

Does Dexamethasone Improves Postoperative Day Care Surgery Outcome When Used As Additive To Local Infiltration Anesthesia: A Randomized case control study

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Abstract

Introduction: Up till now almost all studies used either single intravenous dose of dexamethasone in perioperative period for post operative pain relief or perineurally in regional anesthesia along with local anesthetic agent to prolong the regional anesthesia. The recent animal studies shown the neurotoxicity of perineurally used injection dexamethasone. This study was planned to evaluate the effect of single dose of dexamethasone in infiltration with local anesthetic agent in day care surgical procedure.

Methodology: Cases selection is from ASA – grade I & II patients posted for day care surgical procedure be done under local infiltration anesthesia. The patients are randomly allocated into two groups. Dexamethasone group-GD —25 patients. Control group- GC -26 patients patients were observed for symptoms of perineal itching, effect at the site of local infiltration and PONV. Post operative pain was evaluated half hourly after end of surgical procedure. Pain score is noted by numeric rating scale (NRS) at first pain, after one hour of analgesic and at the time of discharge from the hospital. They were followed up to 7 to 8 days for wound healing and stitch removal.

Observation: The average time of first pain was 259.1 min and 120 min in Group D & C respectively. NRS pain score after rescue analgesic in group D was significantly lower than Group C. Amongst Group D four patients did not required any analgesic till the time of discharge on the same day. From Group C four patients needed additional analgesic Itching at the site of local infiltration perineal itching and PONV was not significant. Conclusion-We conclude that addition of injection dexamethasone with injection lignocaine for local infiltration anesthesia delays the requirement of first analgesic significantly. In addition to this the analgesic effect of injection dexamethasone along with injection diclofinac is highly promising.

Keywords: Analgesia, Day care, Dexamethasone, Infiltration anesthesia, Postoperative pain

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Introduction

Surgical trauma induces the inflammatory response which leads to pain and post operative morbidity. It may contribute to delayed discharge and unanticipated hospital admission in day care surgery. Poor acute pain management can aggravate patient's anxiety, sleeplessness, fatigue, and distress in the postoperative period. There is increasing evidence that persistent pain will follow the surgery. Approximately 14% of patients presenting to the pain clinic attribute their pain to surgery.¹

Postoperative pain, especially when poorly controlled delays long term recovery and chronic pain. Control of the pathophysiologic processes associated with acute postoperative pain may attenuate the stress

response, sympathetic outflow, and inhibitory spinal reflexes and contribute to improvements in morbidity.²

For the day care management this response is more significant as far as discharge of patient from the hospital is concerned. Apart from cost effectivity, other benefits of out patients surgery are decompression of busy hospital beds, less nosocomial infections and early recovery in home environment with the family.³ For post operative pain management opioids and non steroidal anti-inflammatory drugs are of choice. But current trend is multimodality approach for the successful management of pain. Dexamethasone is found to have additive effect for prolonging analgesic effect of local anesthetic.⁴

Effects of dexamethasone in perioperative period are under evaluation. Its long term use is known with many side effects. Up till now single dose of dexamethasone is not reported with any significant side effect.⁵

First clinical data on infiltration of dexamethasone along with extended-release formulations of bupivacaine in microcapsules was by Holte K.⁴

Up till now almost all studies used either single intravenous dose of dexamethasone in perioperative period for post operative pain relief^{6,7,8,9} or perineurally

in regional anesthesia along with local anesthetic agent.^{10,11} to prolong the regional anesthesia. The recent animal studies shown the neurotoxicity of perineurally used injection dexamethasone.¹²

We did not come across with study involving single dose of dexamethasone in infiltration with local anesthetic agent in day care surgical procedures. Infiltration of Local anesthetic agent is the choice of anesthesia for minor surgery procedure. Hence this study was planned to evaluate the effect of single dose of dexamethasone in infiltration with local anesthetic agent in day care surgical procedure.

Aims and objective

This study was conducted to evaluate the analgesic effect of injection dexamethasone as additive with injection lignocaine, the effect on wound healing, postoperative nausea & vomiting. The perineal itching was also under observation.

Methodology

This is a randomised case control study done after approval of the institutional ethical committee.

Case selection— All the patients were from ASA – grade I & II. These were posted for day care surgical procedure be done under local infiltration anesthesia. The age group of the patients was 18 to 65 years.

Exclusion criteria-

1. Patients with endocrine or immunological diseases,
2. Sensitive to dexamethasone.
3. Patients not willing to participate in study
4. Patients who required General anesthesia because of prolong surgical time.

Study group – The patients are randomly allocated into two groups.

Group- D (Dexamethasone group-GD)—25 patients.

Injection dexamethasone 8 mg (2 ml) was added in 10 ml of injection lignocaine 2% which was used for local anesthesia.

Group- C (control group- GC) — 26 patients.

In 2ml of normal saline was added in 10 ml of injection lignocaine 2% which was used for local infiltration anesthesia.

All the patients were explained the anesthesia and surgical procedure plan on the pre anesthesia visit. Accordingly the consent was obtained on voluntary basis and kept nil by mouth for 6 hrs. On arrival in the operation theater patients were put on the intravenous line with ringer lactate solution and injection midazolam 1mg was given to minimize the anxiety. Under all aseptic precaution local infiltration of drug volume was done as mentioned above.

Pulse, non invasive blood pressure, ECG and oxygen saturation was monitored intraoperatively. Along with it patients were observed for symptoms of perineal itching and effect at the site of local infiltration. Post operatively patients were under observation for half an hour in the recovery room. Postoperative nausea and vomiting was treated with injection ondencetron 4mg intravenously. Post operative pain was evaluated half hourly after end of surgical procedure. The time of first pain in the post operative period is the time from end of the surgery to the pain score on NRS is 5. This time is noted and rescue analgesic injection diclofinac 75 mg IM is given. Pain score after one hour of analgesic is noted by NRS score. If the analgesia is not adequate which is considered as Numerical Rating Scale score 4 or more then additional analgesic injection Tramadol 100mg IM is given. After rescue analgesics patients were comfortable in post operative period and discharged on the same day in the evening. At the time of discharge from the hospital pain score noted by NRS scale. They were followed up to 7 to 8 days for wound healing and stitch removal. Wound is observed for any serous discharge or pus.

Observations

Table 1: Surgical Procedures Performed

Sr. No	Surgical Procedures	Group D Inj. Dexamethasone 2ml(8mg) + Inj. Lignocaine 2% 10ml	Group C Normal saline 2ml + Inj. Lignocaine 2% 10ml
1	Fibroadenoma of breast	9	8
2	Lipoma	5	7
3	Demoid cyst	4	6
4	Lymphadenopathy	1	0
5	Excision of Ingrowing Toe nail	1	1
6	Circumcision	3	1
7	Corn excision	2	2
Total		25	25

Table 2: Comparison of the Clinico-demographic Profile of the two groups

Sr. No.	Variables		Group D (n=25)	Group C (n=26)
1	Age(Yrs)	Mean	34.7 yrs	29.1yrs
		S.D.	12.3	14.1
		Range	16-60	11-65
2	Sex	Male	10 (40%)	9(35%)
		Female	15 (60%)	17 (65%)
3	Weight(kg)	Mean	55.08	51.15
		S.D.	7.43	10.18
		Range	40-70	28-68
4	Duration of surgery (Min)	Mean	24.6	22.5
		S.D.	6.8	4.7

The difference between the two groups for age, sex, weight and duration of surgery found to be statistically not significant.

Table 3: Difference between average time of first pain among the study groups

Variable	Group D Inj. Dexamethasone 2ml (8mg) + Inj. Lignocaine 2% 10ml (N=21*)	Group C Normal saline 2ml + Inj. Lignocaine 2% 10ml (N=26)
Average time (in minutes) of first pain		
Mean	259.0	120.0
S.D.	47.2	21.18
Std. Error of Mean(SEM)	10.3	4.1

*4 participants has not experienced pain.

Table 4A: Effect of analgesia score after analgesia among the two groups-

Sr. No.	Variable	Group D (n=21*)	Group C (n=26)
1	Effect of analgesic NRS Scale		
	0	0	0
	1	9	0
	2	10	0
	3	2	21
	4	0	5

Mann Whitney U Test; Z score =5.3816; p<0.05. Statistically significant.

Table 4B: Pain at the time of discharge among the two groups

Sr. No.	Variable	Group D (n=21*)	Group C (n=26)
1	PaIn score at discharge(NRS Scale)		
	0	1	0
	1	5	0
	2	9	2
	3	6	22
	4	0	2

Mann Whitney U Test; Z score =3.9693; p<0.05. Statistically significant.

Table 5: Total number of Analgesics given till the time of discharge

Sr. No	Analgesics	Group D	Group C
		Inj. Dexamethasone 2ml(8mg) + Inj. Lignocaine 2% 10ml	Inj. Lignocaine 2% 10ml + Normal saline 2ml
1	No analgesic	04	00
2	One analgesic	21	21
3	Two analgesics	00	04
	Total	25	25

Table 6: Post operative nausea vomiting among the two study groups

Group	Post operative nausea vomiting (PONV) Present	Postoperative Nausea Vomiting(PONV) Absent	Total
Group D	1(4%)	24(96%)	25
Group C	2 (7.7%)	24(92.3%)	26
Total	3 (5.9%)	48(95.1%)	51

Fisher's exact test: The two-tailed P value equals 1.0000.

The association between groups and presence of nausea vomiting is considered to be statistically non-significant.

In Group D the average time of first pain which required the rescue analgesic was 259 min (4 hours & 19 min) and in Group C this time was 120 min (2hours) as shown in Table 3. Patients of Group D got better analgesia after injection diclofenac 75mg IM. The average NRS pain score after rescue analgesic in group D was significantly better than group C(Table 4 A). The pain relief at the time of discharge was also better in Group D as compared to Group C Table 4B. Amongst Group D four patients did not required any analgesic till the time of discharge on the same day. Moreover in Group C four patients needed additional analgesic injection Tramadol 100mg intramuscular for pain relief as shown in Table 5.

Amongst the Group D four patients suffered almost no pain till the time of discharge on the same day evening. Throughout post-operative period these patients were with NRS score 0 to 1 only. Where as one patient from dexamethasone group had itching at the site of local infiltration which was started after 20-25 minutes of drug infiltration. It was of low intensity. Patient was observed for possible anaphylaxis in the recovery room for next two hours till the itching subsides. Except itching at local site there were no any other sign and symptoms. As preventive measure injection Pheniramine maleate 2ml (22.7 mg /ml) was given. No patients from dexamethasone group suffered perineal itching.

One patient from Group C and two patients from Group D suffered nausea and vomiting postoperatively shown as in Table 6. The association between groups and presence of nausea vomiting is **found to be statistically non-significant**. These patients **did not** had specific history of acid peptic disease, alcohol

consumption or smoking. It was managed with injection ondencetron 4mg intravenously.

Discussion

The surgical stimulus induces the stress response resulting in increasing catabolic hormones like cortisol, glucagon, growth hormone, catecholamine and decrease in insulin, testosterone. These changes are responsible for the undesirable side effects like tachycardia, hypertension, hyperglycemia etc.

Multimodal approach is the key for the management of pain. Routinely the opioids and non-steroidal anti-inflammatory drugs are used successfully. Both the groups are not devoid of significant side effects which limits their uses. Dexamethasone is having good analgesic property when used with local anesthetic agents which may be helpful in the postoperative pain management. Up till now use of single dose of dexamethasone has not been shown with any disadvantage.⁵

Exact mechanism of action of dexamethasone to produce analgesia is not clear. However the proposed action is via glucocorticoid receptors. Dexamethasone acts on the glucocorticoid receptor and decreases release of bradykinin, tumour necrosis factor, interleukin-1, interleukin-2 and interleukin-6 and decreased production of prostaglandins. Moreover it also decreases transmission of impulses in C fibres. Dexamethasone has been shown to inhibit nitric oxide synthase, a mediator of local anaesthetic tachyphylaxis.^{13, 14}

Dexamethasone also alter the functioning of ion channels or produce local acidosis in nerve cell, thereby prolongs the action of local anaesthetics.¹⁵

Moreover dexamethasone do not have any significant effect on respiration and hemodynamic stability. Single dose of injection dexamethasone preoperatively did not abolish inflammation process but decrease cortisol response for 24 hour after surgery. The addition of dexamethasone provides sufficient analgesia which reduces opioid requirements.^{16,17} Initiation of biological effect of injection dexamethasone is one to two hour after injection.¹⁸ In our study this initial 1 to 2 hours were taken care of by the effect of local anesthetic.

The surgical procedures performed during this study are as shown in Table 1. The demographic parameters like age, sex, weight of the patients and duration of surgery were comparable as shown in the Table 2. We observed that in dexamethasone group the average time of first pain which required the rescue analgesic was 259 min (4 hours & 19 min). Table 3. This finding is in consistent with the analysis of De Oliveira GS et al who has confirmed that intermediate dose dexamethasone (0.11–0.2 mg/kg) is a safe and effective multimodal pain strategy after surgical procedures.¹⁹

Four patients do not had pain till the time of discharge from hospital in the evening. Hval Kjetil et al also observed that the duration of post operative analgesia can be up to 16 hours.²⁰

The post operative analgesic effect of dexamethasone along with non steroidal analgesic is promising.²¹ In the Group D the average pain NRS score after the rescue analgesic dose of injection diclofenac sodium was significantly lesser than Group C shown in Table 4 A. More over the Group D patients do not required second additional analgesic in addition to injection diclofenac sodium. Where as in the Group C four patients needed second additional analgesic in addition to injection diclofenac sodium. Dexamethasone reduces the requirement of analgesics in post operative period.^{5, 16}

In our study the incidence of post operative nausea and vomiting (PONV) is not statistically significant amongst two group. The incidence of PONV is less i.e. 4% & 7.7 % in Group C & Group D respectively. Over all reported incidences of PONV is 30% in all post-surgical patients.²² It is related to the patient gender, type of surgery and overall health status.²³ Our study group is of minor surgical procedure with short duration, moreover they are not starving in postoperative period. This justifies the lower incidence of PONV. In addition to this dexamethasone is effective in the treatment of postoperative nausea and vomiting.^{24,25}

Immediate side effect of dexamethasone is perineal itching which seen with intravenous drug administration.²⁶ we did not came across any patient with this complaint as the drug is infiltrated locally. One patient suffered for itching after local infiltration of drug. Dexamethasone do have allergic reactions in

some patients. We are of opinion that it could be due to allergic reaction to injection dexamethasone. This patient did not required any drug treatment except injection pheniramine maleate 2ml (22.7mg/ml) intravenously. There were no other sign & symptoms till the discharge of this patient from the hospital.

The wound healing period was same in both the group i.e. 7 to 8days. There were no additional findings suggestive of delayed wound healing or infection in either group. This finding is consistent with the recent study of Ning Li et al²⁷ and systemic review by N. H. Waldron et al.⁵

Conclusion

We conclude that addition of injection dexamethasone with injection lignocaine for local infiltration anesthesia delays the requirement of first analgesic significantly. In addition to this the analgesic effect of injection dexamethasone along with injection diclofenac is highly promising.

Conflict of Interest: None

Source of Support: Nil

References:

1. Adrian Dashfi eld, Acute pain oxford hand book of anesthesia, chapter 39 p1089-1111
2. ROBERT W. HURLEY • JAMIE D. MURPHY • CHRISTOPHER L. WU, Acute Postoperative Pain Miller's Anesthesia 8th edition Editor R.D.Miller C h a p t e r 9 8 p2974-2998
3. Prof. Jyotsna Wig CURRENT STATUS OF DAY CARE SURGERY Indian J. Anaesth. 2005; 49 (6) : 459 – 466
4. Holte K, Werner MU, Lacouture PG, Kehlet H Dexamethasone prolongs local analgesia after subcutaneous infiltration of bupivacaine microcapsules in human volunteers. Anesthesiology. 2002 Jun; 96(6): 1331-5.
5. N. H. Waldron, C. A. Jones, T. J. Gan, T. K. Allen and A. S. Habib* Impact of perioperative dexamethasone on postoperative analgesia and side-effects: systematic review and meta-analysis. Br J Anaesth. 2013; 1(2): 191-200.
6. Ahmadrza Mohtadi et al The Effect of Single-Dose Administration of Dexamethasone on Postoperative Pain in Patients Undergoing Laparoscopic Cholecystectomy Anesth Pain Med. 2014 Aug; 4(3): e17872.
7. Lim SH, Jang EH, Kim MH, Cho K, Lee JH, Lee KM, et al. Analgesic effect of preoperative versus intraoperative dexamethasone after laparoscopic cholecystectomy with multimodal analgesia. Korean J Anesthesiol. 2011; 61(4): 315–9. doi: 10.4097/kjae.2011.61.4.315.
8. Fukami Y, Terasaki M, Okamoto Y, Sakaguchi K, Murata T, Ohkubo M, et al. Efficacy of preoperative dexamethasone in patients with laparoscopic cholecystectomy: a prospective randomized double-blind study. J Hepatobiliary Pancreat Surg. 2009; 16(3): 367–71.
9. Administration of steroids is effective in reducing postoperative pain, mood improvement, reducing fatigue and increasing appetite after operation (15). Murphy GS, Szokol JW, Greenberg SB, Avram MJ, Vender JS, Nisman M, et al. Preoperative dexamethasone enhances quality of recovery after laparoscopic cholecystectomy: effect on in-hospital and postdischarge recovery outcomes. Anesthesiology. 2011; 114(4): 882–90.

10. Vieira et al Dexamethasone with bupivacaine increases duration of analgesia in ultrasound-guided interscalene brachial plexus blockade European Journal of Anaesthesiology: March 2010 - Volume 27 - Issue 3 - p 285–288.
11. Islam SM1, Hossain MHMD2, Maruf AA3 EFFECT OF ADDITION OF DEXAMETHASONE TO LOCAL ANAESTHETICS IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK JAFMC Bangladesh. Vol 7, No 1 (June) 2011 p 11-14.
12. Fredrickson Fanzca MJ¹, Danesh-Clough TK, White R. Adjuvant dexamethasone for bupivacaine sciatic and ankle blocks: results from 2 randomized placebo-controlled trials. Reg Anesth Pain Med. 2013 Jul-Aug;38(4):300-7.
13. Salvemini D, Settle SL, Masferrer JL, Seibert K, Currie MG, Needleman P. Regulation of prostaglandin production by nitric oxide: An *in vivo* analysis. Br J Pharmacol. 1995;114:1171–8.
14. Johansson A, Hao J, Sjolund B. Local corticosteroid application blocks transmission in normal nociceptive C-fibers. Acta Anaesthesiol Scand. 1990;34:335–8.
15. Prashant A Biradar, Padmanabha Kaimar,¹ and Kannappady Gopalakrishna² Effect of dexamethasone added to lidocaine in supraclavicular brachial plexus block: A prospective, randomised, double-blind study. Indian J Anaesth. 2013 Mar-Apr; 57(2): 180–184./ 2.ref of Holte from introduction.
16. Musba AT*, Tanra H, Yusuf I and Ahmad R The Effect of Dexamethasone on the Dynamics of Inflammation, Cortisol and analgesia in Lower Limb Surgery, J Pain Relief Volume 4 • Issue 4 • 1000186.
17. Jokela et al The Effective Analgesic Dose of Dexamethasone After Laparoscopic Hysterectomy Anesthesia & Analgesia: August 2009 - Volume 109 - Issue 2 - pp 607-615.
18. Murphy GS, Szokol JW, Greenberg SB, Avram MJ, Vender JS, Nisman M, et al. Preoperative dexamethasone enhances quality of recovery after laparoscopic cholecystectomy: effect on in-hospital and postdischarge recovery outcomes. *Anesthesiology*. 2011;**114**(4):882–90.
19. De Oliveira GS, Jr, Almeida MD, Benzon HT, McCarthy RJ. Perioperative single dose systemic dexamethasone for postoperative pain: A meta-analysis of randomized controlled trials. *Anesthesiology*. 2011;115:575–88.
20. Hval Kjetil, MD*Thagaard K. Sem, MD*Schlichting Ellen, MD, PhD†Raeder Johan, MD, PhD* The Prolonged Postoperative Analgesic Effect When Dexamethasone Is Added to a Nonsteroidal Antiinflammatory Drug (Rofecoxib) Before Breast Surgery Anesthesia & Analgesia Vol. 105, No. 2, August 2007 p 481-486.
21. Hval Kjetil, Thagaard K. Sem, Schlichting Ellen, MD, Raeder Johan, The Prolonged Postoperative Analgesic Effect When Dexamethasone Is Added to a Nonsteroidal Antiinflammatory Drug (Rofecoxib) Before Breast Surgery ANESTHESIA & ANALGESIA Vol. 105, No. 2, August 2007 p-481-86.
22. Sebastien Pierre MD , Rachel Whelan, Nausea and vomiting after surgery., Continuing Education in Anaesthesia, Critical Care & Pain | 2012. Published by Oxford University Press on behalf of the British Journal of Anaesthesia.
23. Lenka Doubravska , Katerina Dostalova , Sarka Fritscherova , Jana Zapletalova Milan Adamus INCIDENCE OF POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS AT A UNIVERSITY HOSPITAL. WHERE ARE WE TODAY? Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2010 Mar; 154(1):69–76.
24. Henzi I, Walder B, Tramer MR. Dexamethasone for the prevention of postoperative nausea and vomiting: a quantitative systematic review. *Anesth Analg* 2000; 90: 186–94.
25. Gan TJ, Meyer TA, Apfel CC, et al. Society for Ambulatory Anesthesia guidelines for the management of postoperative nausea and vomiting. *Anesth Analg* 2007; 105: 1615–28.
26. Manpreet Singh^{1*}, Chavi Sarabpreet Sharma², Rajesh S Rautela³ and Akhil Taneja⁴ Intravenous Dexamethasone Causes Perineal Pain and Pruritus Journal of Anesthesia & Clinical Research Special Issue 1 • 2011.
27. Ning Li et al Short-term administration of steroids does not affect postoperative complications following liver resection: Evidence from a meta-analysis of randomized controlled trials. *Hepatology Research* Volume 45, Issue 2 February 2015 Pages 201–209.