Research Article

Effectiveness of intrapleural bupivacaine and adrenaline combination with and without clonodine used for postoperative analgesia

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Abstract

Introduction: Cholecystectomy is now commonly performed by laparoscopic technique because it provides distinct advantages over open cholecystectomy. The pain produced by laparoscopic cholecystectomy is mainly visceral. Recent report have demonstrated that many patients experience considerable pain after laparoscopic cholecystectomy, which is a relatively new procedure, so there is no general agreement on effective postoperative pain control. The various method used with variable success includes NSAID suppository, parenteral NSAID, infiltration of wounds with local anacesthtics, intermittent parentral narcotics, intraperitoneal local aneshtetics and interpleural block etc. **Aims and objectives:** To evaluate and compare the role of interpleural block with bupivacaine with adrenaline and interpleural bupivacaine with adrenaline and clonidine for postoperative analgesia in patients of laproscopic cholecystectomy. **Material and methods:** The present study was conducted in the department of anesthesiology of Government Medical College, Jammu during August 2011 to July 2012. After obtaining approval from the hospital ethics committee, this study was conducted on 40 adult patients of aged 18-70 years of either sex belonging to ASA I and II, admitted in surgical ward for elective laproscopic cholcystectomy. After thorough pre-anesthetic checkup and informed written consent, patients were randomly divided into two groups of 20 each.

- Group I- patients who received bupivacaine with adrenaline.
- Group II- patients who received bupivacaine with adrenaline and clonidine.

All the patients were explained details of visual analogue scale and how to rate it on the scale of 0-10. All patients were given tablet ranitidine 150 mg and alprazolam 0.25mg before sleep and made to fast overnight. Anesthesia was standardized, consisting of glycopyrrolate 0.2mg as premedication i.m 30min before induction..For intraoperative analgesia i/v fentanyl 2microgram/kg given to all the patients. Induction with propofol 2.5mg/kg and succinyl choline 1.5mg/kg IV for intubation given, followed by maintenance with isoflurane and nitrous oxide 60-70% mixture in oxygen. After spontaneous reversal from succinyl choline, neuromuscular blockade was maintained with atracurium. At the end of surgical procedure, just before reversal patient of group I received 20ml bupivacaine 0.5% with adrenaline 5mcg/ml and Group II received 20ml bupivacaine 0.5% with adrenaline 5mcg/ml and 50mcg clonidine through interpleural route. Time required for onset of analgesia and total duration of analgesia was measured and recorded. Pain assessment was done by using visual analog scale.Rescue analgesia was given with i/v diclofenac sodium 75mgin both the groups. **Results:** The difference observed in patients characteristics such as age, sex, weight, male/female ratio and hemodyanamic parameters was founds non significant (p value>0.05) as shown in the table. It was observed that mean duration required for onset of analgesia was 30 min in group I whereas 15min in group II. The mean duration of analgesia in group I was 8.26hrs whereas in group II was 16.54hrs. The difference observed in onset and duration of analgesia between group I and II was statistically significant. It was observed that in group I, pain was present till 30 min after interpleural block whereas reappeared after 6 hrs after the interpleural block. In group II pain disappeared after 15min of interpleural block whereas reappeared after 12 hrs of block. The difference observed in group I and II on VAS was also statistically significant. **Conclusion:** Thus we conclude that addition of clonidine in interpleural bupivacaine with adrenaline can be used for the control of postoperative analgesia in patient of laproscopic cholecystectomy more effectively than using only interpleural bupivacaine with adrenaline.

Key words: Interpleural,bupivacaine, clonidine, effectiveness, laproscopic cholecystectomy, analgesia.

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INTRODUCTION

Uncontrolled post-operative pain may aggravate some of the related complication and increase the patients morbidity and mortality. Post operative pain management, especially with certain types of analgesic regimens, may decrease the related morbidity and mortality. Uncontrolled postoperative pain may result in sympathetic activation and increase myocardial oxygen consumption, which may lead to the development of myocardial ischemia and infarction by decreasing myocardial oxygen supply through coronary vasoconstriction and attenuation of local metabolic coronary vasodilatation.[1] Poorly controlled acute postoperative pain may be an important predictive factor in the development of chronic post-surgical pain (CPSP).[2,3] The relief of postoperative pain is a subject which is receiving increased attention in the past few years because the effective pain control is essential for optimal care of surgical patients. Cholecystectomy is now commonly performed by laparoscopic technique because it provides distinct advantages over open cholecystectomy. (Soper NJ, Stockman PT, Dunnegan DL, ashley Sw, Grace PA, Quereshi A,Colenian J *et al.*).[4,5] The pain produced by laparoscopic cholecystectomy is mainly visceral. Recent report have demonstrated that many patients experience considerable pain after laparoscopic cholecystectomy, which is a relatively a new procedure, so there is no general agreement on effective postoperative pain control (Joris J, Cigarini I, Legrand M *et al.*. Redmaker BM, Ringer J, *et al.*).[6,7] The various method used with variable success include NSAID suppository, parenteral NSAID, infiltration of wounds with local anacesthtics, intermittent parentral narcotics, intraperitoneal local aneshtetics and interpleural block etc. Reiestad *et al.*[8] in 1984 published their result of continuous intercostals nerve block for postoperative pain relief and presented their modification of technique, which is now termed as "interpleural block or analgesia".Interpleural blocked is the technique of injecting the local anaesthetic into the thoracic cage between the parietal pleura and visceral pleura to produce ipsilateral somatic block of multiple thoracic dermatomes. Visceral pain after laparoscopy cholecystectomy usually occurs till 24Hr (joris J, Cigarini I, Legrand M *et al.*)6, shoulder pain due to irritation of phrenic nerve usually occurs on 2nd postoperative day (psaqualucci A, Contrado R *et al.*. plaini)[9] whereas pain due to persistent pneumoperitoneum occurs till 3rd postoperative day (dobbs FF, Kumar V, Alexander JI, hull MGR).[10] Analgesia with single shot interpleural block with bupivacaine is of range of 6-10hr is not sufficient to cover the period of maximum pain after laparocopic cholcystectomy. So we have decided to add clonidine to the bupivacaine in interpleural block to see whether the combination prolonged the postoperative analgesia or not in laproscopic cholecystectomy patients.

AIMS AND OBJECTIVES

To evaluate and compare the role of interpleural bupivacaine with adrenaline and interpleural bupivacaine with adrenaline and clonidine combination for postoperative analgesia in patients of laproscopic cholecystectomy

MATERIAL AND METHODS

The present study was conducted in the department of anesthesiology of Government Medical College, Jammu during August 2011 to July 2012. After obtaining approval from the hospital ethics committee this study was conducted on 40 adult patients, aged 18-70 years of either sex, belonging to ASA I and II were admitted in the surgical ward for elective laproscopic cholcystectomy. After thorough pre-anesthetic checkup and informed written consent, patients were randomly divided into two groups of 20 each.

- Group I- patients who received bupivacaine with adrenaline
- Group II- patient who received bupivacaine with adrenaline and clonidine combination.

All the patients were explained the details of visual analogue scale and how to rate it on the scale of 0-10. All patients were given tablet ranitidine 150 mg and alprazolam 0.25mg before sleep and made to fast overnight. Anesthesia was standardized, consisting of glycopyrrolate 0.2mg as premedication i.m 30min before induction.For intraoperative analgesia i/v fentanyl 2microgram/kg given. Induction with intravenous propofol 2.5mg/kg and succinyl choline 1.5mg/kg IV for intubation, followed by maintenance with isoflurane and nitrous oxide 60-70% mixture in oxygen. After spontaneous reversal from succinyl choline, neuromuscular block was maintained with atracurium. At the end of surgical procedure, just before reversal patient of group I received 20ml bupivacaine 0.5% with

adrenaline 5mcg/ml and Group II received 20ml bupivacaine 0.5% with adrenaline 5mcg/ml and 50mcg clonidine through interpleural route.

Interpleural technique: Just before reversal under strict monitoring of spO_2 19 G Tuohy needle was used to make puncture in the right 7th intercostal space in midaxillary line perpendicular to the skin with bevel toward cephloid just above the 8th rib with all the aseptic precautions. Needle was attached to loss of resistance syringe having 2ml of sterile water and loss of resistance was identified in usual manner as in epidural. A first loss of resistance is felt as the intercostal membrane is pierced, and a second one occurs when the parietal pleura is traversed with the characteristic click. Local anesthetic was injected in pleural space while air penetration avoided with use of tri-way placement.This procedure should be avoided during positive pressure ventilation, because the interpleural pressure is no longer negative during positive pressure ventilation and the risk of pneumothorax and subsequent possibility of tension pneumothorax is increased. Time required for onset of analgesia and total duration of analgesia was measured and recorded. Pain assessment was done by using visual analog scale.Rescue analgesia was given with i/v diclofenac sodium 75mg.

RESULTS

Table 1: Demographic distribution of patients

	Group I	Group II	P VALUE
Age	46.72 ± 8.32	50.15 ± 8.88	0.54
Weight	59.8 ± 5.03	56 ± 5.33	0.51
Systolic blood pressure	122.5 ± 4.63	122.2 ± 6.07	0.08
Diastolic blood pressure	79.65 ± 4.2	77.15 ± 7.16	0.37
Heart rate	82.45 ± 6.72	79.85 ± 6.11	0.29

The difference observed in patients characteristics such as age, sex, weight, male/female ratio and hemodyanamic parameters which was founds non significant (p value>0.05) as shown in the table.

Table 2: Comparison of mean onset and duration of analgesia in two groups

	Group I	Group II	P value
Onset of analgesia(minutes)	30±2.45	15±1.93	<0.001
Duration of analegesia(hours)	8.26±1.49	16.54±0.98	<0.001

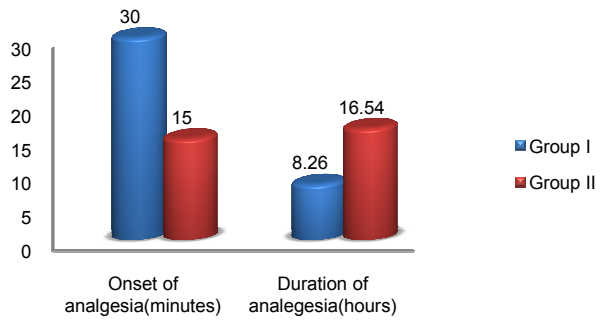

Figure 1: Comparison of mean onset and duration of analgesia in two groups

It was observed that mean duration required for onset of analgesia was 30 min in group I whereas 15min in group II. The mean duration of analgesia in group I was 8.26hrs whereas in group II was 16.54hrs. The difference observed in onset and duration of analgesia between group I and II was statistically significant.

Table 2: Mean visual analogue scale pain scores

Time	Group I		Group II		P value
	Mean	SD	Mean	SD	
5 Min	6.1	1.33	6.55	0.89	>0.05
10 Min	5.25	1.02	5.3	0.92	>0.05
15 Min	5.05	0.99	1.65	0.81	<0.001
30 Min	2.3	1.38	0	0	<0.001
1 Hr	0	0	0	0	
2 Hr	0	0	0	0	
4 Hr	0	0	0	0	
6 Hr	5.9	1.25	0	0	<0.001
8 Hr	7.95	0.76	0	0	<0.001
10 Hr	8.3	0.73	0	0	<0.001
12 Hr			1.5	0.69	
16 Hr			4.95	0.95	
20 Hr			1.82		

It was observed that in group I, pain was present till 30 min after interpleural biock whereas reappeared after 6 hrs after interpleural block. In group II pain disappeared after 15min of interpleural block whereas reappeared after 12 hrs of block. The difference observed in group I and II on VAS which was also statistically significant.

DISCUSSION

In the present study we tried to study the effectiveness of intrapleural bupivacaine and adrenaline combination with and without clonidine used for postoperative analgesia. For this purpose in Group I, patients received bupivacaine with adrenaline whereas in Group II patient received bupivacaine with adrenaline and clonidine. It was observed that there was no significant difference in age, weight, male/female ratio and hemodyanamic parameters of both the groups. Thus both the groups were

comparable with each other. It was observed that mean time of onset of analgesia was 30min in group I whereas mean time for rescue analgesia or duration of analgesia was 8.2hr. In group II mean time of onset of analgesia 15min whereas mean time for rescue analgesia or duration of analgesia was 16.54 hr. thus the onset of analgesia was statistically decreased and duration of analgesia was statistically increased in group II as compared to group I. Similar findings were also observed by stromskage *et al.*[11]. It was observed that in group I, pain was present till 30 min after the interpleural block whereas reappeared after 6 hrs of block. In group II pain disappeared after 15min of the interpleural block whereas reappeared after 12 hrs of block. The difference observed in group I and II on VAS was also statistically significant. Bernard and Macarie[12], while evaluating the effects of adding 30-300 ug clonidine to lignocaine for axillary brachial plexus anesthesia reported that the addition hastened the onset of the block and improved the efficacy of surgical anesthesia and anaigesia. There were reported differences in the effects of administration of low-dose clonidine on time of onset and efficacy of nerve block, which may be explained by differences in the type of nerve block, exact dose injected and technique used to perform the block (casati A, Fanelli G, Beccaria p, Cappeller G, Berti M, Aldegheri G, *et al.*)[13]. Susmita Chakraborty *et al.*[14] studied the effects of clonidine as adjuvant in bupivacaine induced supraclavicular brachial plexus block and concluded that addition of a small dose of clonidine to 0.5% bupivacaine significantly prolonged the duration of analgesia without producing any clinically important adverse reaction other than sedation. The present study also showed that addition of clonidine to bupivacaine improved the onset time of analgesia (15min), mean duration of analgesia (16.54hr). Though little work has been done on interpleural bupivacaine with clonidine for postoperative analgesia by interpleural route in cases of laparoscopic cholecystectomy, our results were consistent with other studies showing analgesia effect of clonidine with bupivacaine in epidural and peripheral nerve blocks without increased incidence of side effects. Demian AD *et al.*[15] used 2mg morphine along with 0.5% bupivacaine and concluded that this technique provides satisfactory analgesia. Bourke DL *et al.*[16] conclude in their study that addition of morphine 0.1 mg to bupivacaine produced improved analgesia without significant side effects. Alpha-2 adrenergic agonists are known to have spinal and epidural antinociceptive effects via alpha-2 receptor sub types. Clonidine a well-known alpha-2 adrenergic agonist, produce a synergistic antinociceptive effect with opioids. Several studies have been published in the last decades describing the anesthetic sparing effects and analgesic property of epidural clonidine (Eisenach jc, de kock M, klimscha w)[17] clonidine, a-2 agonist agent, is causing analgesia with a non-opioid mechanism as an alternative agent to opioid. It was stated that clonidine neither affects proprioception like local anesthetics nor causes respiratory depression, itching, nausea and vomiting like opioids, but when given by epidural route with local anesthetics., it increase analgesia potency (Bernard JM, Kick o, Bonnet F).[18] However, it is also true that it causes side effects like hypotension, bradycardia and sedation (Curatolo M, Petersen-Felix S, Arendt-Nielsen L, Zbinden AM).[19] Additive effect of clonidine to local anesthetics can be explained by various mechanisms. Alpha-2 agonists form their antinociceptive effects probably by affecting descending noradrenergic tract in spinal cord that plays an important role in pain modulation by a non-opioid mechanism, (Sullivan AF, Dash wood MR, Dickenson AH)[20] noradrenergic ganglions in pons and medulla cannot be activated by opioid or noxious stimulus that causes nor epinephrine secretion at dorsal horn of spinal cord (Eisenach Jc, De kock M, Koch M, Klimscha W).[17]

CONCLUSION

Thus we conclude that addition of clonidine in interpleural bupivacaine with adrenaline can be used for the control of postoperative analgesia in patient of laproscopic cholecystectomy more effectively than using only interpleural bupivacaine with adrenaline.

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