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The Effect of Bilateral Superficial Cervical Plexus Block (BSCPb) on Pain Intensity in Ishmolobectomy Patients

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ABSTRACT

Background: Surgery triggers various responses in the pain matrix, including sensitization of pain pathways in the peripheral and central nervous system. Bilateral Superficial Cervical Plexus Block (BSCPb) is a regional block anesthesia technique commonly used to manage post-thyroid surgery pain. This study aims to determine the effects of bilateral superficial cervical plexus block (BSCPb) on pain intensity in patients undergoing ishmolobectomy.

Methodology: The research employed a quasi-experimental design. Samples were divided into two groups: an intervention group (levobupivacaine 0.25%) and a control group (NaCl 0.9%).

Results: There was a decrease in the Numeric Rating Scale (NRS) at 2, 8, 12, and 24 hours post-ishmolobectomy, suggesting that both levobupivacaine 0.25% and NaCl 0.9% had a beneficial impact on NRS. However, a notable difference existed between the two: patients receiving levobupivacaine 0.25% had lower NRS scores than those receiving NaCl 0.9%. A significant difference was observed ($p < 0.05$), confirming the impact of levobupivacaine 0.25% on NRS at 2, 8, 12, and 24 hours after ishmolobectomy.

Conclusion: BSCPb with levobupivacaine 0.25% in ishmolobectomy patients has a positive effect on pain management by reducing pain intensity, thereby accelerating recovery. There is a need for extended follow-up to assess long-term effects.

Keywords: BSCPb, levobupivacaine, NRS, ishmolobectomy

INTRODUCTION

The definition of pain according to the International Association for the Study of Pain (IASP) is "an unpleasant sensory and emotional experience associated with or characterized by actual or potential tissue damage" (Raja et al., 2020; Alzahrani, 2023). Surgery triggers various responses in the pain matrix, including sensitization of pain pathways in the peripheral and central nervous system (Alzahrani, 2023). Approximately 75

percent of patients undergoing surgery experience acute postoperative pain, which is often of moderate to high severity. This percentage poses a significant problem as inadequate postoperative pain control can lead to adverse physiologic effects in patients and increase the risk of developing chronic pain. Severe and persistent postoperative pain affects 2 to 10 percent of adults (Horn, 2019).

Pain associated with post-thyroid surgery is multifactorial (Ochoa, 2022). Complaints of neck pain and throat discomfort post thyroidectomy were 64.9%. Risk factors that may play a role are intraoperative hypotension, blood loss, use of larger ETT size, and duration of surgery (Chawaka and Teshome, 2023). Studies show the most performed thyroid surgery is total thyroidectomy and the most common indication for thyroid surgery is thyroid cancer (Chahardahmasumi et al., 2019). Pain is one of the most common complications following thyroid surgery, with pain levels usually mild-moderate (Alzahrani, 2023; Lukimovic and Bilic, 2020; Woldegerima et al., 2020). The mean post-thyroidectomy pain score is 6.9 ± 1.7 on a visual analog scale and 90% of patients require morphine. Recently, a study showed that 93% of patients required up to 20 mg of oral morphine (Woldegerima et al., 2020).

Bilateral Superficial Cervical Plexus Block (BSCPb) is a regional block anesthesia technique commonly used to manage post-thyroid surgery pain. Studies report that this technique allows for reduced anesthetic requirements and provides prolonged postoperative analgesia. This technique also decreased pain levels, rescue analgesic requirements, and overall opioid requirements in the first 24 hours postoperatively. Levobupivacaine is a good substitute for bupivacaine. Compared to ropivacaine, levobupivacaine provides a significantly longer duration of analgesia. Long duration of sensory block is associated with good analgesia and the lower toxicity of levobupivacaine makes it a better choice. Levobupivacaine 0.5% provides longer duration of sensory block after sciatic nerve block than ropivacaine at the same dose in foot and ankle surgery (Burlaw and Buggy, 2008).

There is significant debate regarding the application of BSCPb in thyroid surgery as postoperative analgesia. Study showed that SCPb reduced the need for intraoperative and postoperative analgesics, while other studies showed that SCPb had no significant effect in thyroid surgery. In this study, NRS was used as a pain marker to assess the use of levobupivacaine 0.25% analgesic with BSCPb technique in thyroid surgery patients.

MATERIALS AND METHODS

The type of research conducted was prospective double blind. The research design used quasi-experimentation with simple random sampling design, in which the research sample was taken by simple randomization of research subjects who were included in the inclusion criteria.

The sampling technique in this study is using consecutive sampling technique, which is looking for subjects who meet the inclusion criteria, then recruited until the required number of samples is met. Subjects will be selected consecutively from patients aged 18-60 years who will undergo ishmolobectomy surgery at Bahteramas Hospital, South Sulawesi who are given levobupivacaine analgesic 0.25% with bilateral superficial cervical plexus block technique and calculated the difference in postoperative NRS. The data collected will be processed descriptively and analytically.

RESULTS AND DISCUSSION

The total sample in this study was 36 samples consisting of 18 samples in the intervention group and 18 samples in the control group. In the characteristics of the study samples, it was found that both the control group using NaCl 0.9% and the intervention group using levobupivacaine 0.25% were more female (83.33-86.67%) than male (16.67%-27.78%).

Table 1. Research Objects Overview

Characteristics	NaCl 0.9%	Levobupivacaine 0,25%
	N=18 n (%)	N=18 n (%)
Gender		
Male	5 (27.78%)	3 (16.67%)
Female	13 (86.67%)	15 (83.33%)
Age (years)		
18–30	5 (27.78%)	6 (33.33%)
31–60	13 (86.67%)	12 (66.67%)

This is according to research that states that currently, one in 55 US women and one in 149 US men are expected to be diagnosed with thyroid cancer during their lifetime (Kitahara nd Schneider, 2022). This is supported by other studies that mention thyroid cancer thyroid cancer represents 1% to 4% of all malignancies and is the fifth most common cancer in women in the United States (Siegel et al., 2015). It has a prevalence in women of about 3:1 (Franceschi et al., 1993).

Other research suggests that thyroid cancer affects both sexes equally but may be detected more often in women than men. This difference may be explained by access to medical care (LeClair et al., 2021). In addition, there are studies that show male gender is reported as an independent risk factor although not all (Oyer et al., 20212; Yang et al., 2013).

The age characteristics of the samples in both the control group using NaCl 0.9% and the intervention group using levobupivacaine 0.25% were more patients aged 31-60 years (66.67%-86.67%). This is in accordance with research that 45 years old, female gender, and family history of thyroid cancer are factors predisposing to the development of thyroid cancer (Hay et al., 1993; Hay et al., 2002; Matsuzu et al., 2014; Haugen et al., 2015). Ganly et al (2015) analyzed a cohort of 3,664 patients affected by differentiated thyroid cancer treated at Memorial Sloan Kettering Cancer Center over 25 years [1985-2010] to determine the significance of age at diagnosis. The study concluded that there is no specific age limit that can determine cancer risk stratification for

papillary thyroid carcinoma (PTC) patients. However, mortality from PTC increases progressively with age (Ganly et al., 2015).

Table 2. NRS Research Descriptive Data

	N	Minimum	Maximum	Mean	Std. Deviation
NRS 2 Hours Intervention	18	4	6	4.94	.725
NRS 8 Hours Intervention	18	2	4	3.00	.686
NRS 12 Hours Intervention	18	2	4	2.61	.698
NRS 24 Hours Intervention	18	1	3	1.67	.686
NRS 2 Hours Control	18	4	7	6.11	.900
NRS 8 Hours Control	18	1	5	3.78	1.114
NRS 12 Hours Control	18	2	5	3.50	.707
NRS 24 Hours Control	18	2	4	3.06	.725

From the data in Table 2, it shows that patients given levobupivacaine 0.25% have pain intensity which in this study is lower NRS than patients given NaCl 0.9% either 2, 8, 12, 24 hours after ishmolobectomy. This is because bilateral superficial cervical plexus block (BSCPB) can be used as preoperative analgesia or to treat postoperative pain in cases of ishmolobectomy surgery because it can block nerve branches originating from the superficial cervical plexus. Pain associated with post thyroid surgery is multifactorial (Ochoa, 2022).

Effect of BSCPB on Pain Intensity

Table 3. NRS Wilcoxon Signed Ranks Test

		N	Mean Rank	Sum of Ranks
NRS 8 Hours Intervention - NRS 2 Hours Intervention	Negative Ranks	18 ^a	9.50	171.00
	Positive Ranks	0 ^b	.00	.00
	Ties	0 ^c		
	Total	18		
NRS 12 Hours Intervention - NRS 2 Hours Intervention	Negative Ranks	18 ^d	9.50	171.00
	Positive Ranks	0 ^e	.00	.00
	Ties	0 ^f		
	Total	18		
NRS 24 Hours Intervention - NRS 2 Hours Intervention	Negative Ranks	18 ^g	9.50	171.00
	Positive Ranks	0 ^h	.00	.00
	Ties	0 ⁱ		
	Total	18		
NRS 8 Hours Control - NRS 2 Hours Control	Negative Ranks	18 ^j	9.50	171.00
	Positive Ranks	0 ^k	.00	.00
	Ties	0 ^l		
	Total	18		
NRS 12 Hours Control - NRS 2 Hours Control	Negative Ranks	18 ^m	9.50	171.00
	Positive Ranks	0 ⁿ	.00	.00
	Ties	0 ^o		
	Total	18		
NRS 24 Hours Control - NRS 2 Hours Control	Negative Ranks	18 ^p	9.50	171.00
	Positive Ranks	0 ^q	.00	.00
	Ties	0 ^r		
	Total	18		

a. NRS 8 Hours Intervention < NRS 2 Hours Intervention

b. NRS 8 Hours Intervention > NRS 2 Hours Intervention

c. NRS 8 Hours Intervention = NRS 2 Hours Intervention

d. NRS 12 Hours Intervention < NRS 2 Hours Intervention

e. NRS 12 Hours Intervention > NRS 2 Hours Intervention

f. NRS 12 Hours Intervention = NRS 2 Hours Intervention

g. NRS 24 Hours Intervention < NRS 2 Hours Intervention

h. NRS 24 Hours Intervention > NRS 2 Hours Intervention

- i. NRS 24 Hours Intervention = NRS 2 Hours Intervention
- j. NRS 8 Hours Control < NRS 2 Hours Control
- k. NRS 8 Hours Control > NRS 2 Hours Control
- l. NRS 8 Hours Control = NRS 2 Hours Control

- m. NRS 12 Hours Control < NRS 2 Hours Control
 n. NRS 12 Hours Control > NRS 2 Hours Control
 o. NRS 12 Hours Control = NRS 2 Hours Control
 p. NRS 24 Hours Control < NRS 2 Hours Control
 q. NRS 24 Hours Control > NRS 2 Hours Control
 r. NRS 24 Hours Control = NRS 2 Hours Control

Table 3 shows that BSCPb both with levobupivacaine 0.25% and NaCl 0.9% had no increase in NRS at 8, 12, and 24 hours after ishmolobectomy. When viewed from the negative rank between NRS 2 hours to 8, 12, and 24 hours after ishmolobectomy, all patients experienced a decrease in NRS with an average of 9.50. Based on Table 4, there is a difference in NRS between 2, 8, 12, and 24 hours after ishmolobectomy so it can be concluded that there is a good effect of using BSCPb with levobupivacaine 0.25% or NaCl 0.9% on the patient's NRS which has decreased. This is in accordance with other study, concluded that BSCPb is effective in reducing the amount of general anesthesia required during thyroidectomy, and reducing the severity of postoperative pain during the first 24 hours. Similarly, the other study also concluded that ultrasound-guided BSCPb had a significant analgesic effect on patients undergoing thyroid surgery. Another study also concluded that ultrasound-guided BSCPb block was more effective in reducing both intra- and postoperative pain compared to the landmark technique in patients undergoing thyroidectomy (Senapathi et al., 2017).

Table 4. NRS Wilcoxon Signed Ranks Test Statistics

	NRS 8 Hours Intervention - NRS 2 Hours Intervention	NRS 12 Hours Intervention - NRS 2 Hours Intervention	NRS 24 Hours Intervention - NRS 2 Hours Intervention	NRS 8 Hours Control - NRS 2 Hours Control	NRS 12 Hours Control - NRS 2 Hours Control	NRS 24 Hours Control - NRS 2 Hours Control
Z	-3.774 ^b	-3.775 ^b	-3.769 ^b	-3.762 ^b	-3.769 ^b	-3.753 ^b
Asymp. Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Levobupivacaine has a relatively greater advantage in reducing opioid requirements and lowering patient pain intensity. In addition, BSCPb and pre-ishmolobectomy intervention had more advantages than local wound infiltration and post-thyroidectomy intervention in reducing patient pain (Zhe Xu et al., 2022).

Table 5. NRS Mann-Whitney Test After 2, 8, 12 and 24 Hours

		Ranks			Test Statistics ^a				
	Time	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
NRS	2 Hours Intervention	18	12.56	226.00	55.000	226.000	-3.523	<.001	<.001 ^b
	2 Hours Control	18	24.44	440.00					
	Total	36							
	8 Hours Intervention	18	14.17	255.00	84.000	255.000	-2.590	.010	.013 ^b
	8 Hours Control	18	22.83	411.00					
	Total	36							

Total	36							
12 Hours Intervention	18	13.14	236.50	65.500	236.500	-3.245	.001	.002 ^b

12 Hours Control	18	23.86	429.50						
Total	36								
24 Hours Intervention	18	11.33	204.00	33.000	204.000	-4.252	<.001	<.001 ^b	
24 Hours Control	18	25.67	462.00						
Total	36								

a. Grouping Variable: Time

b. Not corrected for ties.

Based on Tables 5, it is known that the Asymp. Sig. <0.05 (2-tailed) of 2, 8, 12, and 24 Hours are <0.05. Thus it can be said that there is a difference in NRS 2, 8, 12, 24 hours after ishmolobectomy between BSCPb patients who use levobupivacaine 0.25% as an intervention group with NaCl 0.9% as a control group. Because there is a significant difference, it can be said that there is an effect of levobupivacaine 0.25% on NRS 2, 8, 12, 24 hours after ishmolobectomy.

This is in accordance with other study showed that pain intensity dropped dramatically between 24 and 36 hours after surgery. While in the study of Yoo et al (2014), pain intensity also decreased at 24 hours after surgery. Another study conducted by Tantri et al (2023) to determine the effect of modified thoracolumbar interfacial plane block (TLIP) on postoperative pain showed that the NRS (numerical rating scale) was lower in the modified TLIP group 12 hours postoperatively. The BSCPb technique can reduce the need for intra- and postoperative opioid analgesia and reduce postoperative nausea and vomiting (Fathir et al., 2023). Levobupivacaine has a relatively greater advantage in reducing opioid requirements and lowering patient pain intensity. In addition, BSCPb and pre-ishmolobectomy intervention have more advantages than local wound infiltration and post-thyroidectomy intervention in reducing patient pain (Zhe Xu et al., 2022).

CONCLUSION

The study subjects who underwent ishmolobectomy were more female than male and the most age range was 31-60 years old. Bilateral superficial cervical plexus block (BSCPb) is an anesthetic technique that is beneficial in pain management including in patients undergoing ishmolobectomy.

There was a decrease in NRS at 2, 8, 12, and 24 hours after ishmolobectomy so it can be concluded that there is an effect of either using levobupivacaine 0.25% or NaCl 0.9% on NRS. However, there were differences in NRS 2, 8, 12, 24 hours after ishmolobectomy between BSCPb patients who used levobupivacaine 0.25% as the intervention group and NaCl 0.9% as the control group. Patients who were given levobupivacaine 0.25% had a lower NRS than patients who were given NaCl 0.9%. Because there is a significant difference, it can be said that there is an effect of levobupivacaine 0.25% on NRS 2, 8, 12, 24 hours after ishmolobectomy.

The application of BSCPb with levobupivacaine 0.25% in ishmelebeectomy patients can have a positive effect in pain management by reducing pain intensity which is expected to accelerate the recovery process. However, it is likely that effectiveness and outcomes may vary between individuals. Further research is needed

by further exploring the underlying mechanisms and conducting studies with larger sample sizes to confirm the results of the study. In addition, a longer follow-up period is needed to evaluate the long-term effects of BSCPB.

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