The Effect of Superficial Cervical Plexus Blockage With Ultrasound Guidance on Pain After Thyroidectomy

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Abstract- The main complaint after thyroidectomy is pain upon swallowing. It has been proven that postoperative uncontrolled pain can lead to chronic pain. We investigated the effectiveness of superficial cervical plexus block with ultrasound guidance on pain after thyroidectomy. This is a prospective, double-blind clinical trial study on patients aged 18-60 years who are candidates for thyroidectomy. Patients were randomly divided into two groups. The treatment group underwent superficial cervical plexus block under ultrasound guidance with an injection of 10 ml of ropivacaine 0.2%, and the control group received 10 ml of normal saline after sedation and before general anesthesia. The hemodynamic variables, amount of remifentanil used for hemodynamic stability, the severity of perioperative pain, postoperative nausea and vomiting, and the need for analgesics were compared between the two groups. The severity of pain in the treatment group at the time of discharge from recovery, 2, 6, 12, and 24 hours after surgery was 1.36, 1.76, 1.46, 1.24, and 0.44, respectively and in the control group was 3.12, 3.30, 3.82, 2.96 and 2.02 (P<0.001). The average dose of meperidine administration for pain relief during recovery in the treatment group was 2.8 (±7.84) mg, and in the control group was 9.2 (±11.92) mg (P<0.002). The need for diclofenac for analgesia during 24hours after surgery in the block group was 4 (±19.79) mg and in the control group was 64 (±69.28) mg, (P<0.001). Superficial cervical plexus block can significantly reduce perioperative pain and need analgesic administration during and after thyroidectomy.

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Keywords: Thyroidectomy; Pain; Superficial cervical plexus blockade

Introduction

Postoperative pain is one of the most important and influential factors in the recovery process after surgery as the World Health Organization considers the measurement and recording of pain, especially in the postoperative period, as the fifth vital sign necessity. Since pain is a common and unpleasant complication after surgery, therefore postoperative pain management is a moral, humane and professional duty of the therapist, especially anesthesiologists. Postoperative pain control has a proven role in improving the prognosis of surgery and preventing unwanted complications such as cardiovascular problems, blood clotting, elevated blood sugar, and coagulation disorders (1,2). In many cases after thyroidectomy, patients complain of chronic pain in the lateral areas of the neck on the same side of the surgery and at the site of skin incision, requiring medical interventions (3). According to similar studies, blocking of superficial cervical plexus can reduce post-thyroidectomy pain (2,3). We aimed to evaluate the effect of superficial cervical plexus blockage with ultrasound guidance on postoperative pain of patients who underwent thyroidectomy.

Materials and Methods

The study is a prospective, double-blind clinical trial.

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The patients who were candidates for thyroidectomy with a range of 18 to 60 years old were included in this study. The subjects with sensitivity to local anesthetics, failure of superficial cervical plexus block, altered neck anatomy due to previous surgery or congenital anatomical abnormality, and local infection at the site of the block were excluded from this study. After approval of the study by the ethical committee of our hospital, the process of the study was explained to the patients, and informed consent was obtained from all patients. Patients were randomly divided into two groups. All patients in both groups underwent superficial cervical plexus blockage after sedation with 0.025 mg/kg of midazolam before induction of general anesthesia. The treatment group underwent superficial cervical plexus with sonography guidance bilaterally in the posterior region of the middle part of the sternocleidomastoid muscle by injection of 10 ml of ropivacaine 0.2% plus epinephrine 0.002 mg. In the control group, subjects underwent superficial cervical plexus blockade with an injection of 10 ml of normal saline as a placebo. For blinding, the drug syringe for the block was prepared by an anaesthesiologist without the knowledge of the anesthesiologist performing the block, based on a table of random numbers. The success of the block in the treatment group was assessed by using the pinprick test, and if the block was not successful, the patient was excluded from the study. The anesthesiologist responsible for preparing the syringe had no involvement in measuring the patient's pain in the later stage. After performing the superficial cervical plexus blockage, patients in both groups underwent general anesthesia in the same way. The surgery was performed with the same technique and by the same surgical team. The severity of pain was evaluated by a numerical rating scale (NRS) in both groups. Hemodynamic variables of patients such as intraoperative blood pressure and heart rate were recorded and compared between two groups. The amount of administration of remifentanil to maintain hemodynamic stability was evaluated and recorded in two groups. After the operation, the severity of pain, the incidence of nausea and vomiting, and the amount of analgesic administration in both groups for up to 24 hours were recorded and compared to two groups. Moreover, the need for a diclofenac suppository in order for pain relief after an operation was compared between both groups. The sample size was calculated based on 95% confidence, an accuracy of 0.7, and a standard deviation of 2.5 times 50 people in each group. The data were analyzed using SPSS version 19 software and analysis of variance was used to compare the demographic characteristics of the patients, and a t-test was used for measurement data. The statistical significance was set at $P<0.05$.

Results

A total of 111 patients were included in this study. Elven cases were excluded from the study. These included 3 patients due to lack of complete sensory block after superficial cervical plexus blockade, 3 patients due to bleeding and the need for reoperation 24 hours after surgery, and one patient who needed postoperative re-intubation due to partial paralysis of the vocal cords and respiratory depression and 4 patients due to refusal of continuing this study. One hundred cases remained in our study and were divided into two groups, 50 patients in each group based on a random number table. The demographic characteristics of the patients are identified in Table 1. There were 22 women and 28 men in the treatment group and 24 females and 26 males in the control group, respectively ($P=0.7$). The mean age in the treatment group was 46.30±16.36 years and in the control group, it was 46.30±16.15 years ($P=0.9$). Eight patients in the treatment group and 5 cases in the control group had a history of drug addiction ($P=0.2$). Two cases in the block group and no case in the control group had a history of chronic pain undergoing treatment ($P=0.5$). Regarding the history of hypertension, 8 cases were reported in the treatment group and 7 cases in the control group ($P=0.8$). The mean intraoperative administration of remifentanil was 340.00±817.16 µg in the block group and 570.00±984.63 µg in the control group ($P=0.2$). The severity of pain in the treatment group at the time of discharge from recovery, 2, 6, 12, and 24 hours after surgery was 1.36, 1.76, 1.46, 1.24, and 0.44, and in the control group were 3.12, 3.30, 3.82, 2.96 and 2.02, respectively ($P<0.001$) (Figure 1). There was a statistically significant difference between the two groups in terms of the incidence of nausea and vomiting during recovery time ($P<0.001$), but there was no significant difference in the following hours. The average dose of pethidine to control pain during recovery time in the treatment group was 2.8±7.84 mg and in the control group, it was 9.2±11.92 mg, ($P<0.002$). The need for diclofenac analgesic during the 24 hours after surgery was 14±19.79 mg in the treatment group and 64±69.28 mg in the control group, respectively ($P<0.001$).

Table 1. The demographic characteristics of both groups

Characteristics	Group			
	N	Placebo, N=50[1]	Treatment, N=50[1]	*P-Value*[2]
Age	100	46.30(16.15)	46.30(16.36)	>0.9
Sex	100			0.7
Female		24(48%)	22(44%)	
Male		26(52%)	28(56%)	
Opium	100	5(10%)	9(18%)	0.2
Chronic.pain	100	0(0%)	2(4.0%)	0.5
Htn	100	8(16%)	9(18%)	0.8
Remifentanil	100	570.00(984.63)	340.00(817.16)	0.2
Pain.Recovery	100	3.12(1.70)	1.36(1.32)	<0.001
Pain score after 2 houres	100	3.30(1.27)	1.76(1.15)	<0.001
Pain score after 6 houres	100	3.82(1.08)	1.46(1.27)	<0.001
Pain score after 12 houres	100	2.96(0.83)	1.24(1.17)	<0.001
Pain score after 24 houres	100	2.02(0.77)	0.44(0.76)	<0.001
Nausea.vomit.at.recovery	100	20(40%)	3(6.0%)	<0.001
Nausea.at.2.Hour	100			
No		50(100%)	50(100%)	
Nausea.at.6.Hour	100			
No		50(100%)	50(100%)	
Nausea.at.12Hour	100			
No		50(100%)	50(100%)	
Nausea.at.24Hour	100			
No		50(100%)	50(100%)	
Pethedine	100	9.20(11.92)	2.80(7.84)	0.002
Diclofenac	100	64.00(69.28)	4.00(19.79)	<0.001

[1]Mean (SD); n(%)
[2]Welch Two Sample t-test; Pearson's Chi-squared test test; Fisher's exact test

Table 1. The demographic characteristics of both groups

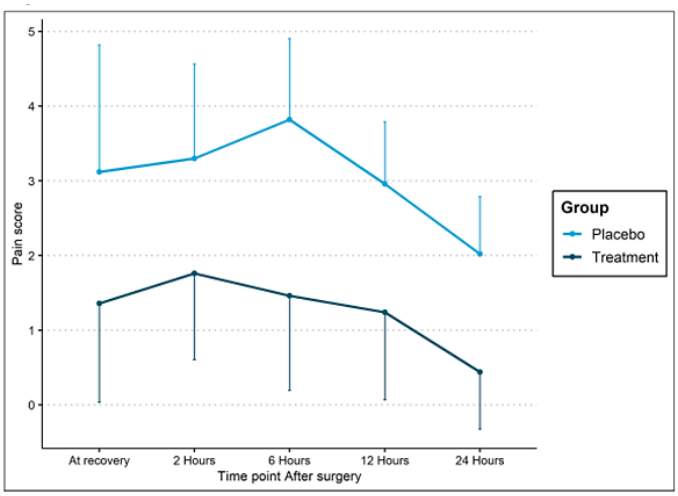

Figure 1. The postoperative pain level of patients in both groups

Discussion

Postoperative pain is one of the most unpleasant experiences for patients. The management of postoperative pain has been introduced as a natural right for patients (4). Andrieu *et al*., studied the analgesic effect of bilateral superficial cervical plexus block after thyroidectomy on 87 patients and reported that the use of this block reduced pain after surgery and reduced the use of analgesics for control of postoperative pain (5). Similarly, in our study, superficial cervical plexus block performed under ultrasound guidance reduced pain and analgesic usage and postoperative need for analgesic agents. A study published by Karthikeyan *et al*.,

examined the analgesic effect of the superficial cervical block by adding clonidine to the anesthetic after thyroidectomy. They reported that in addition to reducing pain during and after surgery, the amount of drug use during and after surgery also decreased (6). In the present study, despite the reduction in the need for remifentanil during surgery, no significant difference was observed between the two groups in this regard. This study shows that despite the reduction of pain during surgery in the treatment group, the need for narcotics during surgery has not decreased significantly in the block group, and perhaps in order for pain relief during and after surgery, we need to use the deep cervical nerve block at the same time. Wattier *et al*., identified that failure to control acute pain after thyroidectomy could lead to postoperative chronic pain if left untreated (7). They showed that of 304 patients who underwent thyroidectomy, 12 (9%) developed chronic or mild to moderate neuropathic pain 3 to 6 months after surgery. Moreover, they showed that the patients who underwent superficial cervical nerve plexus were less likely to experience chronic postoperative pain (7). In our study, it was indicated that patients who underwent nerve block were in less need of analgesic use after surgery. Kalmovich *et al*., performed a study about post-thyroidectomy pain. They studied 53 patients and showed that postoperative pain gradually decreases, and the pain intensity is moderate in the worst case. Also, similar to our study, they identified that the administration of analgesia was subject to the patient's request, and most patients refused to request narcotic analgesia (8). In the present study, we used diclofenac analgesics to control postoperative pain at the patient's request. In our study, the treatment group had less pain during recovery and needed lower additional opioids than the control group. The highest pain intensity in the block group at 2 hours after surgery was 1.76±1.15 and in the control group at 6 hours postoperatively, 3.82±1.08, which was probably due to the effect of receiving more opioids during recovery in the control group. Another point is the effect of the block on controlling pain in the first 24 hours after surgery, which reduces patients' pain at 2, 6, 12, and 24 hours after surgery and reduces the need to take analgesics. There was a statistically significant difference between the two groups, and the pain in the treatment group was lower than in the control group 24 hours after surgery. This indicates the continuation of the block effect postoperatively and the reduction of pain intensity through the decrease of neurogenic inflammation after thyroidectomy 24 hours after surgery (9,10). Postoperative nausea and vomiting during recovery and the first 24 hours after surgery were lower in the treatment group than in the control group, which can be attributed to better control of postoperative pain and less need for opioids (11,12). The mean administration of pethidine during recovery was 2.80±7.84 mg in the block group and 9.20±11.92 mg in the control group, respectively. In conclusion, superficial cervical plexus block under ultrasound guidance is an effective, safe, and accessible way that reduces acute postoperative pain and decreases the need to use analgesics during the postoperative period, and reduces the unpleasant side effects during and after thyroidectomy.

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