Publications

Clinics of Surgery

Review Article

Pre-Emtive Intraoperative Local Analgesia For Laparoscopic Cholecystectomy (Our Approuch)

Gvozdenovic L[1*], Ivanov D[2] and Pajtic V[2]

[1]Clinical Centre of Vojvodina, Novi Sad, Serbia

[2]Department of Medicine, University of Novi Sad, Novi Sad, Serbia

Volume 1 Issue 1 - 2018

Received Date: 19 May 2018

Accepted Date: 04 June 2018

Published Date: 07 June 2018

2. Keywords

Laparoscopic cholecystectomy; Bupivacaine; Opioids; Morphine; Anaesthetics; Local anaesthetics; Pain; Surgery

1. Abstract

1.1. Background and objective: Intraperitoneal administration of local anaesthetic in combination with an opioid, for the relief of postoperative pain, has already been reported after laparoscopic cholecistectomy.

1.2. Methods: At the end of laparoscopic cholecystectomy, in a double blind, randomized manner, one of the following injections was given intraperitoneally. There were 30 patients in each group: Group 1, physiological saline 30 ml; Group 2, bupivacaine 0, 25%, 30 ml; Group 3, bupivacaine 0,25%, 30 ml, plus morphine 2mg. Patients postoperative pain was evaluated using a visual analogue scale and a verbal rating score. The postoperative analgesic requirement was assessed by the total dose of ketokonazol, administered by an i.v or i.m.route. Pain, vital signs, supplemental analgesis consumption and side-effects were recorded for all patients for 24h.

1.3. Results: There were no difference between the three groups , regarding pain scores (et rest and coughing) during the study, except in the first 6h, when scores were lower for patients receiving intraperitoneal bipuvacaine plus morphine ($p<0.05$).

1.4. Conclusions: In the patients undergoing laparoscopic cholecystectomy, the intraperitoneal administration of bupivacaine plus morphine, reduced the analgesic requirements during the first 6 postoperative hours compared with the control group. However, the combination of intraperitoneal bupivacaine 0,25% and morphine was more effective for treatment of pain after laparoscopic cholecystectomy.

3. Introduction

Laparoscopic Cholecystectomy (LC) is currently considered to be a relatively minor operation [1,2]. It has been classified as a basket procedure (analogous to shopping with a supermarket basket) in the UK goverment`s publications on day-surgery [3]. But, an important factor that limits recovery is postoperative pain. Intraperitoneal instillation of local anaesthetics is a simple method of analgesia and should be considered in addition to other morphine-sparing analgesics such as NSAIDs, acetaminophen and incisional local anaesthetics [4,5].

Laparoscopic cholecystectomy, in healthy patients is routinely performed at our hospital on a day case basis. Intraperitoneal instillation of local anaesthetic around the operative site has been used as an analgesic technique on the premise that conduction from visceral sites is blocked and may reduce the extent of referred pain to the shoulder, which results of nerves C3, C4, C5 diaphragm innervation, gas distension and diaphragmatic shifting, in the postoperative period [5-7]. However, in previous studies of intraperitoneal local anaesthetics following laparoscopic cholecystectomy it has not been possible constinently to demonstrate reliable analgesic effects [8-10]. This may be related to nociceptive conduction from incisional sites that is not blocked by local anaesthetics given into the intraperitoneal cavity. Different regimens have been proposed to relieve pain after laparoscopic surgery, such as non-steroidal antiinflammatory drugs, local wound anaestetics, intraperitoneal anaesthetics and saline, gas drainage,

***Corresponding Author (s):** Ljiljana Gvozdenovic, Clinical Center of Vojvodina, Novi Sad, University of Medicine, Serbia, Tel: +38163-529-409; E-mail: profgvozdenovic2010@hotmail.com*

Citation: Gvozdenovic L,Ivanov D, Pajtic V, IPre-Emtive Intraoperative Local Analgesia For Laparoscopic Cholecystectomy (Our Approuch). Clinics of Sugery. 2018;1(1): 1-4.

heated gas low-pressure gas and nitrous oxide pneumoperitoneum.. Multimodal analgesia (combined use of two or more analgesic agents) for pain relief after operation is believed to the more advantageous than single modality treatment, especially when different sites of action are involved, or when a synergistic effect, or both, is achieved [11,12]. The aim of the present study was to determine the efficacy of the intraperitoneal aplication of bupivacain-morphine.

4. Methods

A prospective, randomized, double-blind study was undertaken with written informed consent which was obtained from all patients. The study group consistent of 30 ASA I-II patients scheduled to undergo elective LC for cholelithiasis under general anaesthesia. The individuals, of both sexes, were aged 26-63 yr. Criteria for exclusion were: psychiatric disease, allergic reactions to drugs or local anaesthetics, morbid obesity and severe chronic disease. Patients were also excluded, if they underwent surgery for acute cholecystitis or if the operation was converted to an open procedure.

All patients were given a standardied anaesthetic comprising propofol 2-4 mg/kg, fentanyl 2 microg/kg, ondasetron 4 mg, i.v. Rocuronium 0, 6 mg/kg was used for muscular relaxation. Patients lungs were ventilated withouth nitrous oxide, but with sevoflurane 1-1,5%, with oxygen. Suppositories of diclofenac 100 mg, were administered at the induction of anaesthesia.Standard patient monitoring was used. Lung ventilation was adjusted to maintainan end-tidal carbon dioxide partial pressure of 4.7-5.3 kPa. Intraabdominal pressure during laparoscopy was automatically maintained at 12 mmHg by a CO2 insufflator.

At the end of successful LC, patients were allocated randomly to one of three group. Group 1 (n=30) received physiological sodium chloride 30 ml, intraperitoneally. Group 2 (n=30) bupivacaine 0,25% 30 ml intraperitoneally,. Group 3, (n=30) bupivacaine 0,25% 30 ml, intraperitoneally plus morphine 2mg. Each patient received the test solution in the following way: 15 ml was sprayed to both sides of the diaphragm, and another 15 ml, was directly applied to the gall blader bed and to the right subhepatic space. All patinets received ondasetron i.v., during operation [13].

During closure of the wound, the incisional sites were infiltrated with bupivacaine 20 ml, 0,25%, 2,5 mg/mg, with epinephrine 5 microg/ml, in all patients [14]. Residual neuromuscular blockade was antagonised with a mixture of neostigmine and atropine [15-17].

In the postoperative period, patients were assessed on awakening and than at 1-6 h by a trained observer. Intraperitoneal pain at rest and during deep inspiration, and any pain in the right schoulder were assessed on a Visual Analogue Scale (VAS), The degree of postoperative pain was assessed with a VAS (0-100 mm) at rest and on coughing. Patients were asked about the location of pain, whether at the schoulder, incision sites and/or inside the abdomen. Pain relief was rated by the patients on a 4 point Verbal Rating Score (VRS). 0=no pain relief ; 1= partial pain relief; 2= good pain relief; 3= excellent pain relief, complete analgesia. The VRS recorded during the study was summed obtaining the total pain relief score for that period. Total pain relief scores were used widely in analgesic clinical trials - higher scores signifying better analgesia.

Nausea and sedation were assessed also on a similar VAS, representing «no nausea» and «fully awake « on the left and «worst imaginable nausea» and «very drowsy» on the right, respectively. Pain, sedation and nausea scores for the first 6 h after operation were summed. Nominal data were analysed with the X2-test. Statistical analyses was perfomed with the software SPSS. $P< 0.05$ was considered significant.

5. Results

The groups were similar in regard to gender, age, height, wight and duration of the pneumoperitoneum. Values are mean (_+SD). There were no significant differences between groups. There were no significant differences between the three groups in relation to pain scores (at rest or on coughing) during the study except in the first 6h, in regard to incisional and intra-abdominal pain scores, respectively, in which pain was significantly lower ($p< 0.05$) in those patients receiving intraperitoneal bupivacaine plus morphine. In all patinets the VAS pain intensity scores were < 30. Scores of 2 (good relief) or 3 (complete relief) on the VRS were reported more often by patinets in Group 3, which resulted in higher total pain relief scores scores, although the differences were not significant. 26 patients of the Group 1 needed a rescue dose, of postoperative analgeic drags, in the first 6 h. No differences in the incidence of nausea/vomiting were observed between groups (40%, 33%, and 40% in Groups 1, 2 and 3, respectively). None of the other above-mentioned side-effects was reported by any of the groups.

6. Discussion

The results of this study demonstrated that intraperitoneal administration of bupivacaine 0,25% 30 ml, plus morphine 2mg, significantly reduced postoperative analgesic requirements during the first 6 h, after laparoscopic cholecystectomy, compared with the control group. However, the analgesic requirements were significantly lower during the entire

Table 1: Patients characteristics (n=30)

	Group 1	Group 2	Group 3
Gender (m/f)	27-Mar	26-Apr	27-Mar
Age (yr)	46 (13)	48 (13)	50 (9)
Height (cm)	164 (4)	164 (7)	165 (7)
Weight (kg)	65 (8)	69 (7)	71 (13)
Duration of pneumoperitoneum	57 (13)	68 (20)	66 (21)

study in patients belong to Group 3, who received intraperitoneal bupivacaine 0,25% 30 ml, plus morphine at the end of surgery. There were no difference s between groups in the adequacy of analgesia as assessed by VAS scores ar rest and on coughing. The median pain scores at rest of the patients included in the study were within the « zone of analgesic success» of VAS < 30.

Accordingly, previously we injected the drugs to the subdiaphragmatis area. However, we found a low incidence of shoulder pain in all treatment groups, because the residual intraperitoneal carbon dioxide was emptied carefully by the surgeon. Our study shows that the intraperitoneal administration of bupivacaine is effective after LC, as noted in other reports, although the amount of pain reduction and duration of effect were limited [16-19]. It has been suggested that the poor results in pain reduction, when intraperitoneal local anaesthesia is used, after LC - compared with those in the available gynecological literature - are due ti visceral and parietal pain being more severe than schoulder pain after LC [20-24]. On the other hand, in a recent study the intraperitoneal instillation of bupivacaine during LC resulted in lower pain scores and in reduced morphine requirements compared with placebo.

We used ketorolak, a non-opioid analgesic with minor adverse effects and with powerful pain-relieving activity, including surgical pain, in our study to assess analgesic requirements after operation. Our data also showed a significant decrease in supplemental ketorolak in patients given morphine intraperitoneal.We used bupivacaine and low doses of morphine, intraperitoneally to achieve the additional analgesic benefit from the combined effect of a local anaesthetic with an opioid agonist .

Intraperitoneal local anaesthetics would be expected to be useful for treating visceral pain. In our study it is likely that intraperitoneal bupivacaine in the right hypochondrial area had an analgesic effect. It significantly reduced total abdominal pain during inspiration and there was a trend towards lower scores for total abdominal pain at rest and for total both scholder pain. Local anaesthetic toxity is a serious problem, which limits dosage and efficacy. Bupivacaine is used traditionally as it has a long duration of action. It can cause central and cardiovascular toxicity and there have been reports of accidental deaths and cardiac arrest [17-20].

We did not observe any side-effects attributable to the local anaesthetic. We did not measure plasma concentrations of bupivacaine, but several reports have showen that the range of mean plasma concentration (0.92 - 1.14 microg/ml) after the intraperitoneal administration of plain bupivacaine (100 - 150 mg) is well below the toxic concentration of 3 micro/ml The doses of bupivacaine in our study were lower than those thought to cause systemic toxicity [18].

Our results are consistent with other studies in which intraperitoneal administration of local anaesthetic has been shown to have a modest analgesic effect [19]. Of 13 clinical trials considered in a systemic review it was found that the intraperitoneal administration of bupivacaine 50-200 mg, in volumes of 10-100 ml, produced significant analgesia in seven studies where supplemental analgesic consumption was significantly reduced [20] .

In summery, we have demonstrated that the intraperitoneal administration of morphine plus bupivacaine 0,25% in patients undergoing laparoscopic cholecystectomy reduces ketokonazol requirements during first 6 h after the operation compared to a control group. However, the intraperitoneal application of bupivacaine 0,25% combined with morphine, at the end of surgery is effective in achieving reduction in pain.

Therefore we concluded that combination of intraperitoneal bupivacaine and morpfine was better than, bupivacaine without morphine, or placebo, for pain relief after laparoscopic cholecystectomy.This surgeons involved in the study continue to use this method of analgesia as part of their routine practice.

References

1. Siekmann W, Eintrei C, Magnuson A, Sjölander A, Matthiessen P, Myrelid P, et al. Surgical and not analgesic technique affects postoperative inflammation following colorectal cancer surgery: a prospective, randomized study. Colorectal Dis. 2017;19(6):186-95.

2. Hamill JK, Rahiri JL, Gunaratna G, Hill AG. Interventions to optimize recovery after laparoscopic appendectomy: a scoping review. Surg Endosc. 2017;31(6):2357-65.

3. Ruchira Patel, Jose CA Carvalho, Kristi Downey, Marcelo Kanczuk, Paul Bernstein and Naveed Siddiqui. In Response. Anesthesia & Analgesia. 2017;125:352-3.

4. Hamill JK, Liley A, Hill AG. Intraperitoneal Local Anesthetic for Laparoscopic Appendectomy in Children. Ann Surg. 2017;266(1):189-94.

5. Helander EM, Billeaud CB, Kline RJ, Emelife PI, Harmon CM, Prabhakar A, et al. Multimodal Approaches to Analgesia in Enhanced Recovery After Surgery Pathways. Int Anesthesiol Clin. 2017;55(4):51-69.

6. Hamill JK, Rahiri JL, Hill AG. Analgesic effect of intraperitoneal local anesthetic in surgery: an overview of systematic reviews. J Surg Res. 2017;212:167-9.

7. Benito J, Monteiro BP, Beaudry F, Lavoie AM, Lascelles BD, Steagall PV. Pharmacokinetics of bupivacaine after intraperitoneal administration to cats undergoing ovariohysterectomy. Am J Vet Res. 2016;77(6):641-5.

8. Nelson G, Altman AD, Nick A, Meyer LA, Ramirez PT, Achtari C, et al. Guidelines for postoperative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations -- Part II. Gynecol Oncol. 2016;140(2):323-32.

9. Vather R, O'Grady G, Bissett IP, Dinning PG. Postoperative ileus: mechanisms and future directions for research. Clin Exp Pharmacol Physiol. 2014;41(5):358-70.

10. Bucciero M, Ingelmo PM, Fumagalli R, Noll E, Garbagnati A, Somaini M, et al. Intraperitoneal ropivacaine nebulization for pain management after laparoscopic cholecystectomy: a comparison with intraperitoneal instillation. Anesth Analg. 2011;113(5):1266-71.

11. Effendi MS, Khan MR, Raza R, Zafar SN, Shamim F, Raza SA, et al. To compare the analgesic efficacy of intraperitoneal lignocaine vs bupivacaine after elective laparoscopic cholecystectomy (LC). HPB. 2011;13(Suppl 3):131.

12. Khan MR, Raza R, Zafar SN, Shamim F, Raza SA, Pal KM, et al. Intraperitoneal lignocaine (lidocaine) versus bupivacaine after laparoscopic cholecystectomy: results of a randomized controlled trial. J Surg Res. 2012;178(2):662-9.

13. Roberts KJ, Gilmour J, Pande R, Nightingale P, Tan LC, Khan S. Efficacy of intraperitoneal local anaesthetic techniques during laparoscopic cholecystectomy. Surg Endosc. 2011;25(11):3698-705.

14. Alptekin H, Sahin M. Gallbladder bed irrigation with bupivacaine improves pulmonary functions after laparoscopic cholecystectomy. Langenbecks Arch Surg. 2010;395(5):501-4.

15. Ingelmo PM, Bucciero M, Somaini M, Sahillioglu E, Garbagnati A, Charton A, et al. Intraperitoneal nebulization of ropivacaine for pain control after laparoscopic cholecystectomy: a double-blind, randomized, placebo-controlled trial. Br J Anaesth. 2013;110(5):800-6.

16. Giger U, Ouaissi M, Schmitz SF, Krahenbuhl S, Krahenbuhl L. Bile duct injury and use of cholangiography during laparoscopic cholecystectomy. Br J Surg. 2011;98(3):391-6.

17. Gluud C, Nikolova D, Klingenberg SL, Alexakis N, Als-Nielsen B, Colli A, et al. Cochrane Hepato-Biliary Group. About The Cochrane Collaboration (Cochrane Review Groups (CRGs)). 2014;Issue 2:Art. No.: LIVER.

18. Gurusamy KS, Koti R, Davidson BR. Routine abdominal drainage versus no abdominal drainage for uncomplicated laparoscopic cholecystectomy. Cochrane Database Syst Rev. 2013;(9):CD006004.

19. Naja ZM, El-Rajab M, Ziade F, Al-Tannir M, Itani T. Preoperative vs. postoperative bilateral paravertebral blocks for laparoscopic cholecystectomy: a prospective randomized clinical trial. Pain Pract. 2011;11(6):509-15.

20. Petersen PL, Stjernholm P, Kristiansen VB, Torup H, Hansen EG, Mitchell AU, et al. The beneficial effect of transversus abdominis plane block after laparoscopic cholecystectomy in day-case surgery: a randomized clinical trial. Anesth Analg. 2012;115(3):527-33.