A STUDY OF EFFECTIVENESS OF LOCAL BUPIVACAINE INFILTRATION OF THE WOUND IN REDUCING THE POST OPERATIVE PARENTERAL NARCOTIC ANALGESIC REQUIREMENT

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ABSTRACT

Objective: To see the effectiveness of local perfusion of the wound with bupivacaine .5% following cholecystectomy was studied.

Material and Methods: A prospective randomized clinical trail involving 140 patients undergoing cholecystectomy for symptomatic gallstones, using Kocher's incision, was undertaken. Patients were randomized to receive either intermittent intravenous tramadol infusion on demand (parenteral analgesia, PA-group) or wound perfusion with local bupivacaine .5% per-operatively followed by intravenous tramadol infusion, if needed (local analgesia, LA-group). On hundred and forty patients were recruited in the study, 70 in each group. Patient demographics were comparable in the two groups.

Results: There was no statistically significant difference in post-operative pain scores at rest and with movement between the two groups, excepts for pain scores at rest on the first post-operative day (P = 0.03). The median total amount of tramadol used was significantly greater in PA group i.e. 600 (range 500-1000) mg as compared to the amount used in LA-group i.e. 200 (range 0-400) mg.

Conclusion: Direct local wound perfusion of bupivacaine 0.5% provides good pain relief after cholecystectomy and reduces the requirements of parenteral narcotic analgesia with no major side effect. In other words it is a safe and feasible alternative to parenteral opiods.

Key words: Cholecystectomy wounds, local bupivacaine infiltration.

INTRODUCTION

Although parenteral opiods remain the mainstay for decreasing post-operative pain. They are associated with serious side-effects like nausea, vomiting, excessive sedation and respiratory depression. Though the dosage of opiods and their side-effects can be reduced by use of a patient controlled analgesia (PCA) system. Recently Partridge and Stabile[1] reported that long acting local anaesthetics were highly effective for post-operative pain relief. Wound infusion with local anaesthetics for post-operative pain relief has also been shown to be useful in previous studies[2-13]. The objective of this study was to explore the effect of wound perfusion with 0.5% bupivacaine on post-operative pain score, post operative narcotic requirements and post-operative morbidity compared with patients receiving only narcotic parenteral analgesia for their post-operative pain relief on demand following cholecystectomy.

MATERIAL AND METHODS

A prospective randomized study was conducted from January 2001 to December 2001. One hundred and forty consecutive patients who underwent elective cholecystectomy via a right sub-costal incision, were recruited. They were randomized to receive either 0.5% bupivacaine perfusion of the wound per-operatively followed by tramadol injection for break through pain on demand (LA-group) or intermittent tramadol injection on demand (PA-group) for post-operative pain relief.

All patients underwent standard cholecystectomy with prophylactic antibiotic cover. All wounds were closed in two layers using vicryl. Subcutaneous tissues were approximated using 2/0 catgut and skin was closed sub-cuticularly using a 2/0 polypropylene (Prolene) suture. Patient in (PA-group) received intravenous tramadol on demand for 48 hours, with a usual dose of 400mg / 24 hours, in 3 to 4 divided doses. But where the pain was severe, upto 600mg of tramadol was given to the patient. For patients in LA-group about 20ml of 0.5% bupivacaine was infiltrated into the peritoneum, muscles and subcutaneous tissues and into the skin under direct vision before the closure of the abdominal wall. Intravenous tramadol was given to the patients in this group for break through pain whenever requested. Post operative pain at rest and on movement was measured using a visual analogue scale (0 representing no pain and 10 the most severe pain) within 08 hours of surgery, on the first and second post-operative days. The amount of tramadol used during the same period was also recorded in both the groups. Other variables recorded included vital signs, sedation, confusional states, nausea, vomiting, chest infection, return of bowel function, time for post-operative ambulation urinary retention and wound infection. All the data were examined and statistical analysis was performed. The variables were then compared and analysed using Fisher's exact test and Mann-Whitney U-test. $P<0.05$ was considered to be statistically significant.

RESULTS

Seventy patients median age 42 years (range 18-72) with sixty one females were randomized to PA-group and seventy patients median age 44 years (range 12-68) with fifty nine females to the LA-group. Patient demographics were similar between the two groups. The median incision length was similar for both the groups i.e. 08cm (range 5-15) in the PA-group and 7.5cm (range 6-15) in the LA-group. Eighteen patients in PA-group and 28 patients in LA-group had a drain inserted ($P = 0.21$). Post-operative pain scores were measured using the visual analogue scale at rest and on movement within 08 hours of surgery and on the first

and second post-operative days of the operation. There was no statistically significant difference in pain scores between the 02 groups at rest and with movement except in scores experienced at rest on the first post-operative day (P=0.3). When the median pain scores in the LA-group were slightly higher than those in the PA-group on the 1st post-operative day. The median total amount of tramadol used in the PA-group was significantly more than that in the LA-groups i.e. 600 (range 500-1000) mg in PA-group to 200 (range 0-400) mg (P<0 = 001) Table – I.

POST OPERATIVE PAIN SCORES AND TOTAL TRAMADOL REQUIREMENTS

Pain Score	PA group	LA group
At rest:		
08 hours after operation	2	2
1st post-op day	0	2
2nd Post-op day	0	0
With movement:		
08 hours after operation	5	4
1st post-op day	4	4
2nd Post-op day	1	1
Total Tramadol (mg)	600(500-1000)	200(0-400)

TABLE – 1

None of the patients in either group was unduly sedated, confused or experienced respiratory depression. 36 patients in the PA-group compared to 11 patients in the LA-group experienced vomiting. There was no significant difference in the time to return of bowel movements between the two groups and none of the patient in either group developed urinary retention post-operatively. The timing of post-operative mobilization was similar in both groups. 05 patients in the LA-group and 03 patients in PA-group developed wound infection. Patients were discharged from the hospital with a median stay of 3.8 (range 2-14) days in PA-group and 3.9 (range 3-17) days in the LA-group.

Discussion

PCA (Patient Controlled analgesia) using narcotic analgesics is almost routinely used for post-operative pain relief in the modern world, which not only reduces the required dosage of the opiods but also their main disadvantage i.e their side-effects. But in the developing countries like ours, it is not possible to provide this facility to all the patients. So titration of the exact dosage is very difficult and the chances of over-dosage and toxicity are increased. In this randomized clinical trial, the effectiveness of post-operative pain relief and pain related complications were compared in patients receiving long-acting local anaesthetic perfusion of the wound with parenteral opiods if needed, to the patients who were receiving only opoids for their post-operative pain relief.

Skin crease incisions are thought to result in less post-operative wound pain, so Kocher's incision was used in all the patients. This study shows that the pain scores achieved using direct wound perfusion with bupivacaine 0.5% is comparable, rather better in early post-operative period, than those achieved in PA-group. W.K. Cheong et al[14] in a recent study has reported same pain scores between two groups of patients, one receiving PCA (morphine) and the other group receiving a continuous infusion of bupivacaine 0.5% into the wound via a small catheter put into the subcutaneous layer of the wound and connected to a pump. There are other reports[2,6,8,9] of bupivacaine infusion of the wound by putting the catheter between the rectus sheath and the peritoneum. Cervini P et al[15] also reported that intra-operative bupivacaine infiltrated locally into surgical wound is

associated with both a decreased need for post-operative parenteral narcotics and a reduced number of doses in patients who under-went laparoscopic appendicec-tomy. Instillation of local anaesthetic (bupivacaine 0.5%) into the wound prior to its closure provides a safe and effective pain relief especially in outpatient procedures where parenteral narcotics are impractical[16]. On the other hand Zmora O et al[17] in a prospective randomized clinical trail of sixty patients concluded that intraperitoneal bupivacaine did not attenuate pain following laparoscopic cholecystectomy. Similarly Deans GT et al[18] showed in a study that instilling local anaesthetic into the preperitoneal space has no significant effect on post-operative pain relief following laparoscopic hernia repair. In the PA-group 78 patients and in the LA-group 32 patients had a drain inserted. In the LA-group 5% bupivacaine was also infiltrated around the drain site. But the insertion of drain neither increased the pain nor raised the demand for analgesia. No patient developed any toxic effects in the LA-group, but to avoid over-dosage the maximum daily dosage should be calculated, and the dose can be further reduced when administered along with adrenaline[12,13]. Sansroth M et al[19] reported no recognizable side-effects or complication related to continuous intra-pleural infusion of 0.5% bupivacaine after affective pain relief in infants and children following thoracotomy, where the use of narcotics are more hazarduous. Similar results have been reported following lumber laminectomy by Cherian MN et al[20]. Crystal Z et al[21] reported in their study that the combined technique of bupivacaine infusion with supplements of opiates for post-operative pain management was associated with significantly reduced per-operative opiate requirement, with better emergence from anaesthesia, fewer side effects, a prolonged pain free period and overall better quality of post-operative recovery. Post-operative recovery was comparable between the LA and PA groups, though incidence of post-operative nausea and vomiting was comparatively higher in the PA-group. The amount of tramadol received by patients in the LA-group was significantly lower than the PA group. This is actually the main advantage of the LA-technique. Patients in the LA-group can be easily mobilized than the patients on parenteral opiods. Less parenteral narcotics means less cost as well, which will benefit the poor patients.

CONCLUSION

Direct perfusion of the wound with bupivacaine 0.5% provides an effective post-operative pain relief comparable to narcotic parenteral analgesics. It reduces the need of Parenteral analgesia significantly and so reduces the risk of its side-effects. Local analgesia is safe, effective and cheap as well.

REFERENCES

1. Partridge BL, Stabile BE. The effect of incisional bupivacaine on post-operative narcotic requirements, oxygen saturation and the length of stay in the post-anaesthesia care unit. Acta Anaesthesiol Scand 1990; 34: 486.

2. Thomas DFM, Lambert WG, Williams KL. The direct perfusion of surgical wounds with local anaesthetic solution: an approach to post-operative pain? Ann R Coll Surg Engl 1983; 65: 226.

3. Chester JF, Revindranath K, White BD, Shanahan D, Taylor RS, Lloyd-Williams K. Wound perfusion with bupivacaine: objective evidence for efficacy in post-operative pain relief. Ann R Coll Surg Engl 1989; 71: 394.

4. Suzuki A, Yoshikawa M, Matsuzawa N. The effect of wound perfusion on the relief of post-operative pain. Masui 1994; 43: 96.

5. Chen TF, Clarke N, Bowen R, Harper NJ, Payne SR. Intermuscular bupivacaine infusion for control of pain after renal surgery: a preliminary report. Br J Urol 1994; 74: 155.

6. Gibbs P, Purushotham A, Auld C, Cuschieri RJ. Continuous wound perfusion with bupivacaine for post-operative wound pain. Br J Surg 1988; 75: 923.

7. Patel JM, Lanzafame RJ, Williams JS, Mullen BV, Hinshaw JR. The effect of incisional infiltration of bupivacaine hydrochloride upon pulmonary functions, atelectasis and nacrotic need following elective cholecystectomy. Surg Gynecol Obster 1983; 157: 338.

8. Levack ID, Holmes JD, Robertson GS. Abdominal wound perfusion for the relief of post-operative pain. Br J Anaesth 1986; 58: 615.

9. Mechlem DW, Humphrey MD, Hicks RW. Efficacy of bupivacaine delivered by wound catheter for post-Caesarean section analgesia. Aust NZJ Obstet Gynaecol 1995; 35: 416.

10. Moss G, Regal ME, Lichtig L. Reducing post-operative pain, narcotics, and length of hospitalization. Surgery 1986; 99: 206.

11. Russell WC, Ramsay AH, Fletcher DR. The effect of incisional infiltration of bupivacaine upon pain and respiratory function following open cholecystectomy. Aust NZJ Surg 1993; 63: 756.

12. Martin J, Neill RS. Venous plasma (total) bupivacaine concentrations following lower abdominal field block. Br J Anaesth 1987; 59: 1425.

13. Kastrissios H, Triggs EJ, Sinclair F, Moran P, Smithers M. Plasma concentrations of bupivacaine after wound infiltration of an 0.5% solution after inguinal herniorrhaphy: a preliminary study. Eur J Clin Pharmacol 1993; 44: 555.

14. W.K. Cheon, F. Seow-Choen, K.W. Ev, C.L. Tang and S.M. Heah-Randomized clinical trial of local pubivacaine perfusion versus parenteral morphine infusion for pain relief after laparotomy. Br. J. Surg 2001; 88: 357.

15. Cervini P, Smith LC, Urbach DR. The effect of intra operative bupivacaine administration on parenteral narcotic use after laparoscopic appendicectomy. Surg Endosc 2002 Jan 6; [epub ahead of print].

16. Bourne MH, Johnson KA. Post-operative pain relief using local anaesthetic instillation. Foot Ankle 1998 Jun; 8(6): 350.

17. Zmora O, Stolic-Dollberg O, Bar-Zakai B, Rosin D, Kuriansky J, Shabtai M, Perel A, Ayalon A. Intraperitoneal bupivacaine does not attenuate pain following laparoscopic cholecystectomy. JSLS 2000 Oct-Dec; 4(4): 301.

18. Deans GT, Wilson MS, Brough WA. Controlled Trial of preperitoneal local anaesthetic for reducing pain following laparoscopic hernia repair Br. J. Surg 1998 Jul; 85(7): 1013.

19. Semsroth M, Plattner O, Horcher E. Effective pain relief with continuous intrapleural bupivacaine after thoracotomy in infants and children. Paediatr Anaesth 1996; 6(4): 303.

20. Cherian MN, Mother MP, Chandy MJ. Local wound infiltration with bupivacaine in lumber laminectomy. Surg Neurol. 1998 June; 49(6): 671.

21. Crystal Z, Katz Y. Analgesia in breast surgery with inter pleural bupivacaine. Harefuah 1997 Nov 16; 133(10): 430-2, 503.

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