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Postoperative analgesic effect of TAP (transabdominal plane) block implementation in open appendectomies

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Objectives: **Inadequate pain treatment after surgery is an important factor that negatively affects the healing of the patient. Transversus abdominis plane (TAP) block is used to provide postoperative analgesia. Usg-based TAP block application is widely used.** ***Methods:*** **60 patients, aged between 18-65 years with ASA I-II with emergency appendectomy plan were included. At the end of the surgery, Group I received 20 mL of 0.5% bupivacaine during TAP block. Group II received 10 mL of lidocaine and 10 mL of 0.5% bupivacaine for TAP block. Group III did not undergo TAP block. Visual analog scale (VAS), and additional analgesic dose and their satisfaction were evaluated postoperatively.** ***Results:*** **In Group I and Group II, VAS scores were found to be lower than in Group III. The number of additional analgesia performed in Group III was greater when compared with Group I and Group II. Patient satisfaction rates in Group III were statistically lower than the rates in Group I and II.** ***Conclusion:*** **In our study TAP block application reduced VAS scores, provided an effective postoperative analgesia, reduced need for additional analgesia, no additional complications, and greater patient satisfaction. TAP block may be an alternative to postoperative pain control in lower abdominal surgeons such as appendectomy.**

INTRODUCTION

Acute appendicitis is one of the most common clinical situation encountered by general surgery specialists. The pain originating from the center of the appendix which is located in the right iliac fossa is classical and characteristic. Local, general or regional anesthesia methods can be used alone or together in appendectomy operations (1).

Post-operative pain is an acute pain that develops during operation and carries a potential for chronicity. Inadequate pain treatment after surgery affects patient recovery negatively. Reduced respiratory movements and depression lead to pulmonary complications such as atelectasis. Exacerbation of the pain can lead to hypertension, arrhythmia or even myocardial infarction (2). Adequate postoperative pain treatment reduces complications, increases patient satisfaction and provides early mobilization.

Analgesic drugs and / or local anesthesia techniques can be applied mainly in postoperative pain treatment (3). "Balanced analgesia" is used to reduce side effects of opioids and increase analgesic efficacy (4). In this method, opioids are combined with nonsteroidal or local anesthetic techniques to provide more effective analgesia (5).

The Transversus Abdominis Plan (TAP) block, one of the abdominal site blocks, was described by Rafi in 2001 (6). In 2007, Hebbart et al. have begun to perform TAP block in the presence of ultrasonography (USG) by further improving the method (7).

Transversus abdorninis is located between the plane, internal oblique and transversus abdominis muscles, and the TAP block is performed by injecting the local anesthetic into the neurofacial area that makes up this void (8). It can be applied in operations such as caesarean section, hernia repair, appendectomy, abdominal hysterectomy, prostatectomy (9).

In our study, we aimed to compare the effects of TAP block made with bupivacain or lidocaine-bupivacain on USG guided postoperative surgery and patient satisfaction in open appendectomy surgery under emergency conditions under general anesthesia.

RESULTS

60% of the patients were male (n: 36) and 40% were female (n: 24). The ages of the cases ranged from 18 to 62 years with a mean of 31.7 ± 10.9 years (Table 1). There was no statistically significant difference between the groups in terms of age averages, gender distributions and ASA (p> 0.05) (Table 2).

SBP, DBP and MAP; 1 hour, 4 hour, 12 hour and 24 hour measurements were evaluated. No significant difference was found between the groups in the 4th hour and 12th hour SBP measurements

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Table 1 Demographic characteristics of the patients

Age (year)	18-62 (30)	31.7±10.9
Gender		
Male	36	60
Female	24	40
ASA		
1	35	58.3
2	25	41.7

Table 2 Distribution of the patients due to age, gender and ASA

		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)
Age (year)	**Mean**	29.40	33.55	32.15
	Min-Max	18-62(26.50)	18-62(35)	18-55(32)
Gender n(%)	**Male**	14(%70)	11(%55)	11(%55)
	Female	6(%30)	9(%45)	9(%45)
ASA	**1**	13(%65)	12(%60)	10(%50)
	2	7(%35)	8(%40)	10(%50)
Total		**20**	**20**	**20**

Table 3 SBP values in the groups

SBP (mm/hg)		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)	p^a
1.hour	**Mean±SD**	123±6,34	120±7,6	130±3,9	0,00*
	Min/Max	110-130	100-130	120-140	
4.hour	**Mean±SD**	123,25±7,9	121±6,1	125±4,7	0,123
	Min/Max	110-135	110-130	120-135	
12.hour	**Mean±SD**	123,25±5,9	118,5±5,4	123,75±4,2	0,004*
	Min/Max	110-135	110-125	120-130	
24. hour	**Mean±SD**	121,5±5,1	117,2±6,4	121±5,0	0,037*
	Min/Max	110-135	105-125	110-130	

[a] One-way Anova Test * p<0,05

Table 4 DBP values in the groups

DBP (mm/hg)		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)	p^a
1.hour	**Mean±SD**	55±6,0	54,5±4,8	58,1±6,3	0,113
	Min/Max	50-70	50-60	50-72	
4.hour	**Mean±SD**	53,35±5,8	52,25±4,1	55±6,0	0,278
	Min/Max	50-70	50-65	50-70	
12.hour	**Mean±SD**	53,25±4,6	51,0±2,6	55,75±5,6	0,006*
	Min/Max	50-65	50-60	50-70	
24.hour	**Mean±SD**	51,75±4,3	51,50±2,8	52,25±4,1	0,821
	Min/Max	50-65	50-60	50-65	

[a] One-way Anova Test * p<0,05

Table 5 HR values in the groups

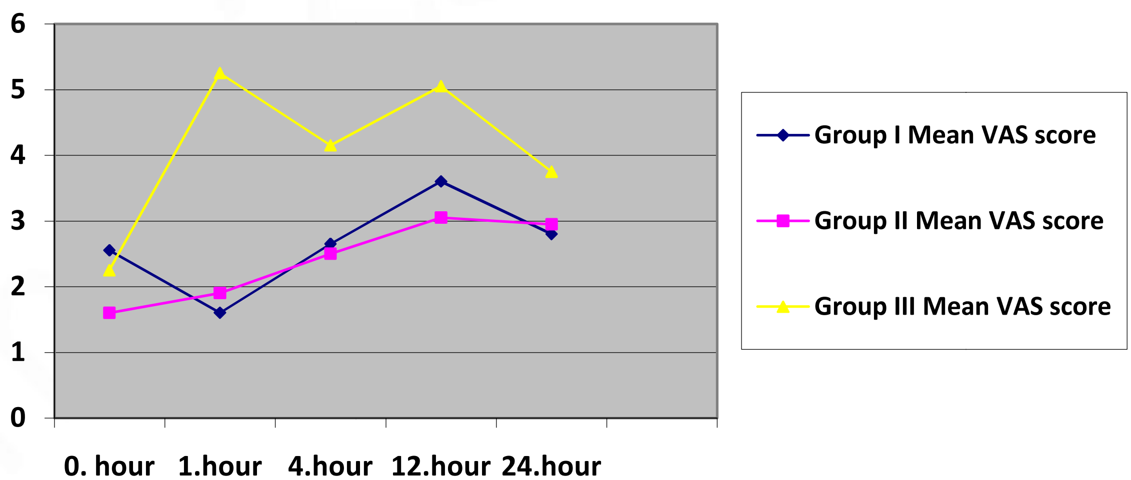
HR (/min)		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)	p[a]
1.hour	Mean±SD	75,20±4,04	74,20±3,9	80,80±4,32	0,000*
	Min/Max	65-80	70-80	75-90	
4.hour	Mean±SD	75,05±4,7	75,15±2,83	75,55±3,5	0,069
	Min/Max	68-85	68-80	70-85	
12.hour	Mean±SD	76,5±2,1	75,25±2,7	76,30±4,3	0,422
	Min/Max	72-80	70-80	60-80	
24. hour	Mean±SD	74,55±2,7	74,0±2,9	74,60±2,1	0,724
	Min/Max	70-80	70-80	70-78	

[a] One-way Anova Test* p<0,05

Table 6 VAS scores in the groups

VAS		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)	p[a]
Postop	Mean±SD	2,55±0,5	1,60±0,5	2,25±0,7	0,000*
	Min/Max	2-3	1-2	1-4	
1.hour	Mean±SD	1,60±0,5	1,90±0,55	5,25±1,4	0,000*
	Min/Max	1-2	1-3	3-8	
4.hour	Mean±SD	2,65±1,22	2,50±0,87	4,15±0,93	0,000*
	Min/Max	2-6	1-5	3-6	
12.hour	Mean±SD	3,60±0,41	3,05±0,6	5,05±1,1	0,000*
	Min/Max	2-6	2-4	3-7	
24. hour	Mean±SD	2,80±0,4	2,95±0,5	3,75±0,44	0,000*
	Min/Max	2-3	2-4	3-4	

[a] One-way Anova Test* p<0,01



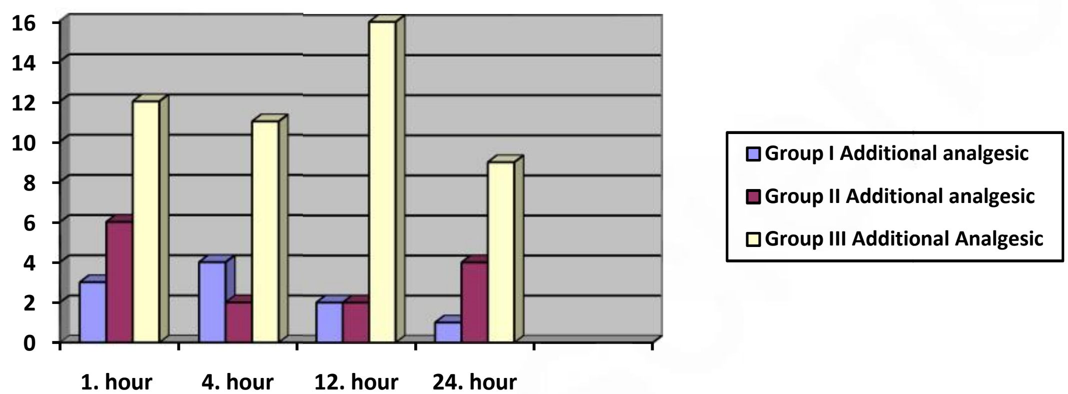
Graphic 1 VAS Scores by Groups

Table 7 Additional analgesic demands in the groups

Additional analgesia (n) (%)		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)	p[b]
1.hour	(-)	17(85)	14 (70)	8(40)	0,005**
	(+)	3(15)	6 (30)	12(60)	

4.hour	(-)	16 (80)	18 (90)	9 (45)	0,010*
	(+)	4 (20)	2 (10)	11(55)	
12.hour	(-)	18(90)	18(90)	4(20)	0,001**
	(+)	2(10)	2 (10)	16(80)	
24.hour	(-)	19(95)	16(80)	11(55)	0,001**
	(+)	1(5)	4(20)	9(45)	
TOTAL	(+)	14(70)	16(80)	25(100)	0,006**
	(-)	6(30)	4(20)	0	

[b] pearson chi-square test ** p<0,01 * p<0,05



Graphic 2 Additional analgesic groups according to time Patient numbers

Table 8 Evaluation of Postoperative First Analgesic Application Time and First 24 Hours of Additional Analgesic Application Measurements

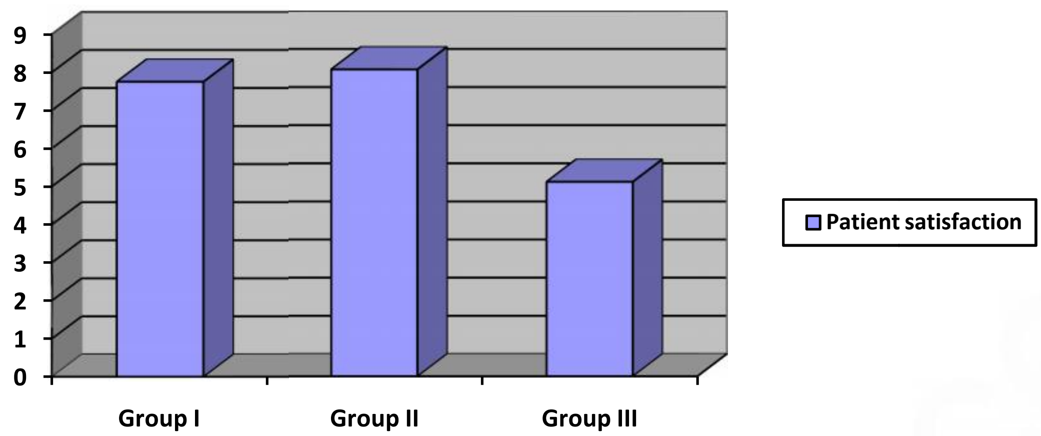
		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)	p[c]
First analgesic application time (hr)	**Mean±SD**	4±2,5	4,45±5,83	1,78±1,31	0,007**
	Min/Max	1-81-24	0,5-30		
Number of additional analgesic application	**Mean±SD**	1,41±0,51	1,50±0,51	3,32±0,99	0,001**
	Min/Max	1-2	1-2	2-5	

[c] Kruskall Wallis Test (** p<0,001)

Table 9 Patient satisfactions in the groups

Patient satisfaction		Group 1 (n:20)	Group 2 (n:20)	Group 3 (n:20)	p[a]
48.hour	**Mean±SD**	7,75±0,44	8,05±0,5	5,10±0,71	0,000**
	Min/Max	7-8	7-9	4-6	

[a] One-way Anova Test** p<0,01



Graphic 3 48th hour Patient Satisfaction Assessment

(p> 0.05) (Table 3). Statistically significant differences were found between the groups at 1st and 24th hours of SBP measurements. (1.hr p = 0.000 12.hr p = 0.004 24.hr p = 0.037 p <0.05). There was no statistically significant difference between the groups in the bilateral comparisons (p> 0.05) (Table 3).

DBP and HR; There was no significant difference between the groups in the 1st hour, 4th hour and 24th hour measurements (p> 0.05) (Table 4, 5). Statistically significant differences were found between the groups at the 12th hour of DBP measurements. (12.hr p = 0.008 p & lt; 0.05). There was no statistically significant difference between the groups in the bilateral comparisons (p> 0,05) (Table 4).

HR; There were statistically significant differences between the groups in the first hour of HR measurements. (12. hour p = 0.000 p <0.05). There was no statistically significant difference between the groups in the bilateral comparisons (p> 0.05) (Table 5).

According to the groups, there was a statistically significant difference in triple comparison between postoperative collection room and VAS score (p <0,01). Also in the binary comparisons, the third group VAS scores were higher than the second group statistically significant. (p = 0.002, p <0.01).

There was a statistically significant difference in terms of 1 hour VAS scores according to the groups (p = 0,000; p <0,01). There was no statistically significant difference between groups 1 and 2 (p = 0,08) in the bilateral comparisons (p = 0,000; p <0,01).

There was a statistically significant difference according to the 4th hour VAS scores according to the groups (p = 0,000; p <0,01). There was no statistically significant difference between groups 1 and 2 in the bilateral comparisons (p = 0,653 p> 0,05). Group 1 and Group 2 were statistically significantly lower in terms of VAS scores than Group 3 VAS scores (p = 0.00, p <0.01).

There was a statistically significant difference in terms of 12-hour VAS scores according to the groups (p = 0,000; p <0,01). The 12th hour VAS scores of the cases in group 3 were statistically significant (p <0,01) in Group 1 (p = 0,000) and Group 2 (p = 0,000) according to bilateral comparisons. There was no statistically significant difference between group 1 and group 2 (p = 0,05).

There was a statistically significant difference in terms of 24-hour VAS scores according to the groups (p = 0,000; p <0,01). The 24 hour VAS scores of group 3 patients were statistically significant (p <0,01) in Group 1 (p = 0,000) and Group 2 (p = 0,000) in the bilateral comparisons. There was no statistically significant difference between Group 1 and Group 2 (p = 0.49) (Table 6), (Graph 1).

There was a statistically significant difference between the groups in terms of number of patients who underwent additional analgesia for the first hour (p = 0.005, p <0.01). Group 1 patients (p = 0,001) and Group 2 patients (p = 0,047) had higher levels of patients who underwent additional analgesia for Group 1 patients than group 2 patients (p <0.05). There was no statistically significant difference between Group 1 and Group 2 (p> 0.05).

There was a statistically significant difference between the groups in terms of number of patients who received additional analgesia for 4 hours (p = 0.010, p <0.05). According to the bilateral comparisons, Group 3 patients were significantly higher than Group 1 patients (p = 0,037) and Group 2 patients (p = 0,005), which was statistically significant (p <0,05). There was no statistically significant difference between Group 1 and Group 2 (p> 0.05).

There was a statistically significant difference between the groups in terms of number of patients who were given additional analgesics for 12 hours (p = 0.001, p <0.01). According to the bilateral comparisons, the number of patients treated with additional analgesics for 12 hours in Group 3 cases was statistically significant (p <0,01). Group 1 (p = 0,001) and Group 2 (p = 0,001) were high. There was no statistically significant difference between Group 1 and Group 2 (p> 0.05).

There was a statistically significant difference between the groups according to the number of patients applying additional analgesics for 24 hours (p = 0,001, p <0,01). According to the bilateral comparisons, the number of patients treated with additional analgesics for Group 3 cases was statistically higher than Group 1 (p = 0.001) and Group 2 (p = 0.002) (p <0,01). There was no statistically significant difference between Group 1 and Group 2 (p> 0.05) (Table 7) (Graph 2).

There was a statistically significant difference in the number of patients who had no analgesics compared to the groups during the 24-hour period (p <0.01); The number of analgesic patients in Group 1 and 2 was significantly lower than Group 3 (p <0.01) (Table 7).

There was a significant difference in the time of first analgesic administration compared to the groups (p> 0,01). In Group 3, analgesic requirement was significantly earlier than Group 1 and Group 2 (p = 0.002, p = 0.045). There was no statistically significant difference between Group 1 and Group 2 (p> 0.05) (Table 8).

The total number of additional analgesic applications was significantly different from the groups (p <0,01). The total number of additional analgesic applications in Group 3 was significantly higher than Group 1 and Group 2 (p = 0.001, p = 0.001, p <0.01). There was no significant difference in the number of additional analgesic applications in Group 1 and Group 2 (p> 0.05) (Table 8). In Group 1, additional analgesics were performed in 14 patients, not in 6 patients; In Group 2, additional analgesics were performed in 16 patients, not in 4 patients. In group 3, additional analgesics were given to all patients.

The 48 hour patient satisfaction was assessed by numerical scoring. When 1 point was given for not satisfied at all, 10 points were considered "very satisfied". There was a statistically significant difference in terms of 48-hour patient satisfaction rates according to the groups (p = 0,000; p <0,01). Patient satisfaction rates of Group 3 patients according to bilateral comparisons were statistically significantly lower (p <0,01) than Group 1 (p = 0,000) and Group 2 (p = 0,000). In group 2, satisfaction was higher than group 1, but the difference was not statistically significant (p = 0,055) (Table 9) (Graph 3).

No side effects and complications were found in any of the three groups in our study.

DISCUSSION

Chronic postoperative pain is nowadays involved in a large proportion of hospital applications and causes serious labor loss (10). Despite the developed drugs, techniques and new technologies, studies show that 25-67% of patients still have moderate and severe post-operative pain. As a result, pain-related postoperative pulmonary and cardiac complications can be encountered (7,11). Effective postoperative pain relief reduces surgical stress and consequent morbidity (12). The development of regional anesthesia methods has been shown to be a more effective option for pain management and to reduce the incidence of adverse effects associated with systemic drug use (13,14). TAP block is one of these regional anesthesia methods and is used for anesthesia and postoperative analgesia in surgeons with lower abdominal region.

Studies have shown that in patients with lower abdominal surgery, TAP block and HKA (patient-controlled analgesia) are comparable analgesic effects with TAP block, and TAP block may be an alternative to avoid side effects of morphine (13).

Local anesthetic dose to be performed in TAP block applications; if done unilaterally, 15-20 mL in adults and 0.5 mL kg-1 in child (14). In a cadaver study, a 20 mL volume of local anesthesic affected the T10-L1 nerves and resulted with sufficient blocks in lower abdominal surgeries, such as appendectomy. We have limited the TAP block local anesthetic volume to 20 mL according to this knowledge. At both concentrations we achieved better analgesic activity than the control group.

In some studies, the TAP block was applied at the end of the surgery, 16 in some studies before the surgery, but because of the voluminal effect on the surgical anatomy and difficulties (2,13,17). In our study, we performed TAP block at the end of surgery.

In the literature, TAP block for postoperative analgesia has been shown to be effective in different surgical types such as cesarean, inguinal hernia, laparoscopic cholecystectomy 19,20). In a study in which TAP block was performed with 30% mL levobupivacaine at concentrations of 0.25% and 0.5%, they found a significant difference in pain scores according to the control group. They observed similar effect with a higher concentration and volume than our study.

When we assessed the effect of TAP block on pain severity, initial analgesic requirement and postoperative analgesic requirement, VAS scores are significantly lower than the literature. In addition, the VAS scores assessed in the postoperative compartment were significantly lower in Group 2 than in Group 1. We can link this difference to lidocaine added to Group 2.

The first analgesic time was later in Group 1 and 2 than in Group 3. The fact that the pain-free survivors of the TAP-blocked groups were longer than the group without TAP block, suggests that TAP block is effective in postoperative pain management.

There are also studies with different results about TAP block activity. In a study conducted, the group that applied TAP block for inguinal hernia surgery performed under general anesthesia compared the control group that they did not apply TAP block. There was no significant difference between the two groups in terms of VAS values (21).

Twenty-five patients who underwent renal transplantation underwent TAP blockade with 20 mL of 0,375% levobupivacaine and 20 mL of 0,9% saline in the other half. Both groups received morphine with PCA (22). When postoperative morphine requirement and pain scores were compared, there was no significant difference between the two groups as opposed to our study. It was thought that these results might have been due to the fact that the block was made with blind technique; Another reason was thought to be insufficient to block the nerves in 20 mL volume renal transplant surgery.

Erbabacan et al (13) applied TAP block with USG in the end of surgery and PCA with morphine in the other half of the patients who underwent lower abdominal surgery in their study. Postoperative HR was found to be lower in the TAP block group compared to the other groups. There was no significant difference between the groups in terms of pressure values.

In our study, we found statistically significant differences in systolic and diastolic pressure comparisons between groups at some measurement times, but we did not find this difference clinically significant when the whole study was evaluated.

Possible complications of the TAP block are hematoma, vascular injury, femoral nerve involvement and abdominal perforation. However, in the studies performed (2,14) no complications were encountered after TAP block. None of our patients had any complications of TAP block.

They found that patient satisfaction was lower in the control group than in the TAP group when they applied postoperative PCA to all cases and assessed postoperative patient satisfaction. In the study conducted by Erdogan et al (18), it was found that the patient satisfaction evaluated in the TAP and control group at 48th was significantly lower in the control group. In our study, the patient satisfaction we evaluated in the 48th hour was lower in Group 3 than in Groups 1 and 2. There was no significant difference between groups 1 and 2. Our study has similarities with these results, and patient satisfaction may be associated with postoperative pain. Therefore, the result of TAP application has increased patient satisfaction.

Since the TAP block was applied at the end of the operation and before the patient was awakened in our study, the failure to assess the efficacy of the distribution and block was accepted as a limitation of our study. Another limitation was that local anesthetic measurement was not performed.

CONCLUSİON

As in our study, TAP blockage with a mixture of bupivacaine or lidocaine-bupivacaine in the same volume at the end of the surgery provided similar efficacy, provided effective postoperative analgesia, decreased VAS scores, decreased additional analgesic requirement and did not cause any additional complications resulting in more patient satisfaction. The current concentration of lidocaine + bupivacaine as the best concentration provided safe & efficacious analgesic effect for appendectomy. This combination of analgesic formulation provided better patient satisfaction than Ropivacaine. In this regard, we believe that different surgeons can perform larger, different doses and volume studies.

MATERIALS AND METHODS

Sixty patients with ASA I-II were included after the ethics committee approval for the study. Patients with ASA III and IV, active infection in the treatment area, coagulopathy, organomegaly and concealed drain were excluded from the study.

Informed consent was obtained by interviewing the patients with open appendectomy plan who had an acute consultation in the surgical observation room.

Patients were divided into 3 groups by double-blind, randomized controlled study. Randomization was performed by computer method. 20 gauge cannulas were placed in the operating room and 4 mL / kg 0.9% NaCl infusion was initiated. Age, body weight and sex of the patients were recorded and ECG, SpO2, non-invasive blood pressure monitor used as standard in the operating room was applied. Routine anesthesia induction was achieved with 2 mg / kg propofol, 1 µg / kg fentanyl and 0.6 mg / kg rocuronium in patients in all three groups and 50% O2 / 2% sevoflurane in anesthesia.

At the end of the surgery, Group 1 received 20 mL of 0.5% bupivacaine during TAP block, 10 mL of lidocaine and 10 mL of 0.5% bupivacaine was applied in Group 2. When patients were in the supine position, TAP block was performed according to the asepsis-antisepsis rules. The area of the TAP-block front edge is the free back part of the extimal oblique muscle, the area of the posterior side of the latissimus dorsi muscle is formed by the lateral iliac crest, and the area called the petit triangle is covered with sterile cleaned, the linear USG probe. By holding the probe abdominal transverse; mid axillary line was fixed on the petit triangle when the skin, subcutaneous fat tissue, external oblique muscle, internal oblique muscle, transversus abdominis muscle and peritoneum were clearly displayed on the petit triangle. Twenty-two gauge block needles (Braun Stimuplex® Ultra 22 Ga.X 2 in. (50 mm), 100 mm) were advanced from the front to the back with a USG probe (Siemens Sodoline Adara Ultrasound System®.) The needle tip had internal oblique muscle and transversus abdominis muscle was administered as a 1 mL test solution of the prepared solution after a careful aspiration to confirm that the placenta was appropriately placed. When the appropriate spread was observed, a local anesthetic solution was injected with simultaneous visualization with USG. The control group was not treated with TAP block in group 3 and 10 minutes after extubation kg 1 mg/kg IV tramadol was given before the patients were completed in Group 1 and Group 2. In Group 3, after declining with 0.01 mg / kg atropine IV and 0.02 mg / kg neostigm IV at the end of surgery, the patients were transferred to the compilation unit.

The visual analogue scale (VAS = 0 no pain, VAS = 10 intolerable severe pain), heart rate (HR), systolic and diastolic blood pressures (SBP, DBP) were recorded in the postoperative collection room for all three groups at 1,4,12 and 24 hours and need for additional analgesia was assessed. Patients in all three groups; 1 mg / kg tramadol IV was given in the first evaluation in the postoperative collection room, and 15 mg / kg paracetamol IV in the subsequent evaluations. Also, the satisfaction of each patient with numerical rating scale (1- Not satisfied at all 10- Satisfied well) was evaluated at the 48-hour follow-up. The amount of postoperative analgesic, if it was done, the time of first postoperative analgesic, patient satisfaction, side effects were recorded.

The study has no financial supports.

Statistical Analysis

NCSS (Number CruncherStatistical System) 2007 (Kaysville, Utah, USA) program was used for statistical analysis. One way ANOVA test and Tukey HSD test were used in the comparison of descriptive statistical methods (Mean, Standard Deviation, Median, Frequency, Rate, Minimum, Maximum) as well as three and over groups with normal distribution of the quantitative data. Pearson Chi square test was used to compare qualitative data. The qualitative data used the Oneway Anova test for comparisons of follow-up, and the t-test for binary comparative evaluations. Significance was evaluated at $p < 0.01$ and $p < 0.05$.

REFERENCES

1. Johansson EP, Rydh A, Riklund KA. Ultrasound, computed tomography, and laboratory findings in the diagnosis of appendicitis. Acta Radiol 2007; (48): 267-73.
2. KucurTE, Duman E, Çetingök H, Demir G, Altun D, Hergünsel O, Post-Op Analgesic Efficacy of Transabdominal Rectus Plexus Block with the aid of US Gin Cesarean Section. Istanbul Med J 2013;(14): 271-5.
3. Keskin A. Operatif stratejide ağrının rolü. Ağrı2004;16 (2):42-3.
4. Kehlet H. Controlling acute pain- role of preemptive analgesia, peripheral treatment and balanced analgesia and effects on outcome. Pain1999-an updated review, M Mitchell. IASPP res, Seattle 1999: 459-62.
5. Pinzur M, Gupta P, Pluth T.Continuous postoperative infusion of regional anesthetic after amputation of the lower extremity: a randomized clinical trial. J Bone Joint Surg Am 1996; (78): 1501-5.
6. Rafi A. Abdominal field block: a new approach via the lumbar triangle. Anaesthesia. 2001;56 (2):1003-29
7. Hebbard P, Fujiwara Y, Shibata Y, Royse C. Ultra-sound-guided transversus abdominis plane (TAP) block. Anaesth Intensive Care. 2007; 35 (4):616-7.
8. Mukhtar K. Transversus Abdominis Plane (TAP) Block. The Journal of New York School of Regional Anesthesia 2009; 12 (3):28-32.
9. Reinoso-Barbero F, Poblacion G, Builes LM , Castro LE , Lahoz AI. Successful ultra transversus abdominis plane blocks improves post-operative analgesia after open appendicectomy in children. Eur J Anaesthesiol. 2012; 29 (8):402-4.
10. Ashburn MA, Caplan RA, Carr DB, Connis RT, Ginsberg B,Green CR et al. Practice guidelines for acute pain management in the perioperative setting an updated report by the American Society of Anesthesiologists task force on acute pain management. Anesthesiology 2004; (100):1573-81.
11. Apfelbaum JL, Chen C, Mehta SS, Gan TJ . Postoperative pain experience: Results from a national survey suggest postoperative pain continues to be undermanaged Anesth Analg 2003; (97):534-40.
12. Sharma P, Chand T, Saxena A, Bansal R, Mittal A, Sbrivastava U. Evaluation of postoperative analgesic efficacy of transversus abdominis plane block after abdominal surgery: A comparative study. J Nat Sci Bio iMed 2013;(4) :177-80.
13. Erbabacan E, Kendigelen P, Koksal GM, Tütüncü Ç, Ekici BB, Şeker TB, et al. Comparison ofTransversus Abdominis Plane Blockand IVPatient-Controlled Analgesia after Lower Abdominal Surgery. Turk Anestezi ve Reanimasyon Dernegi 2015, 43 (1) : 24-28.
14. Salman AE, Yetişir F, Yürekli B, Aksoy M, Yıldırım M, Kılıç M. The efficacy of thesemi-blind approach of transversus abdominis plane block on postoperative analgesia in patients undergoing inguinal hernia repair: a prospective randomized double-blind study. Local and regional anesthesia 2013; 6:1.
15. Tekin M, Gurkan Y, Solak M, Toker K. Ultra-sound-guided bilateral transversus abdorninis plane block in a 2-month-old infant. J Anesth. 2009; (23):643-4.
16. Tekelioglu ÜY, Demirhan .A, Sit M, Kurt AD, Bilgi M, Kocoğlu H. Transversus Abdominis Plan Blogu Eşliginde Yapılan Kolostomi. Turk JAnaesth Reanim 2015;(43):424-6.
17. Kokulu S, Doğan Bala E, Kaçar E. Effect of transversus abdominis plane block on cost of laparoscopic cholecystectomy anesthesia. "Medical science monitor: international medical journal of experimental and clinical research 2014;20:2783.

18. Erdogan N, AyhanB, Sancaoglu F, Pamuk AG, Uzun S, Akıncı SB, et aL. Analgesic Effect ofTAP Block In Hysterectomies, Journal of Anesthesia 2011;19(4):208-12.
19. Canstz KH, Yedekçi AE, Şen H, Özkan S, Dağlı G. The Effect of Ultrasound Guided Transversus Abdominis Plane Block for Cesarean Delivery on Postoperative Analgesic Consumption. Gulhane Medical Journal 2015;57(2):121-4.
20. Ra YS, Kim CH, Lee GY, Han JL. The analgesic effect of the ultrasound-guided transverse abdominis plane block after laparoscopic cholecystectomy. Korean J Anesthesiol 2010;58(4):362-8.
21. Petersen PL , Mathiesen O, Stjernholm P, Kristiansen VB, Torup H, Hansen HG, et al. The effect of transversus abdominis plane block or local anaesthetic infiltration in inguinal hernia repair: a randomised clinicaltrial . Eur J Anaesthesiol 2013; 30(7):415-21.
22. Freir NM, Murphy C, Mugawar M., Linnane A, Cunningham AJ. Transversus abdominis plane block for analgesia in renal transplantation: a randomized controlled trial. Anesth & Analg 2012;115(4):953-7.

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