

Comparison Between Hydrocortisone and Dexamethasone Given Intraperitoneally for Postoperative Pain Relief in Patients After Laparoscopic Hysterectomy – an Observational Study

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ABSTRACT

Background: Pain after laparoscopic surgeries is a common complaint which can prolong hospital stay and delay recovery. Different methods have been developed to manage pain after laparoscopic hysterectomy. One such technique is intraperitoneal instillation of local anaesthetics with adjuvants like hydrocortisone, dexmedetomidine, magnesium sulphate. Various studies have confirmed the efficacy of local anaesthetics with hydrocortisone for analgesia. Studies comparing sole use of steroids are few. We thus devised to conduct a study to compare how effective hydrocortisone or dexamethasone administered intraperitoneally is in causing relief from pain after laparoscopic hysterectomy.

Methods: We conducted an observational study, 60 patients planned for laparoscopic hysterectomy were classified into two groups. Group A (n=30) who received 100 mg hydrocortisone in 50 ml normal saline intraperitoneally and Group B (n=30) who received 8 mg dexamethasone in 50 ml normal saline intraperitoneally. Abdominal and shoulder pain was assessed using visual analogue scale (VAS) at 1, 6, 12 and 24 hour after surgery.

Results: Both Group A and B had similar efficacy in providing both abdominal pain and shoulder pain relief post operatively. Both groups had no rescue analgesic requirement after 12 hour. Both drugs were has low incidence of postoperative nausea and vomiting (PONV).

Conclusion: Intraperitoneal dexamethasone is as equally effective as hydrocortisone in providing postoperative analgesia and antiemesis after laparoscopic hysterectomy.

Keywords: analgesia, dexamethasone, hydrocortisone, laparoscopic hysterectomy

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INTRODUCTION

The evolution of newer surgical techniques with time has resulted in the emergence of safer and better surgical modalities that have increased the quality of life of patients undergoing surgeries. One such evolved surgical modality is laparoscopic surgery otherwise known as keyhole surgery. The main advantages being-laparoscopic surgeries have minute incisions, faster recovery, and shorter hospital stays compared to open surgeries.¹

But postoperative pain is a problematic grievance after laparoscopic surgeries. Post-operative pain can increase the hospitalization and delay recovery to normal life, especially in elderly patients with other co-morbid conditions.² Lack of proper control of pain takes away the advantages of laparoscopic surgeries. Pain after laparoscopic hysterectomy is purported to arise from the surgical port site, peritoneal

stretching following pneumoperitoneum, and from the surgical dissection.³

Different techniques have been developed for the control of pain after laparoscopic hysterectomy. Apart from the parenteral and oral analgesics, intraperitoneal instillation of local anesthetics by themselves or along with non-opioid analgesics have proven benefit in managing post surgical pain which might also reduce the adverse effects of opioid analgesics. As multimodal analgesia confers maximum benefit, it is advantageous to combine various techniques to obtain best results.⁴ Recently, steroids have also been used in various kinds of surgeries for treating post-surgical pain.

The objective of this study is to evaluate and equate the effects of hydrocortisone with dexamethasone intraperitoneally for pain control following laparoscopic hysterectomy. The principal objective was to compare the pain

which includes both abdominal and shoulder pain. The ancillary objectives include postoperative analgesic need, incidence of postoperative nausea and vomiting.

METHODS

This was an observational study designed to be conducted on American Society of Anaesthesiologists' physical status (ASA –PS) patients I and II - planned for laparoscopic hysterectomy. Following clearance from the institutional ethics board (SGMC-IEC-No:44/563/04/2021), 60 women between the age group 45-55 years, who were planned for elective laparoscopic hysterectomy were involved in the study after obtaining their informed written approval. Women who had a long history of chronic pain on medications like- opioids, steroids, and Non-steroidal anti-inflammatory drugs (NSAIDs), or who were allergic to corticosteroids, had neurological diseases and bleeding diathesis was excluded from the study. The patients were classified into 2 groups by a table of random numbers – group A (n=30) and group B (n=30). Preoperatively the women were familiarized with the visual analogue scale (VAS) scale for pain assessment.

Following preoxygenation using 100% oxygen, premedication was administered using midazolam 0.05 mg/kg IV, glycopyrrolate 0.005 mg/kg IV, fentanyl 2.5 microgram/kg IV, ondansetron 0.1 mg/kg IV. Intravenous anesthesia induction was done with propofol 1.5-2 mg/kg IV and 0.1 mg/kg cisatracurium IV to ease endotracheal intubation.

Maintenance of anesthesia was done with 2% sevoflurane and oxygen and air mixture (50:50) and muscle relaxant in maintenance dose of cisatracurium 0.2 mg/kg every 30 min with volume control mode ventilation and ventilator parameters were set to maintain the capnogram in the range of 35-40 mm of Hg. Intravenous paracetamol 1 g infusion was given over 15 minutes at the beginning of the surgery.

Laparoscopy was done using CO₂ as the distension medium. Abdomen was distended to a pressure between 12-14 mmHg. A Trendelenburg position was maintained to provide an optimum view for surgery. At the end of the surgery, group A patients were instilled with 100 mg hydrocortisone diluted in 50 ml normal saline and group B patients were instilled with 8 mg dexamethasone diluted in 50 ml normal saline inside the peritoneum. This was performed by the surgeon. At the end of the surgery, CO₂ was emptied from the peritoneal cavity manually by applying pressure on the abdomen.

Patients were followed up and enquired about postoperative abdominal and shoulder pain using a VAS score on a 0-10 scale (0 meaning no pain and 10 as the most excruciating pain), postoperative analgesic consumption, occurrence of postoperative nausea and vomiting (PONV). We administered an injection of morphine 0.1 mg/kg for breakthrough pain in patients who had a VAS score >4.

Using SPSS statistics 20 (IBM Statistics, USA), arithmetic mean and standard deviation values for the various variables were estimated and statistical analysis were done on each group. Student t-test was used to analyze continuous variables, and for non-continuous variables Chi-square test applied. Statistical significance was considered when p-value was < 0.05.

RESULT

All sixty women who gave consent, finished the study. The two groups were statistically similar with respect to demographic characteristics. VAS score for abdominal and shoulder pain scores were equal between the two groups (p-

value>0.05) and the patients were mostly painless 12 h after surgery, so had no need for any rescue analgesic thereafter. Patients were similar regarding analgesic dose need in the recovery room and 6, 12 and 24 hours after operation. The two groups of patients were statistically equal concerning PONV.

The mean VAS score for abdominal pain for Group A was 4.11 ± 1.06 and for Group B was 3.66 ± 0.92 at one hour after surgery. The difference observed did not prove to be significant on statistical analysis. At 6, 12 and 24 hours after surgery, the VAS score had a mean of 2.16 ± 0.79 , 1.9 ± 1.94 and 1.16 ± 0.15 . There was no difference with Group B which had mean VAS scores of 2.16 ± 0.73 , 1.73 ± 0.69 , 1.06 ± 0.78 at 6 h, 12, and 24 hours respectively. Similarly the two groups did not show any difference in statistical analysis with regard to shoulder pain. The VAS scores in Group A at 1, 6, 12 and 24 hours had a mean of 2.06 ± 0.58 , 1.33 ± 0.46 , 1.06 ± 0.63 and 0.63 ± 0.49 . The VAS scores in Group B recorded mean values of 2.0 ± 0.64 , 1.12 ± 0.60 , 1.06 ± 0.63 and 0.53 ± 0.50 at 1, 6, 12 and 24 hours respectively (Figure.1).

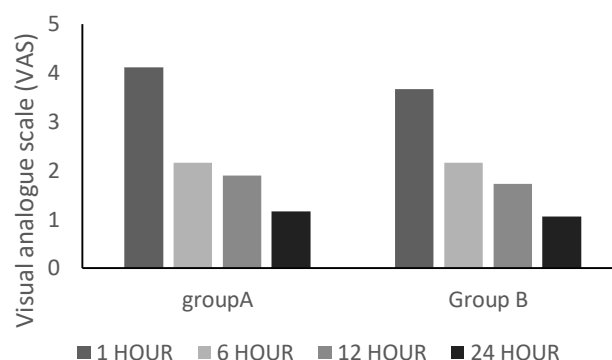


Figure 1. Mean VAS abdominal pain score.

Similarly, the two groups did not show any difference in statistical analysis with regard to shoulder pain. The VAS scores in Group A at 1, 6, 12, and 24 hours had a mean of 2.06 ± 0.58 , 1.33 ± 0.46 , 1.06 ± 0.63 , and 0.63 ± 0.49 . The VAS scores in Group B recorded mean values of 2.0 ± 0.64 , 1.12 ± 0.60 , 1.06 ± 0.63 , and 0.53 ± 0.50 at 1, 6, 12, and 24 hours respectively (Table2). The two groups were comparable regarding mean VAS scores of shoulder pain. Group A showed a mean VAS score for shoulder pain of 2.06 ± 0.58 , 1.33 ± 0.46 , 1.06 ± 0.63 , and 0.63 ± 0.49 . Group B demonstrated a mean VAS score of 2.00 ± 0.64 , 1.12 ± 0.60 , 1.06 ± 0.63 and 0.53 ± 0.50 at 1,6,12 and 24 hours. The two groups (Table 1).

Table 1. Comparison of VAS on shoulder pain in two groups

Time	Group A (n=30)	Group B (n=30)	p-value
1 hour	2.06 ± 0.58	2.00 ± 0.64	0.34
6 hour	1.33 ± 0.46	1.12 ± 0.60	0.18
12 hour	1.06 ± 0.63	1.06 ± 0.63	0.22
24 hour	0.63 ± 0.49	0.53 ± 0.507	0.56

The requirement of rescue analgesia with morphine was very less in both groups. No patients belonging to either group were in need of rescue analgesia after 12 hours as they were completely pain free. At 1 hour, mean number of patients requiring morphine for Group A and B were 27.33% and 26.33% respectively and at 6 hours, mean for Group A and Group B were 8.53% and 6.26%. There was no difference statistically as p-value > 0.05 (Table 2).

Table 2. Comparison of rescue analgesia in the two groups

Time	Group A (n=30)	Group B (n=30)	p-value
1 hour	27.33%	26.33%	0.35
6 hour	8.53%	6.26%	0.67

PONV was found to be greatly reduced having an incidence in Group A and Group B of 3 (10%) and 1 (3.3%) respectively. This too was observed to be statistically similar by the chi-square test which gave a chi-square statistic of 1.0714 (p-value 0.300) (Table 3). 90% of patients in Group A and 96.66% in Group B had no PONV.

Table 3. Incidence of PONV in the two groups

	Group A	Group B
Had PONV	3 (10%)	1(3.3%)
Did not have PONV	27(90%)	29(96.66%)

DISCUSSION

A whole lot of different types of techniques have been studied to try to decrease post-surgical pain after laparoscopic hysterectomy. Bupivacaine instillation intraperitoneally either with or without adjuvants is a popular modality used to address post-surgical pain.⁵ Many drugs have been used as adjuvants of local anesthetics to help reduce the onset of effect, increase the duration of action, and to improve the success of block. The various adjuvants tried in different studies were hydrocortisone, dexmedetomidine, magnesium sulfate, neostigmine, and dexamethasone. However, the popularity has reigned with steroids. We then decided to conduct a study comparing the two commonly used adjuvants as sole agents omitting local anesthetics and determine if they can provide satisfactory analgesia by themselves. A major cause of pain after laparoscopy is inflammation of the peritoneum due to pneumoperitoneum.⁶ Therefore, we can assume that the anti-inflammatory action of steroids can provide more effective analgesia than local anesthetics. A study by Asgari et al. in 2012 was successful in demonstrating this.⁷ Sarvestani et al. in 2013 demonstrated intraperitoneal hydrocortisone to provide effective pain relief following laparoscopic cholecystectomy.⁸

Nouri et al. in a study conducted in 2021 inferred that intraperitoneal dexamethasone was effective in shoulder pain control and PONV after gynecological laparoscopy when compared to placebo.⁹ But there have not been any studies comparing intraperitoneal hydrocortisone and dexamethasone regarding their effectiveness to provide analgesia and reduce postoperative nausea and vomiting. Hence we proposed to study the effectiveness of intraperitoneally instilled hydrocortisone as opposed to dexamethasone in providing analgesia after laparoscopic hysterectomy.

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CONFLICT OF INTEREST

The author declares there is no conflict of interest.

Mechanism of action of steroids include synthesis of tissue bradykinin, nerve ending's release of neuropeptides, reducing prostaglandin production, the peripheral tissues and central nervous system inhibiting cyclooxygenase-2 enzyme; inhibiting mediators of inflammatory hyperalgesia.¹⁰

A study by Srivastava et al in 2022 compared intraperitoneal instillation of dexamethasone, and dexmedetomidine and their combination to decrease the occurrence of PONV and analgesics requirement after laparoscopic hysterectomies. They concluded dexamethasone alone and combined dexmedetomidine is useful in decreasing pain scores and PONV as compared to placebo.¹¹ This is similar to the results of our study where dexamethasone alone can provide effective analgesia. A study by Ismail et al. in 2018 compared the efficacy of intraperitoneal dexamethasone with intravenous dexamethasone in reducing PONV and pain relief.¹² The conclusion was intraperitoneal dexamethasone is superior to intravenous injection in both decrease in PONV and pain relief.¹²

A study by Kankotiya et al. in 2016 found that adding hydrocortisone to intraperitoneal bupivacaine is superior to bupivacaine alone in reducing postoperative pain.¹³ We were able to conclude that both intraperitoneal hydrocortisone and dexamethasone were equally effective in reducing both abdominal pain scores and shoulder pain scores. A study by Bum Choi et al in 2016 found shoulder pain to be present in more than 90% of patients after a laparoscopic hysterectomy which was most severe 24 hours after surgery.¹⁴ In our study, the mean VAS score for shoulder pain was always less than 4 at 1,6,12 and 24 hours post-operative. This was a beneficial effect of adding either hydrocortisone or dexamethasone intraperitoneally. Laparoscopic surgeries are notorious for a high incidence of PONV with a mean incidence of 56.4%.¹⁵ The incidence of PONV in our study was only 10% in the hydrocortisone group and 3.3% in the dexamethasone group. We inferred that when intraperitoneally dexamethasone or bupivacaine was instilled, both were equieffective in decreasing pain and analgesic requirements after laparoscopic hysterectomy sans any adverse effects.

CONCLUSION

Our study revealed that intraperitoneal instillation of dexamethasone can reduce postoperative abdominal and shoulder pain as effectively as hydrocortisone without any post-surgical adverse effects in laparoscopic hysterectomy. There was a low incidence of PONV in both groups. The use of either drug obviates the need for local anesthetics intraperitoneally. Thus both intraperitoneal hydrocortisone and dexamethasone are equally efficacious and devoid of side effects profile while providing analgesia in patients undergoing laparoscopic hysterectomy.

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