Original Research Article

Analgesic Efficacy of Addition of Clonidine to Bupivacaine in Transversus Abdominis Plane Block(TAP) for Pot Operative Analgesia in Laparoscopic Appendicectomy

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Abstract

Background: Pain is the commonest symptom encountered postoperatively and hence multimodal analgesia is tried to overcome it. **Objectives**: To compare bupivacaine and bupivacaine plus clonidine in transversus abdominis plane (TAP) block for postoperative analgesia in patients undergoing laparoscopic appendicectomy under spinal anaesthesia. **Methods:** Sixty ASA I and II patients in the age range of 18-60 years undergoinglaparoscopic appendicectomy were randomly divided into two groups, who were operated after giving spinal block using 2.5 ml of 0.5% hyperbaric bupivacine and 25ug of fentanyl. At the end of surgical procedure tranversus abdominis plane (TAP) block was given by giving 25 ml of injection bupivacaine 0.25% in group I and 25 ml of 0.25% of bupivacaine with 1 ug.kg-1 of clonidine in group II. SPSS (Version 22.0) was used for analysis. **Results:** Demographic characteristics like age, weight, sex, ASA class and diagnosis were comparable in both groups. SBP, DBP and HR were less in group II than in group I and was statistically significant (p-value<0.05). The overall mean VAS score in group I was 3.03 ± 1.57 and group II was 1.72 ± 1.02 with p-value of 0.0005 and hence better quality of analgesia in group II. The duration of analgesia which was calculated by mean time for first rescue analgesia in group I was 6.38 ± 2.56 hours and group II was 14.23 ± 4.63 hours with a p-value of <0.0001 and the difference was statistically significant. None of the patients had any episode of bradycardia or hypotension. **Conclusions:** Addition of clonidine 1 ug.kg-1 to 25 ml of 0.25% bupivacaine compared to 25 ml of 0.25% bupivacaine alone in transverse abdominis plane (TAP) block improves quality of analgesia, increases duration of postoperative analgesia and decreases postoperative analgesic requirements with minimal side effects.

Keywords: Bupivacine, Clonidine, lower abdominal surgeries, Laparoscopic appendicectomy, Transverse abdominis plane block

Introduction

Pain is one of the most common symptoms experienced postoperatively and poorly controlled pain is associated with patient distress, suffering, respiratory complications, increased blood pressure and chances of myocardial infarction, prolonged hospital stay and increased likelihood of chronic pain. In abdominal surgeries, major reason for the pain is the abdominal wall incision and remainder is from internal visceral trauma. The goal of postoperative pain management is to relieve pain while keeping side effects to a minimum. This is often best accomplished with a multimodal approach[1]. Analgesia administered before the painful stimulus occurs may prevent or substantially reduce subsequent pain or analgesic requirements. Pre-emptive analgesia can be administered via local wound infiltration, peripheral nerve blocks, epidural or systemic administration prior to surgical incision. The transversus abdominis plane (TAP) block is a peripheral nerve block that results in anesthesia of the abdominal wall[2]. The block, first described by Rafi in 2001, is a simple and safe technique for analgesia whether guided by anatomical landmarks, laparoscopically or by ultrasound[3,4]. This technique was improved with a blind landmark technique, via the 'lumbar triangle of Petit'[5]. Transverse abdominis plane block has been traditionally given with local anaesthetics like bupivacaine and ropivacaine[6]. Additives to local anaesthetics like opioids, ketamine and α2 agonists like clonidine and dexmedetomidine have been successfully used in peripheral nerve blocks to increase the duration of postoperative analgesia. Various studies have been conducted for the post-operative analgesia in abdominal surgeries by comparing the transverses abdominis plane (TAP) block with placebo or local wound infiltration. In this study, we compared postoperative analgesia in two groups by giving TAP block bupivacaine and bupivacaine-clonidine combination.

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Materials and Methods

This randomized, prospective and double blinded study was carried out from December 2019 to May 2021, in a tertiary care hospital and the study population included patients of either sex, ASA grade I and II in the age range of 18-60 years. After obtaining approval from hospital ethics committee and written informed consent, patients planned for lower abdominal surgeries like laparoscopic appendicectomy were enrolled into study and divided into two groups of 30 patients each by computer generated randomized list. Patients who refused, ASA class III and IV, patients with cardiac, respiratory, renal ailments, patients with allergy to drugs used and pregnant patients were excluded from the study.

Methodology

After proper pre-anaesthetic assessment and baseline investigations patients were shifted to operating room where the monitors like electrocardiogram, non-invasive blood pressure (NIBP), pulse oximetry, temperature probe were attached. A 20 G intravenous cannula was secured and intravenous fluid connected. Regional anaesthesia was given by spinal block using 2.5 ml of 0.5% hyperbaric bupivacine and 25ug of fentanyl in sitting position. Patient was positioned spine and spinal neuraxial blockade confirmed. Then the surgical procedure was started and patient kept on oxygen inhalation via facemask. Heart rate, blood pressure, oxygen saturation and temperature were monitored throughout the procedure. The aim of a TAP block was to deposit local anesthetic in the plane between the internal oblique and transversus abdominis muscles and targeted

the spinal nerves in this plane. The goal was to interrupt the innervation to abdominal skin, muscles and parietal peritoneum.The endpoint was to assess duration and quality of post-operative analgesia in both groups. Quality was assessed by visual analogue scale (VAS), categorical pain scoring system and frequency of rescue analgesia given and duration was assessed with the time at which first rescue analgesia was given[7,8,9]

Statistical analysis

All the collected data was entered in Microsoft Excel sheet and then transferred to SPSS software version 17 for analysis. Qualitative data was presented as frequency and percentages and analyzed using chi-square test of fisher's exact test. P-value < 0.05 was taken as level of significance.

Results

Table 1- Demographic characteristics of both groups

Patient characteristics	Group I (n=30)	Group II (n=30)	P-value
Age (years)	46.03+11.242	45.50+11.69	0.85
Sex (M/F)	17/13	16/14	0.70
Body weight (Kgs)	64.36+7.14	64.43+8.26	0.81
ASA-PS(I/II)	18/12	19/11	0.75

As per table 1 the demographic variables were comparable in both the groups as P value was not significant (p>0.05). The study was male preponderance comprising more than 50% of study participants. Th body weight was comparable in both groups.

Table 2- Comparison of Different Diagnosis based on Surgery in Both groups

Diagnosis	Group I n (%)	Group II n (%)	Total n (%)
Inguinal Hernia	25 (83.3)	20 (66.7)	45(75)
Appendicitis	3 (10)	4 (13.3)	7(11.7)
Post Caesarian wound infection	2 (6.7)	3 (10)	5(8.3)
Wound dehiscence	0 (0)	3 (10)	3(5)
Total	30 (100)	30 (100)	60(100)

As per table 2 the type of surgery were compared in both the groups as seen the procedures were statistically comparable in two groups with p-value > 0.05. The following diagnosis were seen inguinal hernia, appendicitis, post caesarean wound infection, wound dehiscence.

Table 3- Comparison of Hemodynamic parameters (Heart Rate, Blood pressure, Visual analog scale) between two groups at different time settings

Time	HR (I)	HR II)	SBP (I)	SBP (II)	DBP(I)	DBP(II)	VAS(I)	VAS(II)
Baseline	94	90.03	125	132	77.6	76.7	0	0
5 mins	77	71.1	124	113	73.3	64.3	-	-
10 mins	78	67.43	123	111	70.86	61.6	-	-
15 mins	78.2	64.93	123	110	69.63	60	-	-
30 mins	79	62.5	123	107	69	59.4	0	0
1 hour	76	62.26	123	106	67.9	59.2	0	0
2 hours	77.7	62.63	123	107	68.83	59.3	0	0
3 hours	77	65.3	122	109	71.73	61.8	0.37	0
4 hours	79	69.63	124	116	79	65.5	1.7	0.1
5 hours	79.9	70	123	114	77	64.7	2.4	0.9
6 hours	79.2	69.46	124	113	78	64.5	4	2
7 hours	78.7	68.46	125	112	78	64.1	3.3	2
8 hours	78.2	68.5	125	111	76.4	64.3	3.87	2
9 hours	75	67.8	124	111	75	64.5	3.5	2.1
10 hours	76	68.3	125	111	76	64.5	3.13	2.9
11 hours	77.8	68.7	125	111	76.6	63.1	3.07	2
12 hours	77	70.83	123	114	76	63.5	3.1	2.9
13 hours	76.2	71.53	123	114	78.13	64.9	3.93	2.3
14 hours	75	71.06	125	116	77	65.9	3.37	3
15 hours	77	71.66	125	116	77.63	67.7	3.47	2.4
16 hours	75	72.56	127	118	77.6	69.1	3.83	2.3
17 hours	74	72.63	124	119	77.33	70.1	3.97	2.5
18 hours	77	72.7	124	119	75	71	4.33	2.6
19 hours	77	74.43	126	121	77	71.4	4.2	2.7
20 hours	76	74.93	125	122	75	71.6	4.8	1.3
21 hours	76	76.36	126	123	74	71.9	4.43	1.9
22 hours	76	77	127	123	76.13	73.1	4.5	1.8
23 hours	74	77.33	125	123	76	73.8	4.8	1.9
24 hours	77.14	73.14	127	124	79	73.7	4.83	1.9
Total Mean ± SE	77.22 ± 0.60	70.54± 0.96	124.26 ± 0.26	115.15 ± 1.15	75.39	66.18	3.38 ± 0.295	1.62 ± 0.191

As per table 3 The hemodynamics such as heart rate, blood pressure and oxygen saturation wereclosely monitored in both the groups for first 24 hours postoperatively. The overall mean systolic blood pressure (mean ± SE) of group I was 124 ± 0.26 and group II was 115.15 ± 1.15 with p-value of <0.001, mean diastolic blood pressure of group I was 75.39 ± 0.56 and group II was 66.18 ± 0.80 with p-value of < 0.001 and overall mean heart rate of group I was 77.22 ± 0.60 and group II was 70.54 ± 0.96 with p-value of <0.001 and the difference was statistically significant which means the average hemodynamic parameter values of group I were greater than group II. Overall mean VAS score (mean ± SD) for group I

(bupivacaine) was 3.38 ± 0.295 and group II (bupivacaine + fentanyl) was 1.62 ±0.191 with a p-value of 0.005. The VAS score indicated better quality of analgesia in group II.

Table 4- Comparison Sedation Score Between the groups

Sedation Score	Group I n (%)	Group II n (%)	Total n (%)
Awake and Alert	11 (36.7)	0(0)	11(18.3)
Quietly Awake(1)	8 (26.7)	10 (33.3)	18 (30)
Asleep but easily aroused (2)	21 (70)	2 (6.7)	23 (38.3)
Deep sleep (3)	0(0)	0(0)	0(0)
Total	30 (100)	30 (100)	60(100)

As per table 4 the mean number of doses of rescue analgesia in group I for the first 24 hours was 1.37 ± 0.89 and in group II was 0.60 ± 0.62 with a p-value of 0.003 and the difference was statistically significant. This shows that group II (bupivacaine + fentanyl) patients had increased duration of analgesia and also needed less rescue analgesics. Group II patients showed more sedation scores than group I patients.

Discussion

TAP block has proved beneficial in various abdominal surgeries as a part of a multimodal regimen for postoperative analgesia by virtue of its simplicity and effectiveness in providing analgesia, appropriateness for surgical procedures where parietal pain is a significant component of postoperative pain, lower pain scores, and reduction in opioid related side effects[10]. TAP block has been shown to reduce postoperative pain scores and opioid consumption, allowing for early ambulation and faster discharge, after a multitude of lower abdominal operations (colectomy, appendectomy, hysterectomy, caesarean section, abdominoplasty, renal transplantation, prostatectomy, iliac crest bone harvest)[11]. Kanazi et al depicted the effect of low dose clonidine on the characteristics of bupivacaine spinal anaesthesia[12]. They concluded that clonidine (30 μg), when added to intrathecal bupivacaine, produced a prolongation in the duration of the motor and sensory block with preserved hemodynamic stability and lack of sedation. Giovanni Cucchiaro et al., also observed that the addition of Clonidine to Bupivacaine can extend sensory block by a few hours, and increase the incidence of motor blocks[13].

Our study corresponds with the study conducted by Singh et al[14]. who concluded that addition of clonidine to bupivacaine in TAP block bilaterally for cesarean section significantly increases the duration of postoperative analgesia, decreases postoperative analgesic requirement, and increases maternal comfort compared to bupivacaine used alone. Similarly, Gunjan Jain et al. in their study entitled comparison between dexmedetomidine and clonidine as an adjuvant to spinal anesthesia in abdominal hysterectomy observed that there was decrease in VAS score in Bupivacaine plus Clonidine group[15]. Bollag et al. studied the effect of transversus abdominis plane block with and without clonidine on post-cesarean delivery wound hyperalgesia and pain. They concluded that performing a TAP block with or without clonidine does not appear to reduce analgesic consumption or any benefit in wound hyperalgesia[16]. We also noted higher sedation scores in bupivacaine + Clonidine group as compared to Bupivacaine group. Other side effects associated with clonidine like bradycardia, dry mouth was not seen in any patient.

Conclusion

Addition of clonidine as an adjuvant to bupivacaine in TAP block for lower abdominal surgeries during anesthesia resulted into improved quality and increased duration of postoperative analgesia by an average of 8 hours and decreased analgesic requirements by about half, with minimal side effects.

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