Bahrain Medical Bulletin, Volume 18, Number 3, September 1996

EVALUATION OF CONTINUOUS EPIDURAL TRAMADOL AND BUPIVACAINE COMBINATION FOR POSTOPERATIVE ANALGESIA+

S D'Souza* Prasanna A**#

Objectives: Determine the effectiveness of continuous administration of 0.25 % Bupivacaine and Tramadol in the epidural space for major abdominal and lower limb surgery.

Design: In the post operative ward a solution containing 0.25 % Bupivacaine and 0.6 mg Tramadol per milliliter was infused through epidural catheter placed at T12-L1 and L2-L3 space depending on the surgery with a Bard PCA 1 Pump at a rate of 4 ml/hr for 15 to 72 hours. Pain relief was evaluated by VAS at 1st, 4th, 24th, 36th and 48th hours.

Subjects: Fifty three patients between 16-76 years of either sex undergoing abdominal and lower limb procedure with ASA status I-III were studied.

Results: 56.6 % had 50 % pain relief in the 1st hour and 81 % had well to excellent (70 - 90 %) relief by 4th hour. 3.8 % of patients had urinary retention as complication. The sedation score ranged from 0 - fully awake to SA - normal sleep but easily arousable.

Conclusion: The continuous infusion of tramadol and bupivacaine gives good relief in major abdominal and lower limb surgeries with leas side effects.

It is essential to introduce the catheter at the middle of the dermatome to be blocked depending on the surgery and to

---

*** Assistant Professor**
Department of Anaesthesia
Kasturba Hospital and Medical College
Manipal - India

**** Professor and Head**
Department of Anaesthesia
Critical Care and Centre for Pain Relief &
Palliative Care
Meenakshi Mission Hospital & Research Centre
Madurai, Tamil Nadu, India.

 # Former Professor of Anaesthesia and Head of Multidisciplinary centre for Pain Relief and Palliative Care, Kasturba Hospital, Manipal.

+ This paper was presented at the second SACA congress at Colombo in Srilanka during September 1995.

administer a bolus dose prior to the infusion. There is a decrease in the dose of infusion above the age of 70 years. It takes 4 hours to achieve excellent relief.

The doses used do not produce respiratory depression and sedation. The delay time of ordering and execution of medication needs to be minimized with proper communication system to decrease the suffering in the P.O period.

Bahrain Med Bull 1996;18(3):

Effective pain control is essential for optimum patient care in the postoperative period. Postoperative pain differs from other types in that it

starts with the surgery and ends with healing. It is often ignored subjecting the patients to unnecessary suffering[1].

In recent years, the use of intrathecal/ epidural narcotics has become widespread. The side effects like nausea, vomiting and respiratory depression have led to the search for narcotics with least side effects[2]. Preliminary reports have shown that epidural Tramadol can provide postoperative analgesia safely without any serious side effects[3].

Tramadol, a synthetic opioid of aminocyclohexonal group with analgesic properties, has a low preferential activity at mu opioid receptors. It is a 1:1 racemic mixture of 2 enantiomers of (+) tramadol and (-) tramadol. The effects of Tramadol are attributed to the separate enantiomers. (+) tramadol has a greater affinity for mu receptors and inhibits 5-HT uptake and enhances its release; (-) tramadol inhibits noradrenaline uptake[4,5].

Tramadol is 1/13th potent as morphine[6]. Equianalgesic IV dose of Tramadol has much less effect on respiratory centre than morphine and has thus a high therapeutic ratio[7]. It is equal in potency to pethidine. Epidural Tramadol can provide effective postoperative analgesia[8].

The aim of this study was to determine the effectiveness of continuous administration of 0.25 % Bupivacaine and Tramadol in the epidural space for major abdominal and lower limb surgery.

METHODS

Fifty three patients of ASA status I, II or III undergoing major abdominal or lower limb surgery of either sex between 16-76 years were included. The patients were assessed for fitness for surgery. After an informed consent, an epidural catheter was inserted at T12-L1 or L2-3 intervertebral space.

The patients were premedicated with Diazepam two hours prior to surgery and pethidine 1 mg/kg and promethazine 0.5 mg/kg I M 45 minutes prior to surgery. A test dose of 3 ml of 2 % lignocaine with adrenaline was injected through the epidural catheter prior to induction of anaesthesia.

In the postoperative ward an initial bolus of 5-7 ml of 1 % lignocaine followed by a solution containing 30 mg Tramadol and 50 ml of 0.25 % Bupivacaine was infused through the epidural catheter via Bard PCA 1 Pump at a rate ranging from 3 ml/h to 7 ml/h depending on the site of surgery, placement of the epidural catheter and the age for a period of 15 to 72 hours.

The patients were continuously monitored for haemodynamic stability, respiratory rate and oxygen saturation with Nihon Kohden Lifescope 9 monitor. The level of sedation was gauged by the sedation score as shown in Table 1.

Table 1. Sedation Score

0 - Fully awake
1 - Drowsy but easily arousable on calling
2 - Drowsy but arousable on shouting and shaking
3 - Deep sleep. Not arousable on shaking violently
SA - Normal sleep but easily arousable

An anticipated pain score in the preoperative period and the actual pain score prior to commencement of pain relief therapy were assessed by Visual Analogue Scale (VAS). The delay in starting the drug was also noted.

Evaluation of analgesia was done using VAS at 1st, 4th, 24th, 36th and 48th hour. A pain score of 0-2 was taken as excellent pain relief; 3 as good relief and 4-5 as fair relief. The patients were also monitored for any complications.

All observations were made by the same observer to eliminate subjective error. Student's "t" test and Wilcoxon's Rank sum test were used for statistical analysis.

OBSERVATIONS

A total of 53 patients were studied between 16 to 76 years with a mean age of 45.3 and SD17.7 and sex distribution of 37 (69.8 %) males and 16 (30.2 %) females. The weight ranged from 40 kg to 70 kg. The pattern of surgery was as follows: 25 (47.2 %) patients underwent orthopaedic surgery, 13 (24.7 %) urology, 10 (18.9 %) general surgery, 2 (3.8 %) oncological surgery and 3 (5.7 %) gynaecological surgeries. 42 (79.5 %) patients belonged to ASA I status, 4 (7.6 %) patients to ASA II and 7 (13.3 %) patients to ASA III.

In the postoperative ward there was a delay in starting the drug from the time of reference ranging from 2 to 75 minutes with a mean delay time of 18.51 minutes and SD16.42 . In one patient the initial rate of 4 ml/h was changed to a maximum of 7 ml/h as there was no pain relief with the initial dose.

The Anticipated pain score ranged from 6-9 while the actual pain score (before start of pain relief) ranged from 3-8 on VAS which was statistically significant ($p<0.001$ for the paired t test).

Pain relief treatment was discontinued after a period of 15 to 72 hours as per the surgeon's decision or the patient's request (Table 2).

Table 2. Duration of pain relief

Time (hours)	No of patients	Percentage
15	01	1.9
18	01	1.9
24	27	50.9
30	01	1.9
36	03	5.7
48	18	34.0
72	02	3.8

At the 36th and 48th hour the pain score was assessed only in those patients who continued to receive the drug combination under study.

The scores at 4th, 24th, 36th and 48th hours were compared with those at 1st hour using Wilcoxon's Rank Sum Test with statistical significance ($p<0.001$) .81 % has good to excellent relief by 4th hour. In the 48th hour 100 % had excellent relief (Table 3).

Table 3. Pain Score

	1st hour		4th hour		24th hour		36th hour		48th hour	
VAS	No	%	No	%	No	%	No	%	No	%
0	-		-		04	7.6	06	25	09	45
1	-		07	13.2	36	67.9	12	50	08	40
2	03	5.7	10	18.9	07	13.2	05	20.8	03	15
3	03	5.7	26	49.1	03	5.7	01	4.2	-	-
4	02	3.8	02	3.8	02	3.8	-	-	-	-
5	30	56.6	06	11.3	01	1.9	-	-	-	-
6	06	11.3	01	1.9	-	-	-	-	-	-
7	05	9.4	-	-	-	-	-	-	-	-
8	04	7.6	-	-	-	-	-	-	-	-
9	-	-	01	1.9	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-

VAS - Visual Analog Score

The scores between males and females were compared using the unpaired "t" test as well as Wilcoxon's Rank sum test and was found to be statistically insignificant ($p<0.05$).

Majority of the patients had a sedation score of SA in the 1st and 4th hour and 0 score during the rest of the time.

The complications observed were urinary retention in 2 (3.8 %) patients, paralytic ileus in 1 (1.9 %) and urinary retention and paralytic ileus in 1 (1.9 %) patient.

DISCUSSION

Pain follows most surgical operations with varying intensity according to the site, nature of the surgery and the individual patient[9]. Surgical pain has two components - visceral and somatic. An effective pain relief is obtained by blocking both components.

Epidural opioids block the dull resting visceral pain10 without affecting motor, sympathetic and sensory modalities[2,11]. The sharp surgical and muscle spasm pain is relieved by local anaesthetics[12].

The drawback of administration of intermittent doses is that the complaint of pain by the patient is taken as the endpoint for further top up doses. This does not prevent the plasticity in the CNS, thus requiring higher doses with possibility of toxicity. An epidural catheter technique allows adjustment of the blockade by subsequent top up with small doses of opioids[13].

In our study a combination of 0.6 mg/ml Tramadol and 0.25 % Bupivacaine was used as a continuous infusion to minimize the individual drug doses and obviate the side effects, while blocking both components of surgical pain.

Administration of the bolus doses is essential prior to the start of an infusion. In this study 1 % lignocaine was used for the rapid onset and short duration of action.

For optimal results with the least amount of local anaesthetic, the epidural catheter tip should be near the segments innervating the incision[14]. Thus the basal infusion rate varied according to the type of surgery and the placement of the epidural catheter.

In elderly patients the dose requirement of local analgesics in epidural space is reduced. The probable reason being that increased vascularity in young people causes a rapid removal of the drug from the epidural space as it is infused[10]. Thus 4 patients above 60 years age required only 3 ml infusion.

For any given operation the intensity of pain varies with time and reaches a peak about 6 hours after the surgery has been completed[9]. In our study 81.2 % had good to excellent pain relief by the 4th hour.

A comparison of single shot epidural Tramadol with epidural morphine has shown that epidural Tramadol can provide adequate and prolonged postoperative analgesia without early or delayed clinical respiratory depression[8,3] even in the presence of pre-existing respiratory compromise[15]. None of the patients in this study had respiratory depression.

Sedation score in this study ranged from 0 to SA. Most of the patients were drowsy but easily arousable on calling in the first hour and during the rest of the time had normal sleep but were easily arousable. This is due to the insufficient sedative activity of Tramadol[16].

Urinary retention following spinal opioids has been reported indicating the involvement some opioid receptors[11,2]. In this study it was not possible to detect any retention of urine as a direct result of the drug as 23 patients had an indwelling urinary catheter inserted as part of the surgical management. Three patients without indwelling catheter actually complained of urinary retention and had to be catheterized once, of which one of the patients also had paralytic ileus, which was also seen in another patient.
Vital parameters and oxygen saturation remained normal throughout the study showing that Tramadol is a cardio respiratory stable drug as shown by others[17,15,7].

Pain is a subjective response hence emotions like fear and anxiety alter the perception to pain. Hence a quantitative measurement of the fear component of pain of surgery in the preoperative period as "anticipatory pain score" is helpful[12]. This study showed that there was an element of anxiety prior to surgery which was significant.

In our study there was a delay in starting the drug from the time of reference despite an elaborate system due to improper communication between the referring unit and the staff nurse.

CONCLUSION

A continuous infusion of 0.6 mg of Tramadol and 0.25 % bupivacaine per milliliter at a rate of 4 ml/h in the epidural space gives good relief in major abdominal and lower limb surgeries with least side effects, provided the placement of the catheter is at the middle of the dermatome to be blocked depending on the surgery. An administration of a bolus dose is essential prior to the infusion. There is a decrease in the dose of infusion above the age of 70 years. It takes 4 hours to achieve excellent relief.

The doses used do not produce respiratory depression and sedation which are of prime importance in advocating the drug for postoperative pain relief. The incidence of drug induced urinary retention in non-catheterised patients needs further study.

The delay time of ordering and execution of medication should be minimized with proper communication system to decrease the suffering in the postoperative period.

REFERENCES

1. Morgan M. Postoperative pain and its management. In:

   Joylol JH, Majore, eds. Hazards and complications of anaesthesia. London: Churchill Livingstone, 1987:175.

2. Cousins MJ, mather LE. Intrathecal and epidural administration of opioids. Anaesthesiology 1984;61:276.

3. Chrubasik J, Warth L, Wust H, et al. Analgesic potency of epidural tramadol after abdominal surgery. Pain [Suppl 4], Abstract No. 296. 5th World Congress on Pain, Hamburg: 1987.

4. Raffa RB, Friderichs E, Reimann W, et al. Opioid and nonopioid components independently contribute to the mechanism of action of tramadol, an "atypical" opioid analgesic. J Pharmacol Exp Ther 1992;260:275.

5. Raffa RB, Friderichs E, Reimann W, et al. Complimentary and synergistic antinociceptive interaction between the enantiomers of tramadol. J Pharmacol Exp Ther 1993;267:331.

6. Tramadol. A review. Preliminary review of it's pharmacokinetic and pharmacodynamic properties and therapeutic potential in acute and chronic pain states. Drugs 1993;46:332.

7. Vickers MD, O'Flaherty D, Szekely SM, et al. Pain relief by an opioid without depression of respiration. Anaesthesia 1992;47:291.

8. Baraka A, Jabbour S, Ghabash M, et al. A comparison of epidural tramadol and epidural morphine for post operative analgesia. Can J Anaesth 1993;40:308.

9. Beecher HK. The measurement of pain. Prototype for the quantitative study of subjective responses. Pharmacol Rev 1957;9:59-209.

10. Bromage PR, Camporesi E, Chestnut D. Epidural narcotics for postoperative analgesia. Anaesth Analg 1980;59:473.

11. Rawal N, Sjostrand U, Dahlstrom B. Post operative pain relief by epidural morphine. Anaesth Analg 1981;60:726.

12. Brahmaji Rao K, Prasanna A. Intermittent bupivacaine and morphine for anaesthesia. Ind Pain 1993;7:24-9.

13. Behar M, Magora F, Olshwang D, et al. Epidural morphine in treatment of pain. Lancet 1979;1:527.

14. Armitage EN. Local anaesthetic techniques for prevention of post operative pain. Br J Anaesth 1986;58:790.

15. Delikan AE, Vijayan R. Forum. Epidural tramadol for post operative pain relief. Anaesthesia 1993;48:328.

16. Eggers KA, Power I. Tramadol [Editorial]. Br J Anaesth 1995;74:247.

17. Rawal HH, Swadia VN. Epidural tramadol for post operative pain relief. Asian Archives of Anaesthesiology & Resuscitation. 1995;XLII/2-(A-J): April 11.