

Efficacy of Triamcinolone Acetonide vs Bupivacaine Local Infiltration for Early Postoperative Pain Control after Lumbar Discectomy: A Prospective Randomized Double-blind Study

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ABSTRACT

Introduction: The management of pain after lumbar discectomy is a controversial subject. Effective postoperative analgesia is associated with lower rate of morbidity and results in shorter hospitalization, reducing overall cost. Wound infiltration widely used for the purpose is 0.25 or 0.5% bupivacaine and triamcinolone acetonide. We felt the need for a study to compare both in terms of their efficacy in our setup.

Materials and methods: This is a prospective randomized, double-blind study comprising 60 patients of single-level prolapsed intervertebral disk, admitted in the Department of Neurosurgery at Vydehi Institute of Medical Sciences and Research Center, Bengaluru.

Sample size: A total of 60 cases were taken and divided into two groups. Thirty cases in group A were infiltrated by a mixture of 50 mg of triamcinolone in 5 mL of normal saline. Thirty cases in group B were infiltrated by a mixture of 5 mL of 0.5% bupivacaine and 5 mL of normal saline.

Results: The time interval between surgery and first dose of opiate analgesia was significantly higher in the bupivacaine group (5 h 31 min \pm 1 h 14 min) compared with the triamcinolone group (3 h 20 min \pm 40 min). The visual analog pain scale (VAS) scores at 2nd hour (group A 2.034 \pm 0.84 vs group B 0.931 \pm 0.64) and 4th hour (group A 4.104 \pm 0.97 vs group B 2.314 \pm 1.14) were also found to be significantly lower in the bupivacaine group compared with the triamcinolone group. However, there was no significant difference in the amount of total opiate analgesic consumption in 24 hours (258 vs 248 mg).

Conclusion: In the present study, the data suggest that intraoperative local infiltration of bupivacaine is safe and provides significant analgesia in the early postoperative period when compared with triamcinolone acetonide.

Clinical significance: Based on the results of this study, we made departmental protocol to infiltrate all operative lumbar cases with bupivacaine.

Keywords: Bupivacaine, Lumbar discectomy, Triamcinolone acetonide.

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INTRODUCTION

Management of pain after lumbar discectomy is a controversial subject.¹ Many modalities for postoperative pain include parenteral/oral medication, application of local anesthetic or corticosteroid, and transdermal drug delivery system. Moderate or severe postoperative pain has negative effects on the pulmonary system (may lead to atelectasis, pulmonary edema) and cardiovascular system (may cause arrhythmias, hypertension, myocardial infarction).^{2,3} It also hinders in early mobilization, leading to constipation, urinary retention, and increased risk of thromboembolism.⁴ Effective postoperative analgesia is associated with lower rate of morbidity and results in shorter hospitalization, reducing overall cost.⁵ Wound infiltration is the simplest and most effective way to manage pain after surgery. Single-dose infiltration of a long-acting local anesthetic or steroid in the wound provides effective analgesia. The agent most widely used for the purpose is 0.25 or 0.5% bupivacaine and triamcinolone acetonide. The mechanism of action of these two drugs differs: Whereas bupivacaine anesthetizes the wound, triamcinolone reduces local inflammation. There are many studies done earlier comparing both drugs with different patient profiles, methods, and assessment criteria. We felt the need for a study to compare both in terms of their efficacy in our setup so that guidelines can be made for routine use in all operated cases.

OBJECTIVES

To evaluate the efficacy of triamcinolone acetonide and bupivacaine for early postoperative pain management after lumbar discectomy by assessing the following:

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- The time interval between the surgery and the first dose of analgesia given to the patient
- The visual analog pain scale (VAS) at the 2nd and 4th hour
- The amount of opiate analgesics consumption in the first 24 hours after surgery.

Study Design

Prospective randomized double-blinded study.
 Conducted between September 2012 and August 2013.

MATERIALS AND METHODS

This is a prospective randomized, double-blind study comprising 60 patients of single-level prolapsed intervertebral disk (PIVD), admitted in the Department of Neurosurgery at Vydehi Institute of Medical Sciences and Research Center, Bengaluru (Flow Chart 1).

Sample Size

The size of the sample works to 60 cases divided into two groups. A total of 30 cases in group A were infiltrated by a mixture of 50 mg of triamcinolone in 5 mL and 5 mL of normal saline. A total of 30 cases in group B were infiltrated by a mixture of 5 mL of 0.5% bupivacaine and 5 mL of normal saline (Tables 1 to 3).

Inclusion Criteria

- Patients diagnosed as PIVD with nerve root compression demonstrated on magnetic resonance imaging, with clinically correlated clinical findings and had failed conservative treatment prior to enrolment (Tables 4 and 5).
- Willing to give informed consent.

Exclusion Criteria

- Patient’s refusal.
- Patients undergoing multiple-level lumbar discectomies, instrumentation/fusion, and revision discectomy.
- Long-standing diabetic patients on treatment.
- Disk disease associated with scoliosis.

Table 1: Age at presentation

Age at presentation (years)	No. of patients n = 58 (%)	Group A n = 29 (%)	Group B n = 29 (%)
21–30	10 (17.2)	3 (10.34)	7 (24.13)
31–40	26 (44.8)	15 (51.72)	11 (37.93)
41–50	15 (25.8)	8 (27.58)	7 (24.13)
51–60	7 (12)	3 (10.34)	4 (13.79)

Table 2: Demography

Demography	Group A n = 29 (%)	Group B n = 29 (%)
Male	19 (65.51)	21 (72.41)
Female	10 (37.93)	8 (24.13)
Mean age	39.517 ± 9.97	40.931 ± 8.36

Table 3: Occupation

Occupation	No. of patients n = 58 (%)	Group A n = 29 (%)	Group B n = 29 (%)
Heavy work	20 (34.5)	10 (34.48)	10 (34.48)
Moderate work	26 (44.9)	12 (41.37)	14 (48.27)
Light work	12 (20.6)	7 (24.13)	5 (17.24)

Table 4: Diagnosis

Diagnosis	No. of patients n = 58 (%)	Group A n = 29 (%)	Group B n = 29 (%)
L3-4 PIVD	2 (3.3)	1 (3.44)	1 (3.44)
L4-5 PIVD	37 (66.1)	17 (58.62)	20 (68.96)
L5-S1 PIVD	19 (32.2)	11(37.93)	8 (27.58)

Table 5: Surgery

Surgery	No. of patients n = 58 (%)	Group A n = 29 (%)	Group B n = 29 (%)
FD	32 (55.1)	18 (62.06)	14 (48.27)
LD	26 (44.8)	11 (37.31)	15 (51.72)

FD: Fenestration and discectomy; LD: Laminectomy and discectomy

- Patients with preoperative cognitive dysfunction or psychiatric disorders or cardiac or breathing dysfunctions.
- Preoperative opioid consumption and patients who were on systemic steroid.

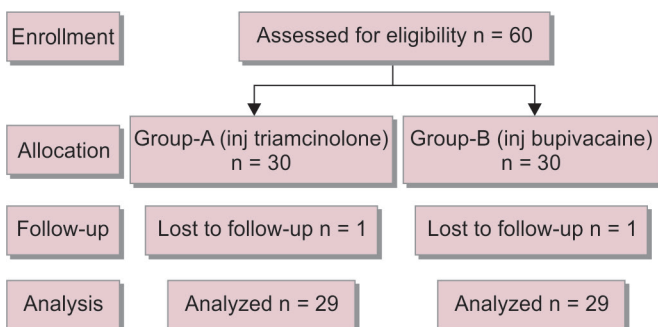
POSTOPERATIVE PAIN ASSESSMENT AND MANAGEMENT

All patients will be followed up for a period of 24 hours from the time of surgery.

The following parameters will be assessed in each group:

- The time interval between surgery and the first dose of opiate analgesia will be noted for all patients. The first dose of analgesia will be given as Inj tramadol 100 mg intravenously with Inj ondansetron 4 mg, and for subsequent doses, 50 mg will be considered. If pain is not controlled with the maximum dose

Flow Chart 1: Consort diagram



(6–7 mg/kg/day) of Inj tramadol, an additive analgesic will be added.

- Visual analog pain scale scores at 2nd and 4th hour will be assessed for all patients till the patient is given a first dose of opiate analgesia.
- The amount of opiate analgesic consumption in 24 hours will be noted.

Statistical Analysis

Results were compared using the t test analysis, and p-value of <0.05 was considered as statistically significant.

Ethical Committee Clearance

Taken from the Ethical Committee VIMS and RC, Bengaluru.

RESULTS

One patient from each group was excluded from the study as other analgesic medication was started.

DISCUSSION

Wound infiltration is one of the simplest and most effective ways to manage pain after surgery. Single-dose infiltration of a long-acting local anesthetic around the wound can provide effective analgesia. The agent most widely used for the purpose is 0.25 or 0.5% bupivacaine. Local anesthetic agents act on the intracellular portion of the sodium channel and block sodium influx into nerve cells, which prevents depolarization, thus reducing the action potentials generated by pain nerve fibers.⁶ Reports of their efficacy in spinal surgery have been well supported in the literature where Morgan et al,⁶ Milligan et al,⁷ and Cherian et al⁸ have shown significant reduction in postoperative pain and opiate requirement.

The pathophysiology of pain in PIVD disease is multifactorial. Mechanical compression of the nerve root is not the only pain generator as previously thought.^{9,10} Saal et al¹¹ have demonstrated high levels of phospholipase A2 enzyme activity in the disk material from patients with nucleus pulposus herniation undergoing lumbar discectomy. The conversion of phospholipids to arachidonic acid is critical to the formation of the inflammatory mediators, such as LTB-4, LTC-4, LTD-4, and LTE-4 and various prostaglandins. This initial step is facilitated by the enzymatic action of phospholipase A2. Corticosteroids inhibit the action of phospholipase and thus prevent the formation of arachidonic acid and subsequently the inflammatory mediators. Corticosteroids inhibits the early inflammatory response (edema, fibrin formation, capillary dilatation, leukocyte aggregation).¹² Bahari et al,¹ Crastein et al,¹² Saal et al,¹¹ and Pobereskin et al¹³ have in the past shown significant reduction in postoperative pain and opiate requirement in patients with corticosteroids irrigation/infiltration at operative wound site. In this study, we have compared both drugs in terms of their efficacy in our setup, and results favor the use of bupivacaine rather than corticosteroids for immediate postoperative pain. The time interval between surgery and first dose of opiate analgesia was significantly higher in the bupivacaine group (5 h 31 min ± 1 h 14 min) compared with the triamcinolone group (3 h 20 min ± 40 min) (Table 6). The VAS scores at 2nd

Table 6: Time interval between surgery and first dose of analgesia given

Time interval	Group A	Group B	p-value
Range of time interval	2–5 hours	4–8 hours	
Mean	3 hours 20 minutes ± 40 minutes	5 hours 31 minutes ± 1 hour 14 minutes	<0.001

Table 7: Mean pain score assessment at 2nd hour

Mean pain score assessment at 2nd hour						VAS (0–10)						
Severity	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Mean
Group A (n = 29)	1	6	14	7	1	–	–	–	–	–	–	2.034 ± 0.84
Group B (n = 29)	6	20	2	1	–	–	–	–	–	–	–	0.931 ± 0.64
p-value												p<0.001

Table 8: Mean pain score at 4th hour assessment

Mean pain score at 4th hour assessment						VAS (0–10)						
Severity	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Mean
Group A (n = 29)	–	2	4	14	7	2	–	–	–	–	–	4.104 ± 0.97
Group B (n = 29)	–	6	14	4	3	2	–	–	–	–	–	2.314 ± 1.14
p-value												p<0.001

Table 9: Total analgesic consumption

	Group A	Group B	p-value
Total analgesic consumption over first 24 hours	258.6 ± 35.5 mg	248 ± 28.2 mg	>0.05

hour (group A 2.034 ± 0.84 vs group B 0.931 ± 0.64) and 4th hour (group A 4.104 ± 0.97 vs group B 2.314 ± 1.14) were also found to be significantly lower in the bupivacaine group compared with the triamcinolone group (Tables 7 and 8). However, there was no significant difference in the amount of total opiate analgesic consumption in 24 hours (258 vs 248 mg) (Table 9).

CONCLUSION

- In the present study, the data suggest that intraoperative local infiltration of bupivacaine is safe and provides effective analgesia in the management of early postoperative pain in primary single-level lumbar discectomy.
- The individual who received bupivacaine local infiltration experienced significantly less pain in the early postoperative period compared with patients who received triamcinolone acetamide.

REFERENCES

1. Bahari S, El-Dahab M, Cleary M. Efficacy of triamcinolone acetamide and bupivacaine for pain after lumbar discectomy. *Eur Spine J* 2010 Jul;19(7):1099-1103.
2. Mirzai H, Tekin I, Alincak H. Perioperative use of corticosteroid and bupivacaine combination in disk surgery: a randomized controlled trial. *Spine (Phila Pa 1976)* 2002 Feb 15;27(4):343-346.
3. Jayr C, Mollie A, Bourgain JL, Alarcon J, Masselot J, Lasser P, Denjean A, Truffa-Bachi J, Henry-Amar M. Post-operative pulmonary complications: general anesthesia with parenteral morphine. *Surgery* 1988 Jul;104(1):57-63.
4. Stoelting RK, Miller RD. Acute postoperative pain management. In: Stoelting RK, Miller RD, editors. *Basics of anesthesia*. 3rd ed. New York (NY): Churchill Livingstone; 1994. p. 443-451.
5. Ready LB, Rawal N. Anesthesiology based acute pain services: a contemporary view. In: *Regional anesthesia and analgesia*. Philadelphia (PA): Saunders; 1996. p. 632-643.
6. Morgan GE, Mikhail MS, Murray MJ. Local anesthetics. In: *Clinical anesthesiology*. 3rd ed. London: Lange Medical; 2002. p. 233-241.
7. Milligan KR, MacAfee AL, Fogarty DJ, Wallace RG, Ramsey P. Intraoperative bupivacaine diminishes pain after lumbar discectomy. A randomized double-blind study. *J Bone Joint Surg Br* 1993 Sep;75(5):769-771.
8. Cherian MN, Mathews MP, Chandy MJ. Local wound infiltration with bupivacaine in lumbar laminectomy. *Surg Neurol* 1997 Feb;47(2):120-122.
9. Sizer PS, Phelps V, Matthijs O. Pain generators of the lumbar spine. *Pain Pract* 2001 Sep;1(3):255-273.
10. McCarron RF, Wimpee MW, Hudkins PG, Laros GS. The inflammatory effect of nucleus pulposus. A possible effect element in the pathogenesis of low back pain. *Spine (Phila Pa 1976)* 1987 Oct;12(8):760-764.
11. Saal JS, Franson RC, Dobrow R, Saal JA, White AH, Goldthwaite N. High level of inflammatory phospholipase A2 activity in lumbar disk herniations. *Spine (Phila Pa 1976)* 1990 Jul;15(7):674-678.
12. Crastein BN, Kimmel SC, Levin RI, Martiniuk F, Weissmann G. A mechanism for the anti-inflammatory effects of corticosteroids: the glucocorticoid receptor regulates leukocyte adhesion to endothelial cells and expression of endothelial-leukocyte adhesion molecule-1 and inter cellular adhesion molecule-1. *Proc Natl Acad Sci USA* 1992 Nov 1;89(21):9991-9995.
13. Pobereskin LH, Sneyd JR. Does wound irrigation with triamcinolone reduce the pain after surgery to the lumbar spine? *Br J Anesth* 2000 Jun;84(6):731-734.