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Original Article

Comparison Between Efficacies of Bilateral Superficial Cervical Plexus Block Versus Local Infiltration of Wound with Bupivacaine after Thyroidectomy

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ABSTRACT

Objective: To compare the effectiveness between two pain management techniques, BSCPB (Bilateral Superficial Cervical Plexus Block) and Local Wound Infiltration, in alleviating post-operative pain.
Study Design: Quasi-experimental study.
Place and Duration of Study: Pak Emirates Military Hospital, Rawalpindi, Pakistan, from Feb to Jul 2023.
Methodology: The study enrolled 68 patients, aged between 20 and 68 years, who were scheduled to undergo total thyroidectomy. The patients were randomly assigned to either Group B, which consisted of 34 patients undergoing a bilateral superficial cervical plexus block (BSCPB), or Group L, which comprised 34 patients undergoing infiltration of local anesthesia after the induction of anesthesia. The severity of pain at 1, 2, 6, and 12 hours, as well as the total analgesic consumption within 24 hours after surgery were the primary outcome variable.
Results: In Group L, 23(67.6%) patients had Visual Analogue Scale (VAS) >4 after first 6 hours post-surgery and only 11(32.4%) patients had VAS <4 (*p*-value=0.002), indicating a significant difference. After 12 hours of surgery, 12(35.3%) Group B patients has VAS >4 and 22(64.7%) patients has VAS≤4 but 29(85.3%) Group L patients had VAS >4 and only 5(14.7%) patients had VAS ≤4 with *p*-value <0.001.
Conclusion: Bilateral superficial cervical plexus block (SCPB) under ultrasound guidance considerably improved analgesia after thyroidectomy and reduced opioid requirements.

Keywords: Bupivacaine, Superficial Cervical Plexus Block, Thyroidectomy.

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INTRODUCTION

Thyroidectomy is a commonly performed surgical procedure among among females,[1] who exhibit a lower pain threshold compared to males, as post-thyroidectomy patients commonly report pain scores >6 on the Visual Analog Scale (VAS), which indicates that postoperative pain following thyroid surgery tends to be moderate to severe in intensity.[2] Consequently, various approaches, including the use of different local anesthetic drugs in field block, regional blocks and peripheral nerve blocks,[3] have been investigated for pain relief. Non-steroidal anti-inflammatory drugs (NSAIDs) are alternatives for postoperative pain relief but the use of NSAIDs is associated with an augmented risk of bleeding post-operatively.[4] Presently, regional anesthesia techniques demonstrate the ability to alleviate mechanical hyperalgesia induced by inflammation.[5] To achieve surface anesthesia in the neck region, local anesthetic is administered bilaterally at the back the lateral edge of the sternocleidomastoid, which effectively numbs the sensory nerves and induces anesthesia in the targeted areas.[6,7] LWI (Local Wound Infiltration) using Bupivacaine 0.25% is a standard procedure typically carried out at the time of skin closure following thyroidectomy and includes perineural numbness of the transverse cervical branches but adverse situations might arise, including hoarseness, formation of hematoma and local anesthetic agent toxicity.[8] Bilateral Superficial Cervical Plexus Block (BSCPB) has been identified as simple, secure, cost-effective, and efficient method for managing post-thyroidectomy pain however it is important to acknowledge that there have been reports of BSCPB being ineffective in some cases.[9] The aim of the study was to evaluate the success of Ultrasound guided technique of bilateral superficial cervical plexus block (BSCPB) for thyroid surgery in comparison to conventional local infiltration of wound with bupivacaine.

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METHODOLOGY

This quasi-experimental study was conducted at Department of Anesthesia, Pak Emirates Military

Hospital (PEMH), Rawalpindi, Pakistan. After obtaining approval of Ethics Committee, via letter number IERB #485/2023/PEMH, the study began in February until July 2023. Sample size was calculated using WHO sample size calculator, keeping level of significance 5%, power of test 90%, anticipated probability of analgesia (P1) with local infiltration being 0.2610 and anticipated probability of analgesia with superficial cervical plexus block (P2) to be 0.6410. The sample size was calculated to be 34 in each group. The sampling technique employed was non-probability consecutive sampling and the participants were randomly assigned to groups using the sealed envelope technique. Group B included 34 patients who were given bilateral superficial cervical plexus block (BSCPB) and Group L comprised 34 patients who were given infiltration of local anesthetic after induction of anesthesia before thyroidectomy.

Inclusion Criteria: Patients of either gender, aged between 20 to 68 years, with American Society of Anesthesiologists (ASA) Classification I-II, and scheduled to undergo elective total thyroidectomy under general anesthesia were included.

Exclusion Criteria: Patients with hypothyroidism, hyperthyroidism, diabetes, chronic pain disorders, premedication involving preoperative analgesics, retrosternal goiter, coagulation disorders, or those requiring additional surgical interventions were excluded.

Prior to the surgery, all patients were guided regarding the postoperative pain scale, using the Visual Analog Score (VAS), which ranges from 0 to 10, where 0 represents absent or no pain and 10 indicates the worst pain imaginable. Premedication with midazolam (intra-venous) 0.03 mg/kg was given. Noninvasive monitoring of blood pressure, heart rate (HR) and peripheral oxygen saturation was initiated. Pre-oxygenation was performed, followed by induction of anesthesia using intravenous hypnotic (propofol) at 2 mg/kg and rocuronium 0.6 mg/kg was instituted. Maintenance was done using mixture of oxygen and isoflurane at a concentration of 2%/L. After adjusting surgical position of neck in Group B patients, footprint of ultrasound transducer was positioned over the side of the neck, specifically at mid of the posterior side of sternocleidomastoid (SCM) muscle clavicular head. The tip of hyperechoic needle was inserted from the dorsal aspect and needle was navigated to the gap between SCM muscle and prevertebral fascia, near the dorsal edge. A 22-gauge needle was used to deposit 10 mL of bupivacaine (0.25%). In Group L patients, 0.25% bupivacaine was infiltrated generously between layers of subcutaneous tissue with 22-gauge needle. To minimize the influence of other confounding factors, standardization was applied to intra-operative and post-operative analgesia. During the surgery, patients received a standardized regimen consisting of a single intravenous (IV) bolus of paracetamol at a dose of 1 g and IV nalbuphine administered in a titrated manner at a dose of 0.1mg/kg. The presence of pain at two, six and twelve hours was assessed where VAS >4 was deemed as pain and VAS<4 was defined as no pain. The presence or absence of pain along with total analgesic consumption within 24 hours were considered as outcome variables. Independent variables included age, weight, gender, ASA Class and duration of anesthesia in surgery. All data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Means along with standard deviation for quantitative variables and the frequencies with percentages for qualitative parameters were calculated. Chi-square analysis was performed to determine the effective difference between the two study groups, with a *p*-value ≤0.05 considered statistically significant.

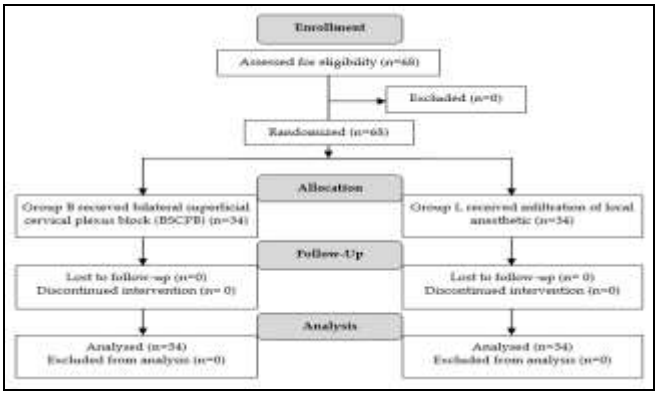

Figure-1: Patient Flow Diagram (n= 68)

RESULTS

The mean age of Group B patients was 42.68±8.2 years while mean age of Group L patients was 43.71±7.90 years, among the total sample, 3(23.5%) patients were male while 10(76.5%) were female. In Group L, 14(58.8%) patients were male and 26(41.2%) were females. The mean weight of Group B patients was 71.65±6.8 kg and that of Group L was 69.68±6.50 kg. The demographics, anesthesia and surgery time were similar in both groups where the average

duration of surgery in Group B was 2.559±0.47 hours versus 2.456±0.49 hours in Group B, similarly, the duration of anesthesia in Group B was 2.559±0.47 hours versus 3.0485±0.50 hours in Group L. There were 19(55.9%) ASA I patients in Group B and 15(44.1%) ASA II patients in Group L, as shown in Table-I.

Table-I: Demographic Variables of Study Groups, (n=68)

Group		Mean±SD
GROUP B n=34	Age (years)	42.68±8.20
	Weight (Kg)	71.65±6.80
	Total Opioid Consumption (mg)	8.18±5.62
	Duration of Anesthesia (hours)	3.0456±0.50
	Duration of Surgery (hours)	2.559±0.47
GROUP L n=34	Age (years)	43.71±7.90
	Weight (kg)	69.68±6.50
	Total Opioid Consumption (mg)	13.03±7.880
	Duration of Anesthesia (hours)	3.0485±0.50
	Duration of Surgery (hours)	2.456±0.49

The Visual Analog Score (VAS) was not very different two hours after surgery. Only 4(11.8%) patients had VAS >4 in Group B while 7(20.6%) Group L patients had VAS>4 with *p*-value=0.256, which does not show a significant difference. However, there was a substantial difference in pain score after 6 and 12 hours of surgery, where 10(29.4%) patients in Group B had VAS >4 while 30(88.2%) patients had VAS <4 after six hours of surgery. In Group L, 23(67.6%) patients had VAS>4 after first six hours post-surgery and only 11(32.4%) patients had VAS ≤4 with *p*-value <0.002, showing a significant difference. After 12 hours of surgery 12(35.3%) Group B patients had VAS >4 and 22(64.7%) patients had VAS≤4. On the other hand, 29(85.3%) Group L patients had VAS >4 and only 5(14.7%) patients had VAS ≤4 with *p*-value<0.001, as shown in Table-II. The mean opioid consumption was 8.18±5.62mg in Group B patients while it was 13.03±7.88 mg in Group L patients, with *p*-value<0.001.

Table-II: Comparison of Visual Analog Score (VAS) at Different Intervals in Study Groups, (n=68)

PARAMTETER		GROUP B (n=34) n (%)	GROUP L (n=34) n (%)	*p*-value (<0.05)
VAS AT 2HRS	>4	4(11.8)	7(20.6)	<0.256
	≤4	30(88.2)	27(79.4)	
VAS AT 6HRS	>4	10(29.4)	23(67.6)	<0.002
	≤4	24(70.6)	11(32.4)	
VAS AT 12HRS	>4	12(35.3)	29(85.3)	<0.001
	≤4	22(64.7)	5(14.7)	

Gender distribution as a percentage of patient enrollment shows more women patients as compared to men, as illustrated by Figure-2.

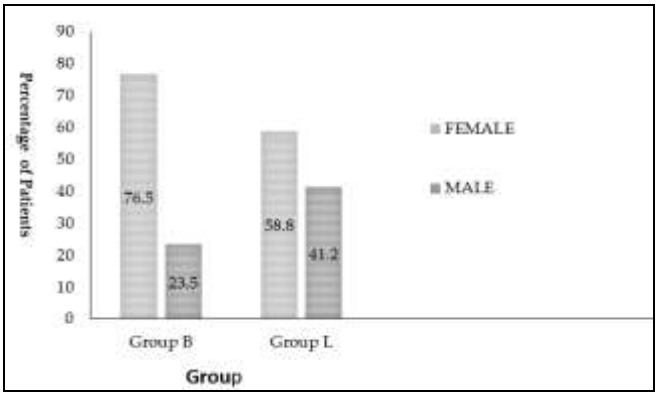

Figure-2: Percentage of Gender Distribution in Both Study Groups, (n=68)

DISCUSSION

This study found a statistically considerable lessening in mean VAS scores at two measured time-points (6 hours and 12 hours) in the block group, unlike previous studies which presented conflicting findings concerning the efficacy of Superficial Cervical Plexus Block (SCPB), where one study demonstrated a lack of improvement in analgesia and morphine consumption after SCPB where factors such as intra-operative neck positioning and wound drainage may play essential roles in the development of post-thyroidectomy pain,[12] however, pain experienced after thyroidectomy comprises a significant superficial component.[13] Thyroidectomy performed without Bilateral Superficial Cervical Plexus Block (BSCPB) was found to be associated with a three-fold increased likelihood of experiencing neuropathic pain compared to thyroidectomy with BSCPB,[14] similar to another study where patients with BSCPB exhibited lower postoperative Visual Analog Scale (VAS) scores when judged against the control group, and demonstrated a greater tolerance to pain, experiencing a longer duration before requiring the first dose of analgesics with lower occurrence of nausea or vomiting post-operatively.[15] Another study found that BSCPB was associated with a reduction in intra-operative induction agent (propofol) and remifentanil consumption, provided reasonable analgesic effects within the first 24 hours after surgery, and contributed to a lower occurrence of postoperative nausea and vomiting,[16] concurring with another study which also noted that no major variation in hemodynamic profile

between the groups, and no peri-operative adverse outcomes were observed.[17] Similarly, impact of ultrasound-guided SCP block on various pain-associated parameters also showed its beneficial aspects where substantial improvement in postoperative pain in immediate post-operative period, time to develop break-thorough pain, the frequency of breakthrough pain, and patient contentment were improved.[18]

LIMITATIONS OF STUDY

The sample size in our study was comparatively small, which can limit the generalizability of the study findings and may result in reduced statistical power to detect significant effects. Intra-operative pain relief and effects and need of anesthetics were not investigated. This limitation prevents us from fully understanding the potential benefits of the block in terms of reducing intraoperative pain and optimizing anesthetic management. Future studies could provide a more comprehensive evaluation of the block's effectiveness and its influence on intraoperative outcomes.

CONCLUSION

Bilateral ultrasound-guided superficial cervical plexus block was found to significantly enhance postoperative analgesia following thyroidectomy and to reduce opioid requirements.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

NK & AK: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AMR & UEM: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

AS & MA: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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