vomiting 3(10%) patient were sedated and mildly febrile as compared to buprenorphine group had two (6.6%), 3(10%) and 14(46.7%) patients had nausea, vomiting and sedation respectively. The incidence of nausea was observed 8% in Buprenorphine group in other study.[19]

CONCLUSION

The study concludes that the epidural tramadol can provide adequate and prolonged postoperative analgesia, without respiratory depression. In contrast, epidural buprenorphine may be followed by respiratory depression as evidenced by decreased in Sa02. This is special importance in surgeries to maintain optimal effective ventilation in order to prevent pulmonary complications. Hence it is the degree of (unwanted) respiratory depression and sedation rather than the analgesic properties per seethed influence or limits the use of buprenorphine in practice surgeries especially abdominal/thoracic surgeries. Tramadol has also better advantage in regards to the onset of analgesia, pain relief and side effects as compared to buprenorphine.

REFERENCES

1. Apfelbaum J.L., Chen C., Mehta S.S., Gan, T.J. Postoperative pain experience: Results from a national survey suggest postoperative pain continues to be undermanaged. Anesth Analg. 2003; 97(2):534–40.
2. American pain Society: Management of Acute Pain and Cancer Pain with Analgesics. In: American Pain Society. Principles of Analgesic Use 8th ed. Glenview, IL, American Pain Society, 2008; 22-23.
3. Garimella V., Cellini C. Postoperative Pain Control. Clin Colon Rectal Surg. 2013; 26(3):191-96.
4. Stamer UM, Maier C, Grond S, Veh-Schmidt B, Klaschik E, Lehmann KA. Tramadol in the management of post-operative pain: a double-blind, placebo- and active drug-controlled study. Eur J Anaesthesiol. 1997;14(6):646-54.
5. Vickers MD, O'Flaherty D, Szekely SM, Read M, Yoshizumi J. Tramadol: Pain relief by an opioid without depression of respiration. Anaesthesia. 1992; 47(4):291–96.
6. Senel AC, Akyol A, Dohman D, Solak M. Caudal bupivacaine-tramadol combination for postoperative analgesia in pediatric herniorrhaphy. Acta Anaesthesiol Scand. 2001; 45(6):786–89.
7. Melzack R, Katz J. McMahon SB, Koltzenburg M. Pain assessment in adult patients,Wall and Melzack's Textbook of Pain, 2006 5th Edn. London Elsevier. 2006; pg. 291-304
8. Pflung A., Bonica JJ. Physiology and control of postoperative pain. Arch Surg. 1977;112:773
9. Rawal N.Sjorstrand V.,Dahistrom B. Post-operative pain relief by epidural morphine. Anaesth Analg. 1981;60(10):726-31.
10. Grond S, Sablotzki A. Clinical pharmacology of tramadol. Clin Pharmacokinet. 2004;43(13):879-92
11. Kayser V,.Besson JM, Gulibaud G. Evidence for a noradrenergic component in the antinociceptive effect of the analgesic agent tramadol in an animal model of clinical pain,the arthritic rat. Eur J Pharmacol. 1992;224(1):83-88.
12. Rafffa RB *et al.*: Opioid and nonopioid component independently contribute to the mechanism of action of tramadol, an atypical opioid analgesic. J Pharmacol Exp Ther 1992; 260(1):275:85.
13. Ofoegbu R.O. Report on clinical trial with tramadol hydrochloride in the prevention of post pain. Current Therapeutic Research. 1984; 36: 436-444.
14. Baraka A. *et al.* A comparison of epidural tramadol and epidural morphine for postoperative analgesia.Can J Anaesth.1993;40(4):308-13.
15. Simpson K.H. *et al.* Comparison of extradural buprenorphine and extradural morphine after caesarean section. Br.J.Anaesth. 1988;60:627
16. Bullingham HES., Mcquavy H.J. Moore R.A. Barnett M: Buprenorphine kinetic. Clinical Pharmacology and Therapeutics. 1980;28: 667-72,
17. Fu.Y.P. *et al*: Epidural tramadol for postoperative pain relief. Ma Tsui Hsuch Tsa Chi. 1991;29(3):648-52.
18. Damle N.A. Epidural Buprenorphine for postoperative pain relief. Journal of Anaesthesiology Clinical Pharmacology 1990; 6: 33-39.
19. Oviasu V.O. *et al*: Multicentric clinical trial with analgesic tramadol hydrochloride. Current Therapeutic Research 1984; 36: 1-6.

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