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ANALGESIC EFFICACY OF INTERPERITONEAL BUPIVACAINE ALONE VS COMBINED BUPIVACAINE AND DEXAMETHASONE COMPARATIVE ASSESSMENT AFTER LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Background: Acute discomfort has been linked to laparoscopic cholecystectomy, and several techniques have been employed to reduce postoperative pain after the procedure.

Aim: The current study aimed to assess the analgesic efficacy of bupivacaine with dexamethasone vs bupivacaine alone after laparoscopic cholecystectomy.

Methods: For the research, 42 patients who underwent laparoscopic cholecystectomy were assessed. Group I received 40 milliliters of 0.25% bupivacaine and 16 milligrams of dexamethasone intraperitoneally, whereas Group II received 40 milliliters of bupivacaine alone. The patients were divided into two groups of 21. The time required for the initial analgesic, the total dosage of rescue analgesic, and the VAS ratings of the two groups were compared.

Results: Group I needed a first rescue analgesic 417.3±276.2 minutes and Group II needed 219.6±226.3 minutes, respectively, with p=0.001. Group I's total intake of rescue analgesics was 60.73±29.82 mg, whereas Group II's was 73.22±11.55 mg, with a significant difference (p=0.01). Additionally, until two hours after surgery, Group I's VAS ratings were lower than Group II's, with a mean difference of -1.0 and p<0.001.

Conclusion: The intraperitoneal injection of a combination of 16 mg dexamethasone and 0.25% bupivacaine significantly reduces postoperative pain and the need for rescue analgesics following laparoscopic cholecystectomy, in comparison to 0.25% bupivacaine alone.

Keywords: laparoscopy, dexamethasone, cholecystectomy, bupivacaine, and analgesia

INTRODUCTION

Due to its numerous benefits over exploratory techniques, laparoscopy is presently the preferred technique for a large number of surgical and diagnostic operations. A shorter hospital stay after surgery, an earlier healing period, improved cosmetic outcomes, and the ability to return to everyday activities quickly after surgery are some of these benefits.1

In addition, the level of discomfort following laparoscopic operations is lower than that following a laparotomy; nevertheless, the pain following a laparoscopy is intense, requiring lengthier hospital stays and more frequent use of analgesics.2

A comprehensive analysis of pain management strategies after laparoscopy has already been conducted. In these methods, local anesthetics are injected intraperitoneally, either alone or in combination with additional drugs such steroids, dexmedetomidine, morphine, analgesic patches, and/or intravenous medicines. It has been common practice to provide intraperitoneal local anesthetics for postoperative analgesia after laparoscopy.3

Intraperitoneal injections of local anesthetics as lidocaine, ropivacaine, and bupivacaine are used. After gynecological laparoscopic surgeries, dexamethasone has been reported to be an effective analgesic medicine when administered as a single dosage.[4] After laparoscopic cholecystectomy, the current clinical investigation aimed to examine the analgesic efficacy of bupivacaine alone with dexamethasone + bupivacaine. The study also aimed to compare the incidence of hyperglycemia, postoperative nausea, vomiting, need for the entire dosage of rescue analgesics, and time for initial administration of rescue analgesics between the two groups.

MATERIALS AND METHODS

The current clinical investigation aimed to assess the analgesic efficacy of bupivacaine with dexamethasone vs bupivacaine alone after laparoscopic cholecystectomy. The incidence of postoperative nausea and vomiting, hyperglycemia, the need for a complete dosage of rescue analgesics, and the amount of time before the first rescue analgesic use were all evaluated in this study. The study was conducted with clearance from the appropriate institutional ethics committee. Every participant provided both verbal and written informed consent before to the study's start.

Subjects undergoing laparoscopic cholecystectomy were included in the trial once their eligibility was evaluated. After the final appraisal for inclusion, each subject was given a comprehensive description of the research strategy. 42 patients with ASA (American Society of Anesthesiologists) status I and II, ages 18 to 60, of both sexes had laparoscopic cholecystectomy. The study excluded subjects with a history of abdominal surgery, pregnant women, people on steroids, people allergic to study medications, and those with diabetes mellitus.

Finally, 42 individuals were divided into two groups of 21 each at random. All research participants' baseline blood sugar levels, Apfel risk ratings, demographic data, and postoperative nausea and vomiting were recorded after final inclusion.

The VAS (visual analog scale), which has 10 points for pain intensity—0 representing no pain and 10 representing the worst agony—was explained to each participant. On the day of operation, regular monitors were set up and peripheral venous access was acquired. Through endotracheal intubation, all individuals were given a dose of 2-2.5 mg/kg of propofol, 0.1 mg/kg of vecuronium, and 2 µg/kg of intravenous fentanyl to induce general anesthesia. An intravenous (IV) dosage of 1µg/kg of fentanyl plus sevoflurane with a minimum alveolar concentration of 1-1.5 was used to maintain general anesthesia in cases when baseline systolic blood pressure and heart rate increased by more than 20%. Additionally, 0.03 mg/kg IV vecuronium was given as needed.

To keep the intra-abdominal pressure between 12- and 14-mm Hg during the laparoscopy, carbon dioxide was injected into the peritoneal cavity. Depending on the group to which the patients had been assigned when pneumoperitoneum was confirmed, medications were given intraperitoneally through an umbilical port.

Group I was given 40 milliliters of 0.25% bupivacaine together with 16 milligrams of dexamethasone; Group II was given 40 milliliters of 0.25% bupivacaine alone. Drugs were administered using a 50 ml syringe attached to the umbilical port.

To allow the medicine to disseminate, the patients were placed in the Trendelenburg position ten minutes after the medication was given. Each person got an intravenous infusion of 4 mg of ondansetron and 1 gramme of paracetamol following the deflation of the gas. After correcting any residual neuromuscular blockade with 8 µg/kg glycopyrrolate and 50 µg/kg neostigmine, tracheal extubation was carried out at the end of the surgery. Those who needed a drain placement were excluded from the study, and those who needed an open cholecystectomy had open surgery instead. The research examined pain at 0, 1, 2, 4, 8, 12, 16, and 24 hours after surgery using the VAS scale.

The length of unpleasant events in the first 24 hours after surgery, the frequency of hyperglycemia, the time needed for the first rescue analgesic, the total dose of rescue analgesic, and postoperative nausea and vomiting were all assessed in this study. Rescue analgesics, such as 75 mg of diclofenac intravenously, were only given in the current experiment when VAS ratings exceeded 3. The dosage of the first rescue analgesic was calculated in milligrams and minutes. 4 & 24 hours following surgery, hyperglycemia—defined as a blood sugar level of greater over 200 mg/dl—was measured using a glucometer.

SPSS software version 21.0 (IBM Corp. NY, USA) was used to statistically analyze the collected data using the t-test, chi-square test, and Fisher's exact test. The data were presented as frequency, percentages, mean, and standard deviation. A p-value of less than 0.05 was considered statistically significant.

RESULTS

After laparoscopic cholecystectomy, the current clinical trial aimed to assess the analgesic efficacy of bupivacaine alone with dexamethasone + bupivacaine. The study also looked at the frequencies of postoperative nausea, vomiting, and hyperglycemia, as well as the time it took to take the first dose of rescue analgesics and the overall quantity needed. Finally, 42 individuals were divided into two groups of 21 each at random.

All research participants' baseline blood sugar levels, Apfel risk ratings, demographic data, and postoperative nausea and vomiting were recorded after final inclusion. Group I participants received 40 ml of 0.25% bupivacaine intraperitoneally along with 16 mg of dexamethasone, while Group II participants received 40 ml of bupivacaine alone. The average age of Group I was 35.3±12.2 years, whereas the average age of Group II was 35.2±11.0 years.

In contrast to Group II, which had 23.80% (n=5) males and 76.19% (n=16) females, Group I had 14.28% (n=3) males and 85.71% (n=18) females. Blood sugar levels were 113.4±25.9 mg/dl for members of Group I and 123.3±31.0 mg/dl for members of Group II. The research participants in Group I weighed 60.2±8.5 kg, whereas those in Group II weighed 60.2±11.7 kg. Apfel scores of I and II were seen in 47.61% (n=10) and 52.38% (n=11) of the patients in Group I, and 33.3% (n=7) and 66.6% (n=14) of the patients in Group II, respectively. Table 1 shows that 66.6% (n=14) and 33.3% (n=7) of the participants in Group I had ASA status I or II, whereas 52.38% (n=11) and 47.61% (n=10) of the individuals in Group II had the same status.

Groups I and II's VAS ratings were evaluated at 0 hours. The findings showed that Group II's VAS values (3.6±2.4) were significantly higher than Group I's (2.2±1.6, p=0.003). The VAS scores for Group I and II at one hour were 1.9±1.2 and 3.0±1.3, respectively, with p=0.001, indicating comparable results. After two hours, Group I, which used both bupivacaine and dexamethasone, had significantly lower VAS ratings (p-values <0.001) than Group II, which used bupivacaine alone (1.9±0.8 and 2.9±1.4, respectively). With p-values of 0.13, 0.88, 0.22, 0.07, and 0.32, respectively, Group I and II's VAS ratings at 4, 8, 12, 16, and 24 hours did not differ significantly, as indicated in Table 2.

Group II needed a significantly higher total rescue analgesic dose (73.19±11.55 mg compared to Group I's 60.73±29.82 mg, respectively; p=0.01), according to the study's features and findings. Compared to Group II (219.6±225.9 min; p=0.001), Group I's mean first rescue analgesic time was much longer (417.3-277.8 min). After 24 hours, the mean random blood sugar levels did not alter significantly (p=0.42). Table 3 demonstrates that, at 4 hours, Group I and II's random blood sugar levels did not differ significantly (p=0.53).

DISCUSSION

42 individuals were randomly assigned to two groups of 21 persons each. All research participants' baseline blood sugar levels, Apfel risk ratings, demographic data, and postoperative nausea and vomiting were recorded after final inclusion. Group I participants received 40 ml of 0.25% bupivacaine intraperitoneally along with 16 mg of dexamethasone, while Group II participants received 40 ml of bupivacaine alone. This research approach was similar to previous studies by Asgari Z et al.7 in 2012 and Nanda A et al.8 in 2020, when the authors compared the efficacy of bupivacaine plus dexamethasone vs bupivacaine alone.

The research participants in Groups I and II were found to have mean ages of 35.3±12.2 and 35.2±11.0 years, respectively, according to demographic data. In contrast to Group II, which had 23.80% (n=5) males and 76.19% (n=16) females, Group I had 14.28% (n=3) males and 85.71% (n=18) females. Blood sugar levels were 113.4±25.9 mg/dl for members of Group I and 123.3±31.0 mg/dl for members of Group II.

Group I and Group II study participants weighed 60.2±8.5 and 60.2±11.7 kg, respectively. Apfel scores of I and II were seen in 47.61% (n=10) and 52.38% (n=11) of the patients in Group I, and 33.3% (n=7) and 66.6% (n=14) of the patients in Group II, respectively. In Group I, 66.6% (n=14) and 33.3% (n=7) of the patients had an ASA status of I, whereas the other participants had an ASA status of 52.38% (n=11) and 47.61% (n=10). These findings were in line with studies by Sharma M et al. (2016) and Ljungqvist O et al. (2017), where the authors assessed individuals using demographic data comparable to the present study.

When Group I and Group II's VAS ratings were compared at 0 hours, Group II's scores were 3.6±2.4, significantly higher than Group I's 2.2±1.6, with a p-value of 0.003. The VAS scores for Group I and II at one hour were 1.9±1.2 and 3.0±1.3, respectively, with p=0.001, indicating comparable results. Group I, which got both bupivacaine and dexamethasone, had significantly lower VAS ratings at two hours than Group II, which received just bupivacaine (1.9±0.8 and 2.9±1.4, respectively).

There was a p-value below 0.001. Group I and II's VAS ratings did not significantly vary at 4, 8, 12, 16, and 24 hours (p-values of 0.13, 0.88, 0.22, 0.07, and 0.32, respectively). According to studies by Aberer F et al. (2021) and Srivastava V et al. (2022), bupivacaine by itself resulted in higher VAS ratings than bupivacaine with dexamethasone.

These results were consistent with those findings. Group II needed a significantly higher total rescue analgesic dose (73.19±11.55 mg compared to Group I's 60.73±29.82 mg, respectively; p=0.01), according to the study's features and findings. Group I's mean first rescue analgesic time was significantly longer than Group II's (209.6±225.9 minutes; p=0.001), at 417.3±275.8 minutes.

After 24 hours, the mean random blood sugar levels did not alter significantly (p=0.42). Group I and Group II's random blood sugar levels at 4 hours did not differ significantly (p=0.53). These findings were consistent with those of Upadya M et al. (2015) and Nasr Y et al. (2013) in 2022, whose authors reported clinical parameters that were comparable to those in the current study.

CONCLUSIONS

The current study, with its limitations taken into account, finds that, when compared to 0.25% bupivacaine alone, the intraperitoneal administration of 16 mg dexamethasone plus 0.25% bupivacaine significantly reduces postoperative pain and the need for rescue analgesics after laparoscopic cholecystectomy.

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TABLES

S. No	Characteristics	Group I (n=21)	Group II (n=21) (Bupivacaine alone)
1.	**Mean age (years)**	35.3±12.2	35.2±11.0
2.	**Gender**		
a)	Males n (%)	3 (14.28)	5 (23.80)
b)	Females	18 (85.71)	16 (76.19)
3.	**Baseline blood sugar (mg/dl)**	113.4±25.9	123.3±31.0
4.	**Weight (Kg)**	60.2±8.5	60.2±11.7
5.	**Apfel score n (%)**		
a)	I	10 (47.61)	7 (33.3)
b)	II	11 (52.38)	14 (66.6)
6.	**ASA n (%)**		
a)	I	14 14 (66.6)	11 (52.38)
b)	II	7 (33.3)	10 (47.61)

Table 1: Demographic data of two groups of study participants

S. No	Time (postoperative in hours)	Group I (n=21) (Mean ± S. D)	Group II (n=21) (Mean ± S. D)	p-value
1.	0	2.2±1.6	3.6±2.4	**0.003**
2.	1	1.9±1.2	3.0±1.3	**0.001**
3.	2	1.9±0.8	2.9±1.4	**<0.001**
4.	4	1.7±0.9	2.6±1.2	0.13
5.	8	2.8±1.4	2.7±1.4	0.88
6.	12	2.3±1.0	1.9±1.0	0.22
7.	16	1.9±1.2	1.5±1.0	0.07
8.	24	1.3±0.4	0.11±0.9	0.32

Table 2: VAS scores in two study groups at different time interval

S. No	Variables	Group I (Mean ± S. D)	Group II (Mean ± S. D)	p-value
1.	**Total rescue analgesic dose (mg)**	60.73±29.82	73.19±11.55	**0.01**
2.	**First rescue analgesic time (min)**	417.3±275.8	219.6±225.9	**0.001**
3.	**Random blood sugar at 24 hours (mg/dl)**	140.2±154.6	118.6±19.4	0.42
4.	**Random blood sugar at 4 hours (mg/dl)**	127.7±29.7	132.0±31.4	0.53

Table 3: Comparison of different study variables in two groups of study subjects