

**Research Article**



**A comparative study between preoperative and postoperative infiltration with Bupivacaine on postoperative pain.**

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**Abstract**

Pain is an unpleasant experience associated with tissue damage. Peripheral tissue injury results in functional disturbances in the nervous system. Modern anaesthesiologists are not only concerned about pre-operative and intra operative care of the patient but also with postoperative welfare of the patient. In present study we have compared the efficacy of injection Bupivacaine 0.25% infiltration preoperatively versus postoperatively on duration of post operative analgesia, VAS at the onset of pain, total analgesia requirement in 24 hours. 150 patients belonging to ASA Class I and II between the age of 15 and 75 who underwent lower abdominal surgeries belonging to either sex were included in the study. The patients were randomly allocated to three groups. Control Group ( C ) received 20ml normal saline, preoperative group (A) received 0.25% bupivacaine before incision , postoperative group (B) received 0.25% bupivacaine before closure. Duration of analgesia, VAS score at the time of first request of analgesia and total doses of analgesia over 24hrs were recorded. The total analgesia requirement was reduced over 24 hours in the group B in which the infiltration was done postoperatively.

**Keywords:** Preoperative , Postoperative, Infiltration , Bupivacaine

**Introduction**

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage .(1) Peripheral tissue injury results in functional disturbances in the nervous system. There is peripheral sensitization by reducing the threshold of tissue noiception (hyperalgesia) and a central sensitization by increasing the excitability of spinal neurons. These two changes together contribute to the tissue injury pain, which manifests as hypersensitivity state found after peripheral tissue injury (2) Inhibition of these changes (pre-emptive analgesia) has possible role in prevention of post-operative pain (3) .Modern anaesthesiologists are not only concerned about pre-operative and intra operative care of the patient but also with postoperative welfare of the patient. (1) Bupivacaine/ is a local anaesthetic drug belonging to

the amino amide group. (4) Bupivacaine is indicated for local infiltration, peripheral nerve block, sympathetic nerve block, and epidural and caudal blocks. It is sometimes used in combination with epinephrine to prevent systemic absorption and extend the duration of action. (5)It is the most commonly used local anesthetic in epidural anaesthesia during labor, as well as in postoperative pain management(6)

In present study we have compared the efficacy of injection Bupivacaine 0.25% infiltration preoperatively versus postoperatively on duration of post operative analgesia, VAS at the onset of pain,total analgesia requirement in 24 hours.

**Methods**

After obtaining permission from the institutional ethic committee and written consent from the patients 150 patients belonging to ASA Class I and II between the age of 15 and 75 who underwent lower abdominal surgeries which included Hernioraphy, cholecystectomy, appendicectomy, hysterectomy, LUCS and Laprotomies belonging to either sex were included in the study.

Patients were given tablet ranitidine 150mg. and tablet diazepam night before the surgery. On the day of surgery the patients were randomly allocated to either group by a sealed envelope method.

In the operating room an I/V access was secured and ringer lactate solution was started. A multichannel monitor was attached which recorded the basal NIBP ,ECG, SpO2. All the cases were conducted under general anaesthesia. Induction was done with Inj. Propofol in a dose of 2ml/kg, tracheal tube was facilitated with inj. Scoline and anaesthesia was maintained with O2, N2O and inj vecuronium. Inj. Tramadol I/V was used for intraoperative analgesia. Drug was drawn by one of the team member and Surgeon was requested to infiltrate either normal saline( control group), inj 0.25% bupivacaine preoperatively ( group A) , inj.0.25% postoperatively (group B).

At the end of the procedure the patients were shifted to the post operative room and monitored for 24 hours by the staff on duty. Patients were evaluated hourly for

first eight hours and then two hourly thereafter for 24 hours. for pain, haemodynamics and adverse effect if any.

Assessment of analgesia was done on Visual Linear Analogue scale and five point pain score.

Duration of analgesia noted on 1<sup>st</sup> request for analgesia and the time taken was noted.

Total dose analgesics was recorded during 24 hrs.

**Observations**

- Group C- Control patient getting normal saline
- Group A- Preoperative Bupivacain 0.25% infiltration
- Group B- Postoperative Bupivacain 0.25% infiltration

The demographic profile of the patients were comparable with regards to age and sex. The distribution as per ASA class and type of surgery were similar and comparable in both the groups.

Table 1 shows that preoperative infiltration with 0.25% bupivacaine provided analgesia for 3.26 ± 0.42 hrs. 72% of the patients had analgesia for 4 hrs. But none of them had analgesia for more than 9 hrs. Duration of analgesia between the control group ( group C ) and the group A is significant. (p < 0.05 ). Whereas postoperative infiltration provided analgesia for 5- 24 hrs. in 88% of the patients and 12% were found have analgesia for > 24 hrs. The mean duration of pain (14.28 hrs.) as compared to control (2.36 hrs.) is highly significant. (p<0.001)

**Table 1** Duration of analgesia

Duration(hrs)	Control		A		B	
	No.	%	No	%	No	%
0-4	23	92	18	72	0	0
5-8	02	08	07	28	9	36
9-12	0	0	0	0	4	16
13-24	0	0	0	0	9	36
>24	0	0	0	0	3	12
mean±S.D	2.36±0.36		3.26±0.42		14.28±7.91	
P value			<0.05		<0.001	

Table 2 shows that in group C VAS score at the onset of pain was 6.6±1.732 and 60% of the patients had the score in the range of the postoperative infiltration not only provided longer duration of analgesia but also

reduced the VAS score (2.84± 1.28) at the time of first request of analgesia as compared to preoperative infiltration. (5.08±1.77).

**Table 2** VAS Score at the onset of pain

VAS	Control		A		B	
	No	%	No	%	No	%
0-2	0	0	1	4	5	20
2.1-4	3	12	4	16	18	72
4.1-6	3	12	15	60	1	4
6.1-8	15	60	3	12	1	4
8.1-10	4	16	2	8	0	0
Mean± S.D	6.6±1.73		5.08±1.77		2.84±1.28	
P value			<0.05		<0.001	

Table 3 shows that the total analgesia requirement was reduced over 24 hours in the group B in which the infiltration was done postoperatively. In the control group ( C ) 72 % Of the patients required 3 doses of analgesia in 24 hrs. The mean requirement was 2.72 ±0.23. In group A 40% of the patients required 3 doses while 24% required just 1 dose. The mean requirement

was 2.16±0.80 which is significant (p<0.01) as compared to control group.(2.72±0.23).In group B none of the patients required 3 doses of analgesia while 12% patients no analgesia. The difference is highly significant (p<0.001) as compared to control group.

**Table 3** Total dose of analgesic in 24 hrs

Dose	Control		A		B	
	No	%	No	%	No	%
0	0	0	0	0	7	28
1	0	0	6	24	8	32
2	7	28	9	36	10	40
3	18	72	10	40	0	0
Mean±S.D	2.72±0.23		2.16±0.80		0.72±0.90	
p value			<0.001		<0.001	

**Table 4** Mean 5 point pain score

Mean score	Control		A		B	
	No	%	No	%	No	%
1	0	0	6	24	10	40
2	0	0	13	52	12	48
3	5	20	6	24	3	12
4	17	68	0	0	0	0
5	3	12	0	0	0	0
Mean±S.D	3.92±0.57		2.48±0.86		1.72±0.67	
P value			<0.001		<0.001	

## Discussion

The main aim of post operative pain relief is to provide subjective comfort, in addition to inhibiting nociceptive impulsive caused by trauma and to blunt autonomic as well as somatic reflexes to pain. Subsequently this might enhance restoration of

function by allowing the patient to breathe, cough and to ambulate easily and early. There are many techniques and drugs which are commonly used to provide post operative pain relief. The use of wound infiltration with local anaesthetic for postoperative pain relief may be an *alternative because of its simplicity* , safety and low cost. However it is still

used inconsistently and randomly by many surgeons and anaesthetists. Despite the number of articles published there is little consensus whether infiltration should be done before the incision or postoperatively. The concept that, infiltration of local anaesthetic before the surgical trauma occurred can reduce the postoperative pain by reducing the central sensitization emerged in 1980s. (8) Since then the technique has widely studied in a vast range of surgical procedures, with conflicting results. Preemptive analgesia has been to be effective in limb surgery, arthroscopy, (9) and gynecological laparoscopy (10). It is found to be not so effective in appendectomy, (11) hysterectomy (12) and cervical spine surgery (13). It seems that results depend up on the anatomical location and depth of the structure (14). In some cases it can even attenuate post operative pain (15). Apart from local infiltration of surgical wound, NSAID, intravenous opioids, ketamine, intra-peritoneal instillation of local anaesthetic and epidural morphine also has been used to demonstrate pre-emptive analgesia. (16)

Keeping the concept of pre-emptive analgesia the present study was conducted on various lower abdominal surgeries. The incision line was infiltrated with bupivacaine 0.25% preoperatively and postoperatively.

Post-operative pain arises from the interplay of three factors.

1. Impulses generated from injured nerve fibers innervating the site of incision/retraction/sutures.
2. Inflammatory mediators which are elevated at the surgical site and sensitize uninjured and injured nerve fibers.
3. Sensitization of pain transmitting circuits in the spinal cord which increases their responsiveness to painful and non-painful stimuli.

The trauma of incision, compression, and stretch from surgical retraction induces impulse firing in peripheral neurons. Tissue damage, bleeding, and release of chemo-attractants from injury sites will foster local inflammation. It also stimulates keratinocytes (the predominant cells of skin) which leads to secretion of cytokines and other neuro-active agents causing sensitivity of peripheral tissues and nociception.[7]

Blocking of these peripheral nerves innervating the surgical site by local infiltration is a traditional approach for post-operative pain control.(7)

Bupivacaine block the nerve conduction by decreasing entry of  $\text{Na}^+$  ions during upstroke of action potential . As the concentration of the LA is increased the rate of rise of AP and maximum depolarization decreases , causing slowing of conduction. Binding of LA prolongs the inactivated state . The channel takes longer to recover refractory period of the fibre is increased. A resting nerve is rather resistant to blockade . Blockade develops rapidly when the nerve is stimulated repeatedly. The degree of blockade is frequency dependent : greater blockade occurs at higher frequency of stimulation.(kdt)

The result of present study, corroborates with the above explanation. In this study we too found that the postoperative infiltration with 0.25% bupivacaine produces longer duration and better quality of analgesia as compared to preoperative infiltration.

## References

- 1.Solanki NS, Goswami M, Thaker N.Bupivacaine infiltration versus Diclofinac suppository for post-tonsillectomy pain relief in paediatric patients.National J of Medical Research.2012;2:5-7.
- 2.Woolf C J. preemptive analgesia treating post operative pain by preventing the establishment of central sensitization. Anesth Analg 1993; 362 – 79
- 3.Woolf C J. Recent advances in the pathophysiology of acute pain. Br J Anesth 1989, 63: 139-46
4. . "WHO Model List of Essential Medicines". *World Health Organization*. October 2013. Retrieved 22 April 2013 Lexicomp. "Bupivacaine (Lexi-Drugs)". Retrieved 20 April 2014
- 5.Alsif A, et al.Effect of Pre-emptive Bupivacaine infiltration on post thyroidectomy pain. The Internet Journal of Anesthesiology. 2004 Volume 9 Number 1.
- 6.Miller, Ronald D. (November 2, 2006). Basics of methodesthesia. Churchill Livingstone.
- 7.Mehta T R , et al.Postoperative analgesia after incisional infiltration of Bupivacaine V/S buprinorphine. Journal of Anaesthesia and clinical Pharmacology.2011; 27(2) : 211-14.

8. Woolf C J. evidence for a central component of post injury pain hypersensitivity. *Nature* 1989;308: 386-8
9. Gatt C J Jr; Parker R D; Tetzlaff-J E; Szabo\_M Z; Dickerson A. *Am J Sports Med* .1999; 27: 544-5
10. Ke-Rw; Portera- SG; Bagous\_W; Lincoln-SR. *Obstet Gynecol* 1998; 92: 972-5
11. KO-CY; Thompson-JE Jr; Alcantra A; Himaya D. Preemptive analgesia in patients undergoing appendectomy. *Arch Surg* 1997; 132: 874-7.
12. Hannibal K , Galatius H, Hansen A, Obel E, et al. Preemptive wound infiltration with bupivacaine reduces early and late opioid requirement after hysterectomy. *Anesth Analg* 1996; 83: 376-81
13. L H Poberson and J R Snyed; wound infiltration after surgery to the cervical spine using a posterior approach. *Br J Anesth* 2000; 84 (1): 87-8
14. Aida-S, Baba-H, Yamakura-T, Taga, Fukuda-S, Shimoji K. The effectiveness of preemptive analgesia varies according to the type of surgery: a randomized double blind study. *Anesth Analg* 1999; 89(3) 711-6
15. Wassef MR: concept of preemptive analgesia for post operative pain. *Mt Sinai J med* 1998; 65(4) 271-9
16. S A; A review of preemptive analgesia. *J Perianaesth Nurs* 1998;13: 109-14
17. Tripathi K D .Local anaesthetics. *Essentials of Medical Pharmacology*. 2013 :360-371