Original Article

EFFECTIVENESS OF DEXAMETHASONE IN INTRA AND POST OPERATIVE PAIN MANAGEMENT OF UNILATERAL INGUINAL HERNIA SURGERY.

Bashir Ahmed[*], Hamid Raza[**], Kamlaish[***], Absar Anwar[****], Zain Ali[*****]
[*]Assistant Professor Anesthesiology and ICU, Dow University of Health Sciences, Civil Hospital Karachi.
[**]Assistant Professor Anesthesiology and ICU, Liaquat University of Medical and Health Sciences Jamshoro.
[***]Consultatn Anesthetist, Dow University of Health Sciences, Civil Hospital Karachi.
[****]Intern, Dow Univeristy of Health Sciences.
[*****]House Officer, Civil Hospital Karachi

ABSTRACT:

OBJECTIVE: The aim of our study is to compare Fentanyl(1 micro/kg) alone, with fentanyl (0.75 micro/kg) administered with dexamethasone (8 mg), for the relief of pain in patients who are being operated for inguinal hernia repair. And compare the resulting analgesia using visual analog scale and hemodynamic variables.

MATERIAL AND METHODS: The type of study is a randomized double blind case control study conducted for a period of one year from April 2013 to May 2014 at a tertiary care hospital in Karachi Pakistan. Patients diagnosed with inguinal hernia were admitted in the hospital. The patients were divided into two groups using a random number generator. Group A was selected to be given fentanyl 1 micro/kg−1 (control group) and the study group (group B)to be given 8 mg dexamethasone with fentanyl 0.75 micro/kg−1 . Assessment of pain was based on hemodynamic changes intra operatively and visual analogue scale post operatively. The data was analyzed using SPSS version 20.

RESULTS: In the control group, the hemodynamic variables including heart rate and blood pressure as compared with that of the study group (taken at 1, 5, 20 and 30 min after incision was given) were considerably higher ($P \leq 0.001$) . Intra-operative (rescue) analgesia that was required in the control group was n= 40 (100%) while n= 24 (60%) for study group. The mean scores for pain measured at pre determined and fixed time intervals were significantly lower in the study group as compared to the control group ($p<0.001$). The use of post operative (rescue) analgesia that was required was found to be n=40 (100%) patients in the control group, while it was required in n= 30 (75%)patients in the study group.

CONCLUSION: Administration of Dexamethasone 8mg IV with fentanyl reduces intra and post operative pain in the 1st hour after unilateral inguinal hernia repair, as compared to administration of fentanyl alone.

KEYWORDS: dexamethasone, inguinal hernia repair, pain relief, postoperative pain management, fentanyl, analgesia.

ABBREVIATIONS: VAS= Visual analog scale,

INTRODUCTION:

Post-operative pain is one of the main reasons for delayed stay in the hospital. To reduce the

Corresponding Author:
Dr. Zain Ali
House officer,
Civil Hospital Karachi Karachi.
Email id: drzainali88@gmail.com

pain, opiods are usually given, but they have their own side effects which include respiratory depression, nausea, vomiting, post operative paralytic ileus and itching. To overcome the side effects of opiods, additional co analgesics are added to reduce the dose of opiods in order to reduce side effects. And one such supplemental drug that is used is dexamethasone, which has strong anti-inflammatory properties and has a strong effect on pain due to tissue injury and plays a pivotal role in the pathophysiology of surgical pain. [1] A single dose of 8 mg of dexamethasone is very much effective in dental surgery [2] and thyroidectomy up to 48 hr [3] but it failed to show a significant role in pain management of Inguinal hernia repair after giving spinal anesthesia according to Tan et al [4]. The aim of our study is to compare intraoperative and early postoperative pain in unilateral inguinal hernia repair, in patients who are administered fentanyl 1 ug/kg−1 alone and compare them with those who receive fentanyl 0.75 ug/kg−1 with added 8 mg of dexamethasone combination given at the time of induction.

MATERIAL AND METHODS:

The type of study is a randomized double blind case control study conducted for a period of one year from April 2013 to May 2014 at a tertiary care hospital in Karachi Pakistan. A total of n=80 patients belonging to ASA grade 1 and 2, between the ages of 20 to 60 years were selected, and went under general anesthesia for the repair of the inguinal hernia. Patients who did not opt for general anesthesia, those who are at the extremes of age were excluded and patients with history of any allergies, hypersensitivity reactions to drugs, chronic usage of steroids one month prior to surgery or excessive analgesic use were also excluded.. A sample size of 40 patients in each group was enough to detect the 50% reduction in pain score with alpha 0.01 and beta 0.01. A 50% pain reduction was considered as a primary outcome and significant. A duly signed informed consent was taken from all the patients in the study. Grouping of patients was based on a random number generator. Fentanyl solution was prepared in 5 ml solution by addition of normal saline or dexamethasone respectively. Control group was provided with fentanyl 1micro/kg−1 and study group with fentanyl 0.75 micro/kg−1 with additional 8mg (2ml) of dexamethasone. Double blinding to the drugs administered was ensured by not naming the syringes of the drugs and drugs prepared by an anesthetist who was not actively participating in the operating procedure.

Patients were explained about the VAS pain scoring system in which 0 means no pain and 10 means very severe pain. Midazolam 7.5mg was given before operation and vitals were taken which included heart rate and blood pressures. On the operation table, the patients lungs were oxygenated for 3 min at the rate of 6L /min, and relevant study drugs were given by an anesthetist who was not involved in making the observations. Anesthesia was induced with propofol 2 mg/kg−1 administered over a period of 30 seconds followed by atracurium 0.6 mg/kg−1 intravenous (iv). For the maintenance of anesthesia Nitrous oxide 60% in oxygen, FiO2 0.4, and isoflurane 0.6-1.2% were used. The tidal volume was kept between 8 and 10 ml kg−1 and ventilation was volume controlled. Intraoperative rescue analgesia was done by using pethidine 10 mg if the hemodynamic variables escalated above 20% of preoperative baseline values as observed by the anesthetist. Neostigmine was given as muscle relaxant reversal drug, and 0.5 mg glycopyrolate IV was given when normal breathing was resumed by the patient.

Patients were shifted to the recovery room after tracheal extubation. Visual analog scale was used to assess pain in the recovery room and at follow up. Readings were taken at 10, 30 and 60 minutes respectively after shifting in the recovery room and the last reading was taken at 120 min after surgery just prior to shifting the patient from the recovery room to the ward. Pethidine 10mg was administered if the patient's VAS score was found to be at three or above. Statistical analysis was based on SPSS ver 19. Mean and standard deviations were calculated for the numerical data and analyzed with the help of independent sample t-test. Qualitative characteristics were analyzed by using frequencies and percentages and they were analyzed by using the Chi-square test.

Hemodynamic changes were analyzed using the mean and standard deviation at different time intervals and analyzed by repeated measures of ANOVA. A p value of ≤ 0.05 was considered as statistically significant.

RESULTS:

[Table 1] shows that two groups were demographically and also in the baselines differences. No statistically significant difference was observed when compared the ASA status and baseline hemodynamic variables of the patients. Blood pressure and heart rate was significantly raised at 1, 5, 20 and 30 min after incision was given in the control group as compared with the study group. All patients in the control group required intra operative rescue analgesia while n= 24 patients (60%) required it in the study group. This difference was found to be statistically significant (P = 0.0002). After shifting in the recovery room n= 19 (45.5%) of the patients in the control group and n= 10 (25%) patients in the study group had a pain score of more than 3. In the next 60 minutes the pain score of the control group was much higher. [Table 3]. After the 120 min mark none of the patients complained of pain. Postoperative rescue analgesia was given in all n= 40 (100%) in the control group and n= 30 (75%) patients in the study group respectively, which was not statistically significant. Table 3 shows the mean pain scores as compared in the two groups.

Table I: Demographics and other variables of the two groups.

Variables	Control Group (n = 40)	Study Group (n = 40)	P value
Age (years)	51.1 (SD +/- 15.4)	42.9 (13.7)	0.08
Weight (kg)	68.1 (SD +/- 7.2)	72.5 (SD +/- 9.8)	0.60
Duration of hernia (months)	1.66 (SD +/- 0.64)	1.65 (SD +/- 1.1)	0.53
Duration of surgery (min)	60.2 (SD +/- 11)	62.4 (SD +/- 25.3)	0.97
Gender (%)			0.67
Male	37 (92.5%)	35 (87.5%)	
Female	03 (7.5%)	5 (12.5%)	
ASA status (%)			0.62
I	18 (45%)	21 (52.5%)	
II	22 (55%)	19 (47.5%)	

Table II: Comparison of patients having VAS pain scores >3 at different time durations.

Time duration	Control Group (n= 40)	Study Group (n=40)	P value
Recovery room arrival	19 (47.5%)	10 (25%)	0.07
10 min	38 (95%)	25 (62.5%)	0.005*
30 min	35 (87.5%)	10(25%)	0.0001*
60 min	16 (40%)	1 (2.5%)	0.0001*
120 min	0 (0)	0 (0)	

Table III: Postoperative mean pain scores on VAS.

Time duration	Control Group (n= 40)	Study Group (n=40)	P value
Recovery room arrival	4.1 (SD +/- 2.2)	2.4 (SD +/- 1.9)	0.001
10 min	6 (SD +/- 1.2)	3.96 (SD +/-1.5)	<0.0001
30 min	5.0 (SD +/- 1.2)	3 (SD +/- 0.98)	<0.0001
60 min	3.2 (SD +/- 1.4)	2.0 (SD +/- 0.9)	<0.0001
120 min	2.04 (SD +/- 0.46)	1.13 (SD +/- 0.35)	<0.0001

DISCUSSION:

The major cause of delay to discharge is the postoperative pain. A combination of opioid and non opioid analgesic technique is more preferred. Ketamine, gabapentin, paracetamol, and NSAIDS have been used as adjunct agents, there is reduction is pain with the use of these adjuncts [5,6,7]. Dexamethasone is now used perioperatively to reduce nausea and vomiting after the procedure [8], it also has analgesic activity due to its antiinflammatory properties. It inhibits the leukocyte infiltration at the site of inflammation, and suppresses the humoral immune response. Effects include a significant reduction in scar tissue and edema, and a general reduction in the immune response, the effects are directly related to the dose, the mediators inhibited by Dexamethasone are interleukin, tumor necrosis factor, C-reactive protein, alpha and leukocyte receptors [9,10,11]. Different doses ranging from 4mg to 16mg of Dexamethasone for post operative pain relief (in both oral and IV form) have been studied [10,11,12,13,14] but the best dose is still not determined. The time of administration of the drug has also been under debate and varies from 2hours before surgery [17] to immediately before induction [13] to post operative administration [13] but the results are not convincing, some report low pain scores while other report no difference [4-16]. According to a study by Karanicolas et al found analgesia to be an effect of Dexamethasone while he was studying it its antiemetic properties in laparoscopic cholecystectomy [17] while Oliveira et al concluded that Dexamethasone when used in doses exceeding 0.1mg/kg are effective in reducing the postoperative pain and consumption of opioids.

According to the results of our study we found that the hemodynamic variable changes due to pain were significantly greater in the control group and this group also required the use of intraoperative rescue analgesia, the VAS score was also greater in this group, as compared to the study group, which also required less rescue analgesia but this difference was not statistically significant. Studies which had the Dexamethasone administration earlier showed a reduction in postoperative pain scores [14,19] which might be explained by improved peak levels of the drug in the blood stream. Jokela et al studied the different doses required of Dexamethasone and concluded that 10 and 15mg doses produced best effects at pain relief and less consumption of oxycodone as compared to 5mg dose [10,20]. It is hypothesized that different surgeries might require different doses of Dexamethasone as Wu et al demonstrated an analgesic effect on 5mg of Dexamethasone when
used in anorectal surgeries [7]. We were unable to study patient satisfaction and dynamic pain, also our method of administration of the drug was quiet simple, non use of depth of anesthesia monitor is also a limitation of our study, we did not use such equipments due to cost issues. In conclusion the use of Dexamethasone is cheap , it is easily available and lessens the concomitant use of other analgesics like narcotics and opioids, it decreases the incidence of nausea and vomiting and also helps in early discharge thus reducing the overall cost and lessens the burden on the economy.

CONCLUSION:

Administration of Dexamethasone 8mg IV with fentanyl reduces intra and post operative pain in the 1st hour after unilateral inguinal hernia repair, as compared to administration of fentanyl alone.

REFERENCES:

1. Salerno A, Hermann R. Efficacy and safety of steroid use for postoperative pain relief. Update and review of the medical literature. J Bone Joint Surg Am 2006;88:1361-72.
2. Numazaki M, Fujii Y. Reduction of postoperative emetic episodes and analgesic requirements with dexamethasone in patients scheduled for dental surgery. J Clin Anesth 2005;17:182-6.
3. Worni M, Schudel HH, Seifert E, Inglin R, Hagemann M, Vorburger SA, et al. Randomized controlled trial on single dose steroid before thyroidectomy for benign disease to improve postoperative nausea, pain, and vocal function. Ann Surg 2008;248:1060-6.
4. Tan PH, Liu K, Peng CH, Yang LC, Lin CR, Lu CY. The effect of dexamethasone on postoperative pain and emesis after intrathecal neostigmine. Anesth Analg 2001;92:228-32.
5. Bell RF, Dahl JB, Moore RA, Kalso EA. Perioperative ketamine for acute postoperative pain. Cochrane Database Syst Rev2006;Issue 1.Art.No.:CD004603. DOI:10.1002/14651858. CD004603.pub2.
6. Ho KY, Gan TJ, Habib AS. Gabapentin and postoperative pain — A systematic review of randomized controlled trials. Pain 2006;126:91-101.
7. Ong CK, Seymour RA, Lirk P, Merry AF. Combining paracetamol (acetaminophen) with nonsteroidal antiinflammatory drugs: A qualitative systematic review of analgesic efficacy for acute postoperative pain. Anesth Analg 2010;110:1170-9.
8. Gan TJ, Meyer TA, Apfel CC, Chung F, Davis PJ, Habib AS, et al. Society for Ambulatory Anesthesia guidelines for the management of postoperative nausea and vomiting. Anesth Analg 2007;105:1615-28.
9. Tsuei SE, Moore RG, Ashley JJ, McBride WG. Disposition of synethetic glucocorticoids. I. Pharmacokinetics of dexamethasone in healthy adults. J Pharmacokinet Biopharm 1979;7:249-64.
10. Holte K, Kehlet H. Perioperative single-dose glucocorticoid administration: Pathophysiologic effects and clinical implications. J Am Coll Surg 2002;195:694-712.
11. Thangaswamy CR, Rewari V, Trikha A, Dehran M, Chandralekha. Dexamethasone before total laparoscopic hysterectomy: A randomized controlled dose-response study. J Anesth 2010;24:24-30.
12. Fukami Y, Terasaki M, Okamoto Y, Sakaguchi K, Murata T, Ohkubo M, et al. Efficacy of preoperative dexamethasone in patients with laparoscopic cholecystectomy: A prospectiverandomized double-blind study. J Hepatobiliary Pancreat Surg 2009;16: 367-71.
13. Numazaki M, Fujii Y. Reduction of postoperative emetic episodesand analgesic requirements with dexamethasone in patients scheduled for dental surgery. J Clin Anesth 2005;17:182-6.
14. Worni M, Schudel HH, Seifert E, Inglin R, Hagemann M, Vorburger SA, et al. Randomized controlled trial on single dose steroid before thyroidectomy for benign disease to improve postoperative nausea, pain, and vocal function. Ann Surg 2008;248:1060-6.
15. Al-Qudah M, Rashdan Y. Role of dexamethasone in reducing pain after endoscopic sinus surgery in adults: A double-blind prospective randomized trial. Ann Otol Rhinol Laryngol 2010;119:266-9.
16. Tolver MA, Strandfelt P, Bryld EB, Rosenberg J, Bisgaard T. Randomized clinical trial of dexamethasone versus placebo in laparoscopic inguinal hernia repair. Br J Surg 2012;99:1374-80.
17. Karanicolas PJ, Smith SE, Kanbur B, Davies E, Guyatt GH. The impact of prophylactic dexamethasone on nausea and vomiting after laparoscopic cholecystectomy: A systematic review and metaanalysis. Ann Surg 2008;248:751-62.
18. 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.
19. Gómez-Hernández J, Orozco-Alatorre AL, Domínguez-Contreras M, Oceguera-Villanueva A, Gómez-Romo S, Alvarez Villaseñor AS, et al. Preoperative dexamethasone reduces postoperative pain, nausea and vomiting following mastectomy for breast cancer. BMC Cancer 2010;10:692.
20. Jokela RM, Ahonen JV, Tallgren MK, Marjakangas PC, Korttila KT. The effective analgesic dose of Sdexamethasone after laparoscopic hysterectomy. Anesth Analg 2009;109:607-15.

SR #	AUTHOR NAME	CONTRIBUTION
1	Dr. Bashir Ahmad	Concept study Design, Organizing draft, Manuscript writing
2	Dr. Hamid Raza	Data entry and analysis, layout design
3	Dr. Kamlaish	Data Collection, Final layout, Design of study
4	Dr. Absar Anwar	Manuscript writing, Data entry
5	Dr. Zain Ali	Final write up, corresponding author

Submitted for publication: 21.04.2016
Accepted for publication: 25.07.2016

Failures are often the results of timidity and fears; disappointments are the results of bashfulness; hours of leisure pass away like summer-clouds, therefore, do not waste opportunity of doing good

Hazrat Ali (Karmulha Wajhay)