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Effect of bilateral superficial cervical block on postoperative analgesia in thyroid surgery performed under general anesthesia

Genel anestezi altında yapılan troid cerrahisinde bilateral yüzeyel servikal blok uygulamasının postoperatif analjezi üzerine etkisi

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Abstract

Aim: The purpose of this study was to assess the effect of bilateral superficial cervical plexus block (BSCPB), administered along with general anesthesia in total thyroidectomy surgical operations, on postoperative opioid consumption and the duration of hospital stay.

Materials and Methods: A total of 150 patients who underwent total thyroidectomy surgical operations under general anesthesia and had or did not have bilateral superficial cervical plexus blockade (BSCPB), were prospectively evaluated in terms of their postoperative tramadol needs and durations of hospital stay. At the beginning of the surgical intervention after anesthesia induction, 75 patients who received BSCPB administered with a 0.5% of 20 mL levobupivacaine constituted the BSCPB group; on the other hand, 75 patients in the control group received only general anesthesia and no BSCPB was administered.

Results: No statistically significant difference was found when age, gender, height, weight and ASA (American Society of Anesthesiologists) physical status classifications of patients in both groups were compared. Only 15 patients out of 75 patients in the BSCPB group (20%) had postoperative opioid needs, whereas this rate was determined as 85% in 64 patients out of 75 patients in the control group ($p<0.05$). Similarly, the tramadole consumption in the BSCPB group was significantly less when compared to the control group ($p<0.05$). Postoperative hospital stay in the BSCPB group (2.4±0.6) was also significantly less than that of the control group (4.7±1.6) ($p<0.05$)

Conclusion: Bilateral superficial cervical plexus block administered along with general anesthesia in thyroidectomy operations considerably reduces pain and tramadol need in the postoperative period and lessens the duration of hospital stay.

Keywords: Thyroidectomy, superficial cervical plexus block, opioid.

Öz

Amaç: *Total tiroidektomi operasyonların da genel anesteziye ek olarak uygulanan bilateral yüzeyel servikal pleksus bloğu (BYSPB)'nun postoperatif opioid tüketimi ve hastanede yatış süresine etkisini değerlendirmeyi amaçladık.*

Gereç ve Yöntem: *Genel anestezi altında total tiroidektomi operasyonu geçiren, bilateral yüzeyel servikal pleksus blokajı (BYSPB) yapılan ve yapılmayan toplam 150 hasta, postoperatif tramadol ihtiyacı ve yatış süreleri açısından prospektif olarak değerlendirildi. Anestezi indüksiyonu sonrası cerrahi başlangıcında %0.5 lik 20 mL levobupivakain ile BYSPB uygulanan 75 hasta BYSPB grubunu oluşturdu, diğer yandan kontrol grubundaki 75 hastaya sadece genel anestezi uygulandı ve BYSPB yapılmadı.*

Bulgular: *Her iki gruptaki hastaların yaş, cinsiyet, boy, kilo, ASA (Amerikan Anesteziologlar Birliği) fiziksel durum sınıflandırması karşılaştırıldığında istatiksel olarak anlamlı fark bulunmadı. BYSPB grubundaki 75 hastanın sadece 15 hastada (%20) postoperatif opioid ihtiyacı olurken, kontrol grubunda bu oran %85 (75 hastanın 64'ü) olarak bulundu ($p<0.05$). Yine BYSPB grubundaki tramadol tüketimi kontrol grubuna göre anlamlı derecede düşüktü ($p<0.05$). Postoperatif dönemdeki hastane yatış süresi BYSPB grubunda (2.4±0.6), kontrol grubundan (4.7±1.6) istatistiksel olarak anlamlı derecede düşük bulundu ($p<0.05$).*

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Sonuç: *Tiroidektomi operasyonlarında genel anesteziye ek olarak yapılan bilateral yüzeyel servikal pleksus bloğu, postoperatif dönemde ağrıyı ve tramadol ihtiyacını önemli ölçüde azaltmakta ve hastanede yatış süresini kısaltmaktadır.*

Anahtar Sözcükler: *Tiroidektomi, yüzeyel servikal pleksus bloğu, opioid.*

Introduction

Thyroidectomy is the most commonly applied surgery procedure in endocrine surgery (1). Many of these cases complain of severe pain on the incision point especially on the first day after surgery (2,3). 90% of these cases have been reported to have severe pain that even required morphine (4). Reducing the postoperative pain increases patient's comfort and ensures that the patient returns to their daily life activities sooner.

Pain observed after thyroidectomy can be brought under control through non-steroid anti-inflammatory agents or opioids. However, it has been reported that non-steroid anti-inflammatory agents increase postoperative bleeding risk in some cases (2). Opioid analgesics also have undesired side effects such as postoperative nausea and vomiting (2). Therefore, wound infiltration through local anaesthetics, bilateral superficial cervical plexus block and bilateral combined (superficial and deep) cervical plexus blocks are frequently used as postoperative analgesia methods in thyroid operations. However, there are studies available which provide different data and information regarding whether these methods reduce the analgesic requirement in postoperative period or not (2-7). Bilateral superficial cervical plexus block (BSCPB) is the most common one among these administrations in terms of both ease of administration and efficiency (5-7). The purpose of this study was to prospectively examine the effects of BSCPB administration in thyroid surgery performed under general anaesthesia on postoperative opioid requirement and duration of hospital stay.

Materials and Methods

Approval of ethics committee was received from 19 Mayıs University Clinical Studies Ethics Committee for our study. In accordance with principles of Declaration of Helsinki, a total of 150 patients, who had total thyroidectomy operations under general anaesthesia between January 2014 and June 2014, and received or did not receive bilateral superficial cervical plexus blockade (BSCPB), were prospectively examined in terms of their postoperative opioid needs and durations of hospital stay. 75 patients constituted the control group and did not receive BSCPB. 75 patients, who submitted their anaesthesia consents and voluntariness consents, received BSCPB. Patients, who were diagnosed with Thyroid carcinoma, included in ASA IV risk class and were younger than 18 and older than 75 years of age, were excluded from the study. In accordance with the anaesthesia protocol we apply in our clinic for all patients during routine general anaesthesia practices, all patients received 2.5 mg/kg propofol (Propofol ®1%, Fresenius Kabi, Deutschland, Germany), 0.6 mg/kg rocuronium bromide (Esmeron®, MSD, N.V Organon, Oss, The Netherlands), 1 mcg/kg fentanyl (Talinat® ,Vem İlaç, Istanbul, Turkey) for anaesthesia induction and the maintenance was ensured with 1-2% sevoflurane (Sevorane® Liquid, Abbvie İlaç, Queensborough, England) and 50% N_2O/O_2, when required 0.1 mg /kg rocuronium bromide (Esmeron®, MSD, N.V Organon, Oss, The Netherlands) was used for maintenance of muscle relaxation. In both groups during the perioperative period was 50 mcg bolus dose of fentanyl is analgesic consumption.

Seventy five patients received BSCPB with 0.5% of levobupivacaine hydrochloride 20 mL (Chirocaine® 0.5%, Abbot ilaç, Istanbul, Turkey) in the preoperative period after anaesthesia induction. All BSCPB administrations were performed by the same anaesthesia team after intubation using the same technique. Three-point injection technique was used for block administration (8). With this technique, after the head is turned facing the other side, a 22-gauge injector is inserted on the mid-point of the back verge of the sternocleidomastiod muscle, the injector is directed caudally, cephalically and horizontally (from sternocleidomastiod muscle) and 10 mL of 0.5% levobupivacaine hydrochloride (Chirocaine® 0.5%, Abbot İlaç, Istanbul, Turkey) was infiltrated on both sides of neck with a maximum depth of 1 cm.

All patients received paracetamol 1000 mg (Parol® flakon 100 mL, Atabay İlaç, Istanbul, Turkey) with an interval of 12 hours, the first dose being within first 24 hours in the postoperative period in the recovery unit, and with the patients' consent, those who needed additional analgesics were administered with 50-100 mg intravenous tramadole (Tradolex® 100 mg/2 mL amp, Keymen İlaç, Ankara, Turkey). Postoperative pain of the cases was evaluated by a surgical nurse, who did not know which groups patients belonged to, with a visual analogue scale for pain (VAS) in the 0^{th} hour (recovery unit), 2^{nd} hour, 4^{th} hour, 6^{th} hour, 12^{th} hour and 24^{th} hour. Severity of pain was assessed on the basis of 10 degrees between 0 (no pain) and 10 (unbearably severe pain). Additional analgesics were administered to the cases whose VAS values were 5 and above. Total daily additional analgesic needs were recorded. In the

postoperative period, local and systemic complications related to levobupivacaine administration were recorded.

Patients' age, gender, height, weight, ASA (American Society of Anaesthesiologists) physical status classification, surgery time, duration of postoperative hospital stay, opioid needs in the postoperative first 24 hours and total opioid amounts used in the same period were recorded for both groups. SPSS (Statistical Package for Social Sciences for Windows 18.0) program was used for the statistical analysis of the study. Descriptive statistical values were given as mean ± standard deviation and the total opioid amount, which did not demonstrate a normal distribution and was used in the postoperative first 24 hours, was given as median, minimum (min) and maximum (max).

In statistical comparisons; Student's t test was used for age, weight, height, surgery time and duration of postoperative hospital stay, and Mann Whitney U test was used for the total tramadol amount used in the postoperative first 24 hours. Chi-Square test and ASA were used for comparisons of opioid need data in the postoperative first 24 hours while Fisher exact chi-square test was used since the expected values for gender data were lower than 5, and $p<0.05$ was accepted to be significant.

Table-1. Demographic Data and Surgery Time (Mean ± Standard Deviation).

	BSCPB group (n=75)	Control group (n=75)	P value
Age (years)	54.2±8.4	52.9±10.5	0.476
Weight (kg)	71.6±8.4	74.8±10.3	0.699
Height (cm)	169.8±13.7	165.9±10.9	0.648
Female/Male	59/16	53/22	0.739
ASA (I/II/III)	16/49/10	21/42/12	0.621
Surgery time (minutes)	131.5±12.5	138.7±14.5	0.129

BSCPB: Bilateral superficial cervical plexus block
ASA: American Society of Anaesthesiologists.

Results

When patients' ages, genders, heights, weights, ASA risk class and surgery times in both groups were compared, no statistical difference was found ($p>0.05$) (Table-1). Comparing the two groups of perioperative opioid requirements; BYSPB group did not need additional fentanyl, however, in the all cases in the control group 2 or 3 times with 50 mcg (maximum 150 mcg) dose was needed fentanyl. 15 out of 75 patients in the BSCPB group (20% of the cases) had opioid need, whereas 64 patients in the control group had this need (85% of the cases) ($p<0.05$). The median tramadol amount used for patients in the BSCPB group was 0 mg (min: 0-max: 75) and 40 mg (min: 0-max: 180) for the patients in the control group and when these values were compared, the tramadol amount used in the BSCPB group was found to be statistically and significantly low ($p<0.05$). When average durations of hospital stay in the postoperative periods were compared, it was observed that patients who received block administration were discharged from hospital in a significantly shorter time (2.4±0.6 days) than those who did not receive the administration (4.7±1.6 days) ($p<0.05$) (Table-2). When compared in terms of postoperative complications; every one of our patients in both groups had no phrenic nerve paralysis and development in any case still has not developed the toxicity of local anesthetics.

Table-2. Opioid Needs in the Postoperative First 24 Hours and Total Duration of Hospital Stay.

	BSCPB group (n=75)	Control group (n=75)	P value
Number of patients who needed opioid	15 (%20)	64 (%85)	P<0.05
Opioid amount (mg) (Median min-max)	0.0-75	40.0-180	P<0.05
Duration of hospital stay (days) (Mean ± standard deviation)	2.4±0.6	4.7±16	P<0.05

BSCPB: Bilateral superficial cervical plexus block.

Discussion

As is in all surgical incisions, the pain observed in the postoperative period is known to be related to the incision location (9) . Especially the pain observed in the postoperative period after thyroidectomy is generally related to deep and superficial incision point (2). The number of studies conducted on local anaesthetic administration in order to prevent pain observed in postoperative period after thyroidectomy is scarce if any (1,2).

The need for analgesics is very high in the postoperative period after thyroidectomy operations performed with only general anaesthesia, and it has been reported that this method increases the rate of nausea and vomiting which is already high due to the surgical procedure and affects the patient's comfort and recovery time negatively (5,10). Similarly in our study, the tramadole amount used within the first 24 hours and duration of hospital stay for patients in the control group were found to be significantly higher compared to the patients who received block administration.

Even though general anaesthesia is often preferred for head and neck surgeries, bilateral deep and/or superficial SPB administrations have become a current issue for analgesics purposes during and after the operation (2,11-14). When methods applied by adding bilateral deep cervical plexus block to BSCPB without general anaesthesia were examined, it was observed that patients are discharged from hospital much earlier

with this method, however patients should be selected very carefully in terms of surgical procedures, general conditions of patients and anxiety, otherwise both patient and surgeon comfort grow worse (15-17).

When neck area was anatomically examined, superficial branches of cervical plexus innerve neck and shoulder skin and superficial tissues; on the other hand, its deep branches innerve front neck muscles, other deep tissues, diaphragm, and phrenic nerve. In a study conducted by Pandit et al (18)., on 5 cadavers, they showed that the deep cervical area was also dyed along with the superficial cervical area when 30 mL of methylene blue was injected into the deep cervical fascia (18). However, sufficient anaesthesia cannot be ensured on deep tissues on all patients receiving superficial CPB. Therefore, deep cervical plexus block, sedation or general anaesthesia administrations are also performed in addition to superficial cervical plexus blockade. In surgical practices focusing on the thyroid gland, both skin incision and manipulations around trachea and larynx require endotracheal intubation (17,19,20).

Complications induced by phrenic, recurrent laryngeal, vagus and stellate ganglion involvement may be observed on the bilateral combined (deep and superficial) cervical plexus block. Especially phrenic involvement is afraid for those receiving bilateral deep cervical plexus block (21). When literature is reviewed, bilateral phrenic nerve paralysis extending up to 14 hours has also been reported as well as many successfully performed operations (22). In a study where deep and superficial cervical plexus block complication rates were compared, complications were reported to be higher in the deep cervical plexus block. This was associated with the fact that the deep technique was more difficult (23). In our study, the block-related complications on cases who received superficial cervical plexus block were not observed.

There have been studies in literature which specify that the superficial cervical plexus block added to general anaesthesia reduces the need of intraoperative and postoperative analgesics (3,11). Herbland et al. (24) obtained similar results for patients who received and did not receive bilateral superficial cervical plexus block in total thyroidectomy operations in terms of their analgesic needs and postoperative pain scores (24). Similarly in our study which we conducted for postoperative analgesic purpose, only 15 out of 75 patients in the BSCPB group (20%) had postoperative opioid need, whereas this rate was found to be 64 out of 75 patients (85%) in the control group (in which block administration was not performed) (85%) ($p<0.05$) and again, when we compared opioid consumption, the tramadole consumption in the BSCPB group was found to be significantly lower than the control group ($p<0.05$).

It has been reported that side effects related to the anaesthetic agents and techniques such as systemic toxic reactions and hematoma may be observed among patients receiving BSCPB due to the intense vascular structure of the neck region (25). In our study, no side effects related to local anaesthesia or injection were observed in any of the patients receiving block administration, because our patients were under general anaesthesia and the airway was safe. Even though the local anaesthetics, levobupivacaine and bupivacaine which are frequently used in cervical plexus blocks do not have many superiorities compared to each other, we preferred using levobupivacaine for our block administration due to its less cardiotoxic effects (5,26,27).

It is seen that the duration of postoperative hospital stay of patients receiving BSCPB is significantly shorter (2.4±0.6 days) than those who did not receive block administration (4.7±1.6 days) ($p<0.05$). BSCPB decreases numerous reasons such as the pain which determines the duration of postoperative hospital stay and the corresponding opioid need and bleeding which may occur due to agitation, and therefore reduces duration of hospital stay and increases patient satisfaction. As complied exactly with our study, in similar studies conducted by Shih et al. (5), and Tekgül et al. (28). BSCPB was performed along with general anaesthesia during thyroidectomy operations and the duration of hospital stay, postoperative opioid need and the number of patients who had opioid need in the control group were found to be significantly higher than the groups receiving BSCPB administered with bupivacaine and levobupivacaine (5,28).

Conclusion

Bilateral superficial cervical plexus block administered with 20 mL of 0.5% levobupivacaine and with the three-point injection technique under general anaesthesia before thyroidectomy operations reduces the need of opioid in the postoperative period and the duration of hospital stay.

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