Original Research Article

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A study to assess the effect of a single pre-operative dose of steroid in major abdominal surgery outcomes

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ABSTRACT

Background: Abdominal surgeries are associated with an appreciably high rate of post-operative nausea, vomiting and pain due to the severity of the proinflammatory cytokine response arising from peritoneal trauma. This study was designed to study the efficacy of single pre-operative dose of dexamethasone in reducing the incidence of post-operative nausea, vomiting and pain after major abdominal surgeries.

Methods: The study was prospective, randomized and double blinded. 60 adult patients of either sex, scheduled for elective laparotomy from March 2012 to October 2013 were included in the study.

Results: In this study 86.7% of patients in the saline group experienced nausea, whereas only 13.3% of patients in dexamethasone group experienced nausea. Chi square value is 32.67 and p value is<0.05. Among the patients who received dexamethasone only 10% experienced vomiting, where as in the saline group 33.3% developed vomiting. Chi square value is 4.812 and p value is 0.029. This is statistically significant as p value is<0.05. Among the patients who experienced very severe pain 100% were from the saline group, whereas none of the patients in dexamethasone group experienced very severe pain. Among the patients who experienced severe pain 85.7% belonged to saline group, and only 14.3% were from the dexamethasone group. The p value is<0.05.

Conclusions: It was found that single pre-operative dose of dexamethasone (8 mg) reduces post-operative nausea, vomiting, pain significantly after abdominal surgery.

Keywords: Postoperative nausea, Vomiting, Pain, Major abdominal surgery, Dexamethasone

INTRODUCTION

abdominal surgery profound Major causes physiological insult with significant metabolic derangement. This response is greater in magnitude when compared to other surgical procedures of similar duration performed in comparable populations, and this has been postulated to be due to the severity of the proinflammatory cytokine response arising from peritoneal trauma.¹⁻³ The resultant clinical manifestation is prolonged convalescence and delayed functional recovery. Previous studies have also demonstrated that increased levels of proinflammatory cytokines correlate with increased morbidity and mortality.⁴ Thus there has been considerable interest in attenuating the postsurgical stress response to enhance recovery after surgery.⁵

Postoperative nausea and vomiting, one of the common complications after anesthesia, that resulted in patient discomfort, prolonged stay in PACU and can be rarely life threatening if it predisposes to pulmonary aspiration syndrome. Post-operative nausea and vomiting is difficult to measure, is generally self-limiting and until recently was accepted as something the patients were expected to put up with, without complaining. The incidence of postoperative emesis in large studies has been reported to

be in the 20 -30% range. The importance of preventing nausea and vomiting has gained much popularity following the advent of day care surgery and anesthesia.

Post-operative nausea and vomiting can cause patient discomfort, debilitation and limitation of physical activity, and loss of wages. The institutional effect of PONV include increased cost of management time from nurse to physicians and drugs and supplies, prolonged stay in PACU and hospitalization. In severe cases it also adds to the indirect cost implications.

The use of dexamethasone was first demonstrated in cancer chemotherapy where it was a better antiemetic than conventional drugs like metoclopramide, droperidol, and prochlorperazine etc. Besides it potentiates the action of other antiemetic agents like metoclopramide and granisetron. Dexamethasone is cheap and administration of a single dose is not associated with significant side effects like adrenocorticoid suppression, hyperglycemia or wound infection.⁷

Glucocorticoids (GCs) have been postulated as a suitable pretreatment agent to attenuate the postsurgical stress response. Although their molecular mechanisms have not been completely elucidated, they can modify the surgically induced neurohumoral mediators of injury and inflammation. Within experimental models, GCs have been shown to decrease proinflammatory cytokines such as IL-6, IL-1, and TNF-α. GCs also have an antipyretic effect and increase blood glucose concentration and leucocyte count and may have beneficial effects on postoperative renal function.8-10 GCs have found many clinical indications and have been extensively investigated in the context of treatment for sepsis, where prolonged use in low doses has been thought to provide a survival advantage. Within surgical settings, the use of GCs has been evaluated in cardiac surgery where they have been shown to mitigate against ischemia-reperfusion injury.11 They have been shown to decrease nausea and vomiting after laparoscopic cholecystectomy. 12,13

This is associated with an attenuation of the postsurgical inflammatory response as evidenced by a decreased concentration of serum IL-6 in patients receiving GCs.¹⁴

These results hold largely true in procedure-specific analyses and in particular, GCs do not seem to increase the risk of complications in colorectal surgery. The metabolic response to major abdominal surgery is mediated in part by pro-inflammatory cytokine release. Although inflammation is a necessary precursor for healing, it is the excessive amplitude of the inflammatory response after major abdominal surgery that is thought to contribute to postoperative morbidity and delay recovery. Moreover, due to positive-feedback cycles and inherent biological redundancy in the cytokine cascade after the abdominal incision, preoperative treatment with GCs has been postulated as an ideal empirical solution. The cytokine cascade after the abdominal incision, preoperative treatment with GCs has been postulated as an ideal empirical solution.

Objectives

Objectives were to assess the effect of single preoperative dose of dexamethasone in preventing nausea, vomiting, pain and reducing the length of hospital stay after major abdominal surgery.

METHODS

Study design

prospective, randomized and double blinded Study

Study Setting

Government Medical College, Kottayam

Institutional Ethical Committee of Medical College, Kottayam has approved the research on "A study to assess the effect of a single dose of steroid in major abdominal surgery outcomes" (IEC No: 37/2012 Dated 23/02/2012)

Statistical method and sample size

Sample size was calculated as in the study by Wang et al. They found that total incidence of nausea and vomiting in the group which received no dexamethazone was 63% and it was 23% in the group which received dexamethazone. substituting the values in the formula $n=8 \times (r(100-r)-s(100-s)/(r-s) \times (r-s)$

r=event in the placebo group s= event in the test group

The sample size got according to the formula was 20.5 in each group as there is chance to follow up and violation from the study, 60 patients were included in the study, where 30 patients will be receiving dexamethazone and other 30 patients will be receiving saline instead of drug.

Data was entered in MS Excel and analyzed using SPSS 16.0. Catagoric variables were analyzed using chi square test and continuous variables with independent t test.

Study method

The amount of dexamethasone was chosen based on work by Lee et al that showed 8 mg is the minimum effective dose for reduction of post-operative nausea and vomiting. The Injections will be given by nursing staff 90 minutes before the induction of anaesthesia. Patients were evaluated pre operatively and 12 hours after the surgery. Patients were evaluated for nausea, vomiting, pain, length of hospital stay Anaesthesia was performed under GA using routine medications. Drugs used were Glycopyrolate, midazolam, morphine, vecuronium, thiopentone and succinyl choline. Surgery was performed by staff surgeons. Nausea and vomiting will be assessed in a 10-point scale using visual analogue scale. Antiemetic therapy will be given according to patient

needs. The first line antiemetic was promethazine 12.5 mg IV. Pain will be analysed with a standardized visual analogue scale that ranged from 0(no pain) to 10 (unbearable pain) at the above-mentioned time point. All patients will be familiarized with visual analogue scale preoperatively, after surgery all patients received basic analgesic therapy with acetaminophen 1.5 gm/day. Additionally, some patients received 100mg tramadol IV.

Length of hospital stay—day of surgery was counted as day 0. Visual analogue scale for pain 0-no pain, 2-mild pain, 4-moderate pain, 6-severe pain, 8- very severe pain, 10-unbearable pain. Visual analogue scale for nausea & vomiting 0- no nausea 1-nausea; 0- no vomiting, 1-vomiting.

Inclusion criteria

Total 60 adult patients of either sex, scheduled for elective laparotomy under general anaesthesia in Government Medical College Kottayam from March 2012to October 2013 were included in the study.

Exclusion criteria

Exclusion criteria were 1) patients with depression, chronic pain disorder, insulin dependent diabetes mellitus 2) history of severe or repeated post-operative pain & vomiting after previous minor surgery 3) age<18 yrs 4) patients who did not receive standard anaesthesia or received intra operative additional steroids were also excluded.

Duration of study

One year

Procedure

The study was prospective, randomized and double blinded, the patients were randomly divided into two groups by closed envelop method. Study group A – Consisted of 30 patients who received 8mg dexamethazone 90 mts before surgery. Group B consisted of 30 patients who received 2 ml saline.

RESULTS

In the study population mean age was found to be 55 and standard deviation was 10.88.

The age distribution patients who took part in the study. 55% of the patients were 55 years or less, and 45% of patients were more than 55 years. In the age group of 55 years or less, 53.6% patients were males and 56.2% were females, and in the age group of more than 55 years, 46.4% of patients were males and 43.8% were females. The p value was>0.05 hence both the groups were comparable (Table 1).

Table 1: Gender distribution of patients in age group.

A co Croun	Gender	
Age Group	Male	Female
≤55	15 (53.6%)	18 (56.2%)
>55	13 (46.4%)	14 (43.8%)

df=1, p value >0.05

Table 2: Age distribution of patients in study groups.

	Age group	
Group	≤55	>55
Dexamethasone	19 (57.6%)	11(40.7%)
Saline	14(42.4%)	16(59.3%)

df =1, p value=0.159

Total 57.6% of patients were 55 years or less in the dexamethasone group while it was 42.4% in the saline group. 40.7% of patients in the dexamethasone group were above 55 years while it was 59.3% in the saline group. Both the groups were comparable as the p value is>0.05 (Table 2).

Table 3: Gender distribution in the groups.

Cwarm	Sex		
Group	Male	Female	
Dexamethasone	13 (46.4%)	17 (53.1%)	
Saline	15 (53.6%)	15 (46.9%)	

Df=1, p value=0.398

Total 46.4% of dexamethasone group and 53.6% of saline group were males. 53.1% of dexamethasone group and 46.9% of saline group were females. Both the groups were comparable according to gender as p value is >0.05 (Table 3).

Table 4: Type of surgery.

	Frequency	Percent
Cholecystectomy	12	20.0
Colo rectal surgery	28	46.7
Gastrectomy	16	26.7
Retroperitoneal tumors	4	6.7

The surgeries performed were colorectal surgery (46.7%), gastrectomy (26.7%), cholecystectomy (20%) and retroperitoneal tumour excision (6.7%) (Table 4).

Total 86.7% of patients in the saline group experienced nausea, whereas only 13.3% of patients in dexamethasone group experienced nausea. chi square value is 32.67 and p value is <0.05 which is significant. Among the patients who received dexamethasone only 10% experienced vomiting, whereas in the saline group 33.3% developed vomiting. chi square value is 4.812 and p value is0.029. This is statistically significant as p value is<0.05. Continuity correction has been done (Table 5).

Table 5: Distribution of nausea and vomiting in study groups.

Group	Nausea Vomiting			
	Absent	Present	Absent	Present
Dexamet	26	4	27	3
hasone	(86.7%)	(13.3%)	(90%)	(10%)
Saline	4	26	20	10
	(13.3%)	(86.7%)	(66.6%)	(33.3%)

Among the patients who experienced very severe pain 100% were from the saline group, whereas none of the patients in dexamethasone group experienced very severe pain, among the patients who experienced severe pain 85.7% belonged to saline group, and only 14.3% were from the dexamethasone group. p value is<0.05, hence dexamethasone produces a significant reduction in pain (Table 6).

Table 6: Postoperative pain.

Pain	Dexamethasone	Saline
Very Severe	0 (0%)	8 (100%)
Severe	3 (14.3%)	18 (85.7%)
Moderate	18 (81.8%)	4 (18.2%)
Mild	9 (100%)	0 (0%)

Chi square value=36.623, df-3, p value<0.05

Table 7: Length of hospital stay comparison.

	Group	N	Mean	SD
	Dexamethasone	30	5.87	1.548
hospital stay	Saline	30	6.60	1.673

The average length of hospital stay for the dexamethasone group is 5.87 and 6.60 days for the saline group. It is evident that dexamethasone does not produce a significant reduction in length of hospital stay (Table 7).

DISCUSSION

Major abdominal surgery profound causes physiological insult with significant metabolic derangement, this has been postulated to be due to the severity of pro inflammatory cytokine response arising from peritoneal trauma, the resultant clinical manifestation is prolonged convalescence and delayed functional recovery.¹⁻³ Postoperative nausea and vomiting (PONV) is of multifactorial origin. The incidence of PONV after anaesthesia, despite the advances in antiemetic therapy in the last decades is still found to be relatively high.

Our study was aimed at finding the efficacy of dexamethasone in preventing PONV, pain, after major abdominal surgeries. In our study the factors that would have contributed to nausea and vomiting may be gastric

and bowel surgery, surgery for a gall bladder related pathology, use of Fentanyl etc. Use of facemask, use of nitrous oxide may or may not have contributed to nausea and vomiting.

In our study, the treatment groups were similar in terms of patient characteristics, type of anaesthesia and analgesics used postoperatively. Therefore, the differences in scores can be attributed to the differences in the agents tested.

Abdominal surgeries were chosen because of high incidence of PONV associated with it. In this study a single 8 mg dose of dexamethasone was given 90 minutes before the surgery. Since 1981, dexamethasone has been reported to be effective in reducing the incidence of in patients undergoing chemotherapy.

In this study 86.7% of patients who did not receive dexamethasone experienced nausea whereas among those who received dexamethasone it was only13.3%, and vomiting was seen in only 10% of the patients who received dexamethasone and in the saline group 33.3% patients developed vomiting this is statistically significant to say that pre-operative dexamethasone use reduces the incidence of PONV. This is in accordance with the results obtained in studies by Henzi et al and Wang et al. ^{13,16-20}

Adequate hydration, optimum pain relief, avoidance of hypotension, adequate oxygenation, easy ambulation and gentle handling of patients in the postoperative period have all found to have decreased the incidence of PONV. In our study also, all the above mentioned were taken care of in both the study groups.

Adverse effects related to a single dose of Dexamethasone are extremely rare. Wang et al stated that they were unable to find any report on side effects associated with a single dose of Dexamethasone.¹³ Less than 24 hour of Dexamethasone therapy is considered safe and almost without adverse effects.

Alternative treatments of PONV include the rather expensive 5HT3-receptor antagonists like ondansetron or other antiemetics that can cause undesirable even dangerous side effects, such as excessive sedation, hypotension, hallucinations, and extrapyramidal symptoms.²¹ The results suggest that the routine use of a single dose of dexamethasone is an economical strategy that is effective with virtually no major side effects.

Post-operative pain

Pain after abdominal surgery is often the cause of major discomfort within the first 24 hours. In this study we used acetaminophen as baseline analgesic therapy. Among the patients who reported very severe pain, all of them were in the saline group, among the patients who reported severe pain 85.7% were in the saline group, and among

the patients who reported mild pain 81.8% had received dexamethasone therapy. This definitely shows preoperative dose of dexamethasone has analgesic property. This result was in accordance with multiple studies which evaluated the analgesia effect of dexamethasone.²²⁻²⁷

Limitations

The small sample size and study in a single institution are limitations of the study. Hence this observation has to be substantiated by larger multicenter studies.

CONCLUSION

Dexamethasone 8 mg was given to 30 patients 90 minutes before the surgery and saline 2ml was given to another comparable group. All underwent elective abdominal surgery. Patients were monitored in the postoperative period for nausea, vomiting, pain. It was found that single pre-operative dose of dexamethasone 8 mg reduces post-operative nausea, vomiting, pain significantly after abdominal surgery. There was no significant difference in the length of hospital stay between the two groups.

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Institutional Ethics Committee

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