Original Article

Effect of Perioperative Single Dose Dexamethasone on Postoperative Mean Pain Score

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ABSTRACT

Objective: To evaluate the analgesic effect of perioperative single dose of dexamethasone with control in patients undergoing surgery under general anesthesia.

Study Design: Randomized controlled trial study.

Place and Duration of Study: This study was conducted at the Department of Anaesthesia, Arif Memorial Teaching Hospital associated with Rashid Latif Medical College and Lahore General Hospital, Lahore from July 2019 to December 2019.

Materials and Methods: One hundred and forty patients, aged 18-60 years, undergoing surgery under general anesthesia. They were split into two groups, Control (Group C) and Dexamethasone (Group D). The patients in control group were given injection nalbuphine 6-10mg with placebo while those in study group were given injection dexamethasone 0.1mg/kg along with injection nalbuphine 6-10mg. The technique for general anesthesia was standard for both groups. After 12 and 24 hours patients were evaluated for post-operative pain by using visual analogue score (VAS).

Results: Mean pain score with dexamethasone was significantly low compared to the placebo group i.e. Dexamethasone: 1.41 vs. Placebo: 2.96, p-value=0.000. Patients were stratified according to age i.e.<40 and ≥40 years, Sex i.e., male and female patients, BMI i.e., normal, overweight & obese and the mean pain score was notably reduced with Dexamethasone as compared to placebo group across all groups.

Conclusion: Dexamethasone at dose of 0.1 mg/kg, is efficacious in minimizing postoperative pain.

Key Words: Control, Dexamethasone, General anesthesia, Pain score, Single dose

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INTRODUCTION

Immediate postoperative pain is an unpleasant consequence that slows down functional recovery of patients, prolong hospital stay and reduce patient satisfaction. Multimodal analgesic technique has been an important strategy to manage postoperative pain. Glucocorticoids have pain-relieving, anti-inflammatory and anti- emetic effects. Several randomized controlled trials have evaluated responses associated with a single perioperative dose of glucocorticoids in various major and minor surgical procedures. Dexamethasone has been conventionally used as peri-operative corticosteroid to lower the incidence of nausea and vomiting after surgery, and assumed to have a significant role as an analgesic in the immediate post-operative period.[1,2] Studies have shown that preoperative administration of dexamethasone reduces the post-operative pain significantly. It inhibits peripheral phospholipase, which reduces the pain-enhancing agents from the cyclooxygenase and lipoxygenase pathways. Additionally, corticosteroids inhibit expression of cytokine gene and hinders the release of pro-inflammatory enzymes, bradykinin, and neuropeptides from damaged nerve terminals, key factors in precipitating pain.[3,4] Previous studies have evaluated the potential analgesic effect of single perioperative intravenous dose of dexamethasone for several surgical procedures. Waldron et al. conducted a systemic review to investigate effect of a single intravenous dose of dexamethasone on postoperative pain and side effects related to it. A single intravenous perioperative dose of dexamethasone less but statistically significant benefits.[5,6] A literature review by Moore SG concluded that a minimum dose of at least 0.1 mg/kg of dexamethasone will be effective in reducing the pain scores and opioid reqirements.[7]

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A meta-analysis carried out by De Oliveira et al. (2011) concluded that medium dose dexamethasone (0.11 to 0.2 mg/kg) is a potent post-operative pain control strategy without having any significant harmful effects and better controlled achieved with preoperative drug administration.[8]

The rationale of the study is to compare the mean pain score with perioperative single dose of dexamethasone versus placebo in patients undergoing surgery under general anesthesia. Literature review of some studies show that the addition of dexamethasone during surgery under general anesthesia has no use as there was no difference in post-operative pain. In contrary some data showed that dexamethasone is highly effective in controlling post-operative pain. No such data is available for our local population. So we conducted this study to conclude whether to implement the use of dexamethasone in general anesthesia surgeries and if not effective, then additional dexamethasone could be restricted. This will help in reducing harmful effects of pain, patient sufferings, on the other hand, reducing burden on staff.

MATERIALS AND METHODS

This randomized controlled trial was performed in the Department of Anaesthesia, Arif Memorial Teaching Hospital associated with Rashid Latif Medical College and Lahore General Hospital, Lahore from 1st July 2019 to 31st December 2019. One forty patients in the age range of 18-60 years were registered in this study after written informed consent. Patients undergoing gynecological procedures, orthopedic and general surgeries under general anaesthesia were included in this study. Patients with hepatic and renal insufficiency, diabetes mellitus, history of corticosteroid hypersensitivity, prior gastric ulcer, already on corticosteroids or immunosuppressive drugs, analgesics and opioids were excluded. Patients were randomly divided into two groups, Group C (control) and D (dexamethasone) by using lottery method. After baseline blood pressure, oxygen saturation, capnography, electrocardiographic evaluation, and hydration with 10 mL/Kg of crystalloids in all patients, general anesthesia was induced with propofol and atracurium 0.5mg/kg. In both groups inj. Nalbuphine 0.1mg/kg was given as premedication prior to induction and 30 mg inj. Ketorolac intraoperatively. The patients in control group (C) were given 2ml normal saline after induction while in group D (dexamethasone), 0.1 mg/kg inj. Dexamethasone was given. After surgery patients were shifted to post anesthesia care units and postoperative pain was assessed by using VAS at 12 and 24 hours. The range of this score is from 0 to 10. '0' was considered as no pain while '10' was considered as worst bearable pain. 0.1 mg/kg of nalbuphine was given as rescue analgesia at VAS score greater than 3. The data was analyzed using SPSS version 21. Student 't'-test was applied for the comparison of the mean pain score in both groups. p-value ≤0.05 was considered as significant.

RESULTS

Mean age of patients in dexamethasone and in placebo group was 36.93±12.24 and 40.87±12.03 with age range between 18 and 60 years (Table 1) In dexamethasone group 51.4%(n=36) patients were male and 48.6% (n=34) patients were female while in placebo group there were 44.3% (n=31) male and 55.7% (n=39) female patients (Table 2). Mean BMI of patients in Dexamethasone and in Placebo was 24.07±2.87 and 25.21±2.57 (Table 3). Mean pain score was significantly higher in placebo group at 12 and 24 hours. The Mean pain score at 12 hours was 2.37±1.00 in dexamethasone group vs 3.07±1.01 in placebo group (p=0.009). It was 1.41±1.05in dexamethasone group at 24 hours while in placebo group it was 2.96±1.31 [p=0.000] (Table 4).

Table No.1: Mean distribution of patients (n=140)

Group	Mean±SD
Dexamethasone	36.93±12.24
Placebo	40.87±12.03

Table No.2: Frequency of genders (n=140)

Gender	Dexamethasone		Placebo	
	No.	%	No.	%
Male	36	51.4	31	44.3
Female	34	48.6	39	55.7

Table No.3: Mean distribution of body mass index (mg/m^2)

Group	Mean±SD
Dexamethasone	24.07±2.87
Placebo	25.21±2.57

Table No.4: Pain scores in both groups

Pain score	Dexamethasone	Placebo	P value
At 12 hours	2.37 ±1.00	3.07±1.01	0.009
At 24 hours	1.41±1.056	2.96±1.313	0.000

DISCUSSION

Postoperative pain is one of the main reasons of delayed recovery and unanticipated hospital admission in day care anesthesia. The intensity of postoperative pain differs from individual to individual and is mediated by following factors: age, sex, psychological and emotional factors, site and type of surgery, pain threshold and anesthetic agents. Glucocorticoids have been investigated for their role in reducing inflammation, anodyne effects and immune modulatory actions. Several studies have been conducted to evaluate the effect of a perioperative single

glucocorticoid dose administration.[2,3] The pain lowering effects of glucocorticoids are primarily mediated by the peripheral inhibition of phospholipase enzyme, thus reducing the products of the cyclooxygenase and lipoxygenase pathways hindering inflammatory reactions. Besides anti-inflammatory effects, steroids are presumed to reduce the amount of substance P released at dorsal root ganglion which may be additive to its pain reducing actions.[5]

The recommended analgesic dose of dexamethasone for this purpose is variable. Our study concluded that one dose of 8mg dexamethasone was efficacious in reducing postoperative pain after general anaesthesia. Similar findings were seen with dexamethasone (8mg) on VRS pain scores at 24 hours in patients having total knee replacement by Samona et al. Dexamethasone group (4.57) had lower pain score than the control group (6.077) (P = 0.003).[4]

The results of our study were also comparable with that of Szucs et al who concluded a significant improvement in postoperative analgesia with a single dose of 0.1mh/kg intravenous dexamethasone given prior to operative fixation of fractured neck of femur. Pain scores 6h post-surgery were less in the dexamethasone group in comparison to group which received placebo [0.8±1.3 vs. 3.9±2.9] (p = 0.0004).[9]

Sharma et al also evaluated the effects of preoperative injection dexamethasone on intra and immediate post-operative pain for procedures on lumbar spine and reported similar observations. They found that a dose of 8 mg intravenous dexamethasone to be efficacious when compared to placebo. (p<0.001).[5]

In accordance to our study, Shahlu et al have seen significant reduction in VAS scores at 12 and 24 hours postoperatively with administration of intravenous dexamethasone (8mg) in elective caesarian section under spinal anaesthesia (p<0.001).[10] Our study is also in line with a study done by Melese et al in Ethiopia on the analgesic effect of Intravenous Dexamethasone Prior to Spinal Anesthesia Among Parturient Undergoing Cesarean Section. They found statistically significant decrements in NRS score both at rest and voluntary coughing in dexamethasone group at 12 and 24 hours (p=0.0001).[11]

Kadur et al investigated the effect of intravenous dexamethasone 0.1mg/kg on postoperative pain, nausea and vomiting after spinal anesthesia with pethidine and bupivacaine in lower limb orthopedic surgery. They also found significant reduction in VAS scores with dexamethasone at 12 hours (4.12±1.59 vs 5.11±1.57) and 24 hours (1.613±0.74 vs 2.30±1.81) as compared to control group (p=0.000).[12]

Similarity was seen in results of study by Harr et al. They had shown that one 8 mg dose of intravenous dexamethasone given at least an hour before surgery was effectual to control post-operative pain at 12 hours in comparison with placebo (2.8±1.3 vs 4.2±2.4). Inconsistent with our study results, no significant difference was seen at 24 hours. (p>0.05).[13]

In contrast, Jain et al did not find significant reduction in pain scores with 8mg dexamethasone at 24 hours during infraumbilical surgeries under spinal anaesthesia (p=0.08). This difference could be due to variation in methodology as they had given study drug preoperatively.[1]

One of the limitations of our study was that we did not measure the total consumption of rescue analgesia. Another limitation was that we did not evaluate postoperative side effects in terms of delayed wound healing, nausea and vomiting. Also serum concentration of dexamethasone was not measured. Future studies can be done regarding these along with different dexamethasone doses at different times.

CONCLUSION

The single perioperative dose of intravenous dexamethasone is effective in decreasing postoperative pain.

Author's Contribution:

Concept & Design of Study:	Zahid Hanif
Drafting:	Umar Iqbal, Ahsan Khan
Data Analysis:	Nighat Parveen, Aqeel Moazzam, Muhammad Saqib
Revisiting Critically:	Zahid Hanif, Umar Iqbal
Final Approval of version:	Zahid Hanif

Conflict of Interest: The study has no conflict of interest to declare by any author.

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