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Original Research Article

Effectiveness of Superficial Cervical Plexus Block as an Adjuvant to General Anesthesia in Reconstructive Commando Surgery

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Abstract

Background: Reconstructive commando surgery, commonly performed for advanced head and neck cancers, involves extensive tissue resection and reconstruction, presenting challenges related to surgical complexity, airway management, and postoperative pain.[1] While general anesthesia (GA) is indispensable for such procedures, it is frequently associated with high opioid consumption, hemodynamic fluctuations, and prolonged recovery times. To improve perioperative outcomes, regional anesthesia techniques—such as the superficial cervical plexus block (SCPB)—have gained attention as effective adjuncts. SCPB anesthetizes the sensory branches (C2–C4) of the cervical plexus, providing targeted analgesia to the neck and shoulder regions. When used in combination with GA, SCPB has been shown to enhance intraoperative hemodynamic stability, reduce anesthetic and opioid requirements, and improve postoperative comfort and recovery. The technique is straightforward, safe, and helps mitigate complications including postoperative nausea, delayed wound healing, and respiratory depression.[2-3]. This study aims to assess the efficacy of SCPB as an adjunct to GA in reconstructive commando surgery, with a focus on intraoperative hemodynamics, pain management, graft viability, blood loss, ICU and hospital stay, and patient and surgeon satisfaction

Objective: To assess the efficacy of superficial cervical plexus block (SCPB) as an adjunct to general anesthesia in enhancing intraoperative hemodynamic stability, postoperative recovery, and patient satisfaction in individuals undergoing reconstructive commando surgery**.**

Methodology: This prospective randomized controlled study included 140 patients aged 20–70 years undergoing elective commando surgery. Patients were divided into two groups: The Block group received SCPB with 0.5% levobupivacaine and standard GA; The Control group received GA alone. Outcomes measured included intraoperative hemodynamic parameters, blood loss, graft viability, ICU/hospital stay, and patient/surgeon satisfaction.

Result: Patients receiving SCPB demonstrated significantly better intraoperative hemodynamic stability, reduced blood loss, decreased anesthetic requirements, and improved postoperative analgesia. Additionally, the block group reported higher satisfaction scores, shorter ICU and hospital stay, and a lower rate of graft re-exploration.

Conclusion: SCPB is a safe, effective adjunct to GA in reconstructive commando surgery, offering improved surgical and recovery outcomes. It should be considered as part of multimodal analgesia for head and neck procedures.

Keywords: Superficial Cervical Plexus Block, General Anesthesia, Commando Surgery, Regional Anesthesia, Postoperative Analgesia, Hemodynamic Stability, Head and Neck Cancer.

Introduction

Reconstructive commando surgery, primarily indicated for advanced head and neck cancers, involves extensive resection and reconstruction, posing challenges related to surgical complexity, airway management, and postoperative pain.[1] General anesthesia (GA), while essential, often

results in significant opioid use, hemodynamic instability, and prolonged recovery. To enhance outcomes, regional anesthesia techniques like the superficial cervical plexus block (SCPB) have emerged as valuable adjuvants.

SCPB targets the sensory branches (C2–C4) of the cervical plexus, providing effective analgesia to the neck and shoulder regions. When combined with GA, it improves intraoperative stability, reduces anesthetic and opioid requirements, and enhances postoperative comfort and recovery [2,3]. The technique is simple, safe, and aids in minimizing complications such as postoperative nausea, delayed wound healing, and respiratory depression.

This study aims to evaluate the effectiveness of SCPB as an adjuvant to GA in reconstructive commando surgery, focusing on intraoperative hemodynamics, pain control, graft viability, blood loss, ICU/hospital stay, and patient/surgeon satisfaction.

Methodology:

A randomized, prospective study was carried out at Mahatma Gandhi Hospital between March 2023 and August 2024. A total of 140 patients scheduled for elective commando free flap surgery were enrolled, with 70 patients assigned to each group. The sample size was calculated assuming an alpha error of 0.05 and 80% study power, with an additional 10% to compensate for possible dropouts. Patients aged 20–70 years of either sex or belonging to ASA Grade II or III were included. Exclusion criteria were severe cardiac disease, uncontrolled hypertension or diabetes, severe asthma or COPD, known drug allergies, obesity, pregnancy, lactation, or predicted difficult airway. Participants were randomized into two groups. Group B received GA along with regional blocks, which included an ultrasound-guided superficial cervical plexus block (10 mL of 0.5% levobupivacaine), an intraoral inferior alveolar nerve block (5 mL of 0.5% levobupivacaine), and a lingual nerve block (5 mL of 0.5% levobupivacaine). Group C underwent conventional GA with vecuronium infusion. Standard anesthetic monitoring and protocols were followed in all cases.

The superficial cervical plexus blocks targeted C2–C4 sensory branches under ultrasound guidance for precise local anesthetic deposition. The inferior alveolar nerve block was administered intraorally using anatomical landmarks, while the lingual nerve block was placed near the second molar region. These regional techniques were intended to optimize analgesia, maintain intraoperative hemodynamic stability, and minimize anesthetic requirements. Comparative assessment was performed for intraoperative hemodynamics, analgesia, anesthetic and opioid use, blood loss, graft viability, ICU and hospital stay, and satisfaction levels of both patients and surgeons.

Statistical Analysis: Data were analyzed using SPSS software (version 25). Quantitative variables were presented as mean ± standard deviation, and comparisons between groups were carried out using the independent t-test. Categorical variables were expressed as proportions and analyzed accordingly.

Results:

Table 1: Demographic and Clinical Characteristics of Patients

Parameter	Category	Group-B n (%)	Group-C n (%)	p-value
Age (years) (Mean ± SD)		52.5 ± 9.64	52.80 ± 9.66	0.8543
Age (years)	<30	0 (0%)	1 (1%)	-
	31–40	8 (11%)	6 (9%)	
	41–50	22 (31%)	23 (33%)	
	51–60	27 (39%)	26 (37%)	
	>60	13 (19%)	14 (20%)	
Gender	Male	61 (87%)	64 (91%)	-
	Female	9 (13%)	6 (9%)	
ASA Grade	I	14 (20%)	13 (19%)	0.94
	II	43 (61%)	45 (64%)	
	III	13 (19%)	12 (17%)	
Common Diagnosis	Ca Rt Tongue	10 (14%)	11 (16%)	-
	CA Lt BM	21 (30%)	17 (24%)	
	CA Rt BM	21 (30%)	22 (31%)	
	Others	18 (26%)	20 (29%)	

The mean age of patients was comparable between Group B (52.5 ± 9.64 years) and Group C (52.8 ± 9.66 years), with no statistically significant difference (p = 0.8543). The majority of patients (70%) in both groups were aged between 41 and 60 years, indicating a similar age distribution. Both groups exhibited a male predominance, with 87% in Group B and 91% in Group C, while females comprised 13% and 9%, respectively, reflecting comparable gender distribution.

ASA physical status was similarly distributed across the groups. Most patients were classified as ASA II (61% in Group B and 64% in Group C), followed by ASA I and III, with no significant difference observed (p = 0.94), suggesting comparable baseline health status. The most common diagnoses included carcinoma of the right and left buccal mucosa and carcinoma of the right tongue.

Diagnostic distribution was similar between groups, ensuring homogeneity in underlying pathology.

Table 2: Perioperative Parameters

Parameter	Category	Group-B n (%)	Group-C n (%)	p-value
Duration of Surgery (Mean ± SD)		5.07 ± 0.87	5.62 ± 0.64	<0.0001
Duration of Surgery	4 hr 30 min	9 (13%)	2 (3%)	0.034
	6 hr	19 (27%)	27 (39%)	0.23
ICU stay (days)		2.01 ± 0.32	2.2± 0.30	0.0004
Blood Loss (ml) (Mean ± SD)		480 .71 ± 162.25	651.47 ± 256.11	<0.0001
Blood Loss	350 mL	7 (10%)	1 (1%)	0.033
	≥700 mL	3 (4%)	17 (24%)	0.058
Blood Product Use	Yes	4 (6%)	12 (17%)	0.37
Hypotension	Episodes	3	8	0.13
Hypertension	Any episode	16 (23%)	49 (70%)	<0.0001
Drug Requirement (Metoprolol/NTG)	Higher dose use	Less frequent	More frequent	<0.001

Interpretation of Perioperative Parameters:

- Duration of Surgery: The mean surgical duration was significantly shorter in Group B (5.07 ± 0.87 hours) compared to Group C (5.62 ± 0.64 hours, p < 0.0001). A higher proportion of patients in Group B completed surgery within 4 hr 30 min (13% vs. 3%, p = 0.034), suggesting that SCPB may optimize intraoperative conditions and efficiency.
- ICU Stay: Group B had a shorter mean ICU stay (2.01 ± 0.32 days) compared to Group C (2.2 ± 0.30 days, p = 0.0004), indicating faster postoperative stabilization.
- Blood Loss: Average intraoperative blood loss was significantly lower in Group B (480.71 ± 162.25 mL) than in Group C (651.47 ± 256.11 mL, p < 0.0001). Fewer patients in Group B experienced high-volume blood loss (≥700 mL: 4% vs. 24%), suggesting improved hemodynamic stability with SCPB.
- Blood Product Use: Transfusion requirements were lower in Group B (6%) compared to Group C (17%), though this difference was not statistically significant (p = 0.37).
- Hemodynamic Events: Episodes of hypotension were rare and comparable (3 vs. 8, p = 0.13). Hypertension occurred significantly less in Group B (23% vs. 70%, p < 0.0001).
- Drug Requirement: Use of antihypertensive agents (Metoprolol/NTG) was significantly less frequent in Group B, indicating better cardiovascular stability intraoperatively (p < 0.001).

Table 3: Postoperative Outcomes

Parameter	Category	Group-B n (%)	Group-C n (%)	p-value
Complications	Yes	21 (30%)	54 (77%)	<0.0001
ICU Stay (Mean ± SD)		2.01 ± 0.32	1.9 ± 0.31	0.0407
	1 day	11 (16%)	3 (4%)	0.05
	2 days	54 (77%)	58 (83%)	
	3 days	5 (7%)	9 (13%)	
Hospital Stay (Mean ± SD)		5.95 ± 0.52	6.21 ± 0.58	0.0060
	5 days	16 (23%)	7 (10%)	0.07
	7 days	6 (9%)	11 (16%)	
Re-exploration	Required	2 (3%)	9 (13%)	0.04
Patient Satisfaction	Score 1	62 (94%)	50 (71%)	0.0035
Patient Satisfaction (mean Score)		1.05 ± 0.23	1.22 ± 0.42	0.25
Surgeon Satisfaction	Score 1	62 (89%)	51 (73%)	0.30
Surgeon Satisfaction (mean Score)		1.04 ± 0.20	1.18 ± 0.39	0.0084

Interpretation of Postoperative Outcomes:

- Complications: Group B experienced significantly fewer postoperative complications compared to Group C (30% vs. 77%, p < 0.0001), suggesting that SCPB may contribute to safer postoperative recovery.
- ICU Stay: Mean ICU stay was slightly longer in Group B (2.01 ± 0.32 days) compared to

Group C (1.9 ± 0.31 days, p = 0.0407). However, a higher proportion of patients in Group B were discharged from ICU within 1 day (16% vs. 4%, p = 0.05), indicating faster early recovery for some patients.

- Hospital Stay: Overall hospital stay was shorter in Group B (5.95 ± 0.52 days) versus Group C (6.21 ± 0.58 days, p = 0.006), with a trend toward more patients in Group B being discharged within 5 days (23% vs. 10%, p = 0.07).
- Re-exploration: Fewer patients in Group B required surgical re-exploration (3% vs. 13%, p = 0.04), reflecting better surgical outcomes and graft viability.
- Patient Satisfaction: A higher proportion of patients in Group B reported the highest satisfaction score (94% vs. 71%, p = 0.0035). Mean satisfaction scores were slightly lower in Group B, though not statistically significant (1.05 ± 0.23 vs. 1.22 ± 0.42, p = 0.25).
- Surgeon Satisfaction: More surgeons rated satisfaction highest in Group B (89% vs. 73%, p = 0.30), with mean scores showing a significant improvement in Group B (1.04 ± 0.20 vs. 1.18 ± 0.39, p = 0.0084).

Table 4: Intraoperative Hemodynamics. Intraoperative Hemodynamics (Mean ± SD values)

Parameter	Group-B (Mean ± SD)	Group-C (Mean ± SD)	Significance (p-value)
Heart Rate (HR)	82.6 ± 8.4	84.1 ± 9.2	0.315
Systolic BP (SBP)	118.5 ± 9.3	131.7 ± 8.7	< 0.0001
Diastolic BP (DBP)	74.2 ± 7.1	82.9 ± 6.8	< 0.001
Mean Arterial Pressure (MAP)	89.3 ± 6.9	97.6 ± 7.4	< 0.001

Interpretation of Intraoperative Hemodynamics:

- Heart Rate (HR): There was no significant difference in mean heart rate between Group B (82.6 ± 8.4 bpm) and Group C (84.1 ± 9.2 bpm, p = 0.315), indicating comparable cardiac rate control during surgery.
- Systolic Blood Pressure (SBP): Group B demonstrated significantly lower mean SBP (118.5 ± 9.3 mmHg) compared to Group C (131.7 ± 8.7 mmHg, p < 0.0001), reflecting better intraoperative blood pressure stability with SCPB.
- Diastolic Blood Pressure (DBP): Mean DBP was also significantly lower in Group B (74.2 ± 7.1 mmHg) versus Group C (82.9 ± 6.8 mmHg, p < 0.001), further supporting improved hemodynamic control.
- Mean Arterial Pressure (MAP): Group B had a significantly lower MAP (89.3 ± 6.9 mmHg) compared to Group C (97.6 ± 7.4 mmHg, p < 0.001), indicating overall better cardiovascular stability during surgery when SCPB was used.

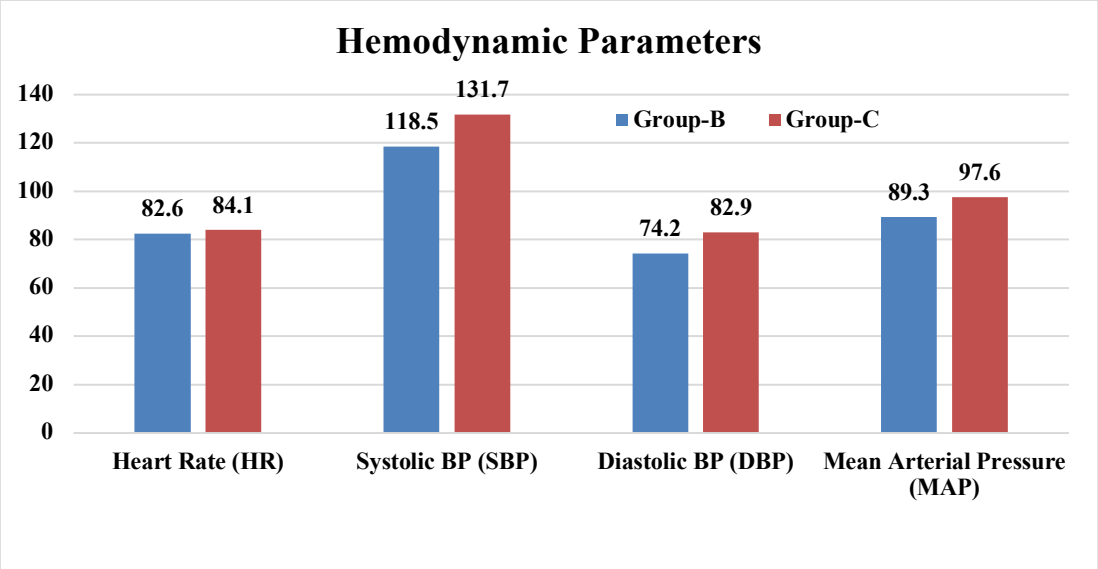

Figure 1: Hemodynamic Parameters

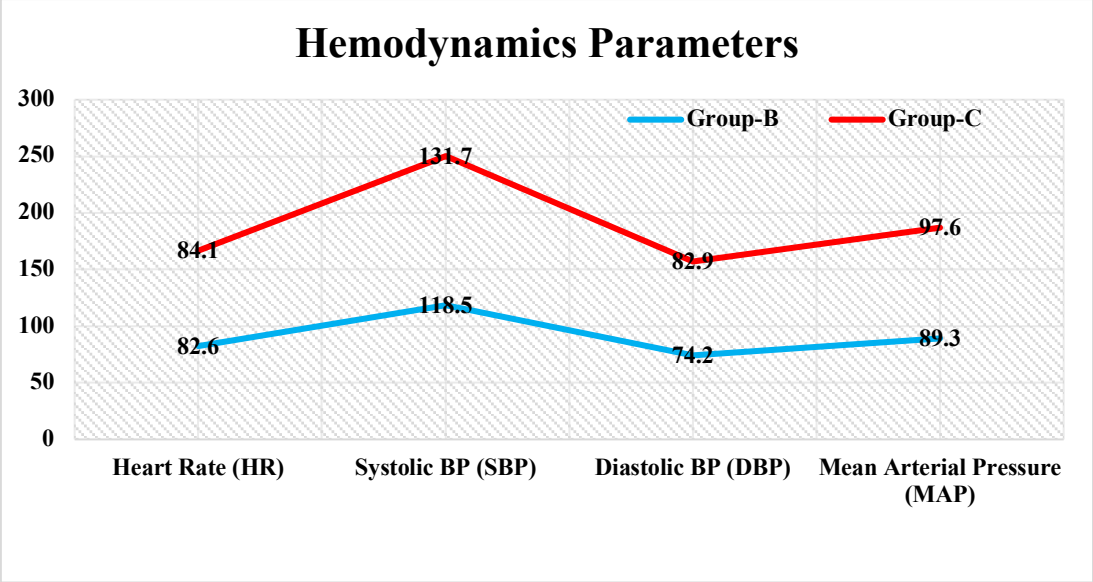

Figure 2: Hemodynamics Parameters

Table 5:

Parameter	Findings	Significance
Heart Rate (HR)	No significant difference at most time points	$p > 0.05$
Systolic BP (SBP)	Group-C consistently higher at 15–120 min	$p < 0.0001$
Diastolic BP (DBP)	Group-C significantly higher at 15–120 min	$p < 0.001$
Mean Arterial Pressure (MAP)	Group-C significantly higher at 15–150 min	$p < 0.001$

Result

The two groups were comparable with respect to age, gender, ASA grade, and primary diagnosis, confirming baseline homogeneity and suggesting that differences in outcomes were attributable to the SCPB intervention. Patients receiving SCPB (Group B) experienced significantly shorter surgical and ICU durations, lower intraoperative blood loss, fewer hypertensive episodes, and reduced requirement for pharmacologic interventions. Analysis of intraoperative hemodynamics demonstrated that SCPB markedly improved blood pressure control and overall cardiovascular stability, while heart rate remained comparable between the groups.

Discussion

The superficial cervical plexus block (SCPB) is a reliable regional anesthesia technique that provides effective sensory blockade for surgeries involving the neck and maxillofacial regions. The block is performed at the midpoint of the posterior border of the sternocleidomastoid muscle (SCM), a key anatomical landmark. Compared with deep cervical plexus block (DCPB), SCPB is technically simpler, safer, and easier to perform, contributing to its widespread adoption in clinical practice. Despite these advantages, literature on its application in oral and maxillofacial surgery remains limited.

Previous studies, such as Balakrishnan et al. [4], demonstrated that ultrasound-guided SCPB offers superior cardiovascular stability compared to landmark-based approaches, with significantly lower heart rates up to two hours post-block ($p < 0.05$). Consistent with these findings, our study showed that patients in Group B (SCPB with GA) experienced significantly fewer hypertensive episodes than Group C (GA alone) (30% vs 77%, $p < 0.0001$). Mean arterial pressure (MAP) remained consistently lower in Group B from 15 to 150 minutes, and even at 300 minutes, indicating more stable intraoperative hemodynamics.

Our results align with previous reports by Yayo Lai et al. [5] and Yuan-Fang Zhong et al. [6], which highlighted that ultrasound-guided nerve blocks provide more effective sensory blockade, attenuate nociceptive input, reduce stress hormone release, and improve hemodynamic stability. Similarly, Wangseok Do et al [7], reported that regional anesthesia for carotid endarterectomy decreased intraoperative complications and shortened hospital stay. While they used ropivacaine, our study utilized 10 mL of 0.5% levobupivacaine with ultrasound guidance, which proved safe and effective.

Group C required greater pharmacologic intervention for hemodynamic fluctuations: nitroglycerin was administered for hypertension in 49 patients versus 16 in Group B ($p < 0.0001$), and mephentermine for hypotension was higher in Group C (7 vs 3 patients). Tachycardia occurred exclusively in Group C (3 cases, managed with

esmolol), while bradycardia incidence was low and comparable between groups. These findings highlight the enhanced cardiovascular stability conferred by SCPB.

Demographically, there was a male predominance in both groups (87% vs 91%), consistent with the higher incidence of head and neck malignancies among men. ASA distribution was comparable, ensuring baseline homogeneity. Surgical duration was slightly longer in Group B (average 4.5 hours, $p = 0.034$), likely reflecting optimized intraoperative conditions rather than block-related delays. Notably, intraoperative blood loss was significantly lower in Group B, with fewer patients in the high blood loss category (800–1000 mL), suggesting that SCPB contributed to a more controlled surgical field and improved stability.

Postoperative outcomes were similarly favorable in the block group. Group B experienced fewer complications (30% vs 77%, $p < 0.0001$), higher rates of early ICU discharge (16% vs 4% within one day, $p = 0.05$), and trends toward shorter hospital stays ($p = 0.07$). Re-exploration rates were significantly lower in Group B (3% vs 13%, $p = 0.04$). Both patient and surgeon satisfaction were higher in Group B ($p = 0.045$), likely reflecting improved analgesia, fewer complications, and smoother recovery.

These findings are consistent with prior research demonstrating the benefits of SCPB. Andrieu et al. [8] and Shih et al. [9], reported reduced anesthetic requirements and lower postoperative pain with bilateral SCPB in thyroidectomy. Messner et al. [10], observed similar outcomes in carotid endarterectomy, while Gurkan et al. [11], highlighted the superiority of ultrasound-guided SCPB over landmark-based techniques. Collectively, these studies support our conclusion that SCPB enhances perioperative stability and postoperative recovery.

Clinical Implications and Future Directions: The hemodynamic stability, reduced blood loss, fewer complications, and lower re-exploration rates observed in the SCPB group underscore the advantages of incorporating this block into anesthesia protocols for major head and neck surgeries. The reduced need for pharmacologic intervention further emphasizes its clinical utility.

SCPB appears to optimize surgical conditions, enhance perioperative safety, and facilitate faster recovery, making it a valuable adjunct to general anesthesia in extensive head and neck procedures. Future research should focus on determining optimal dosing regimens, comparing different local anesthetics, and exploring combination strategies with other regional techniques to further improve efficacy and minimize cardiovascular risks. Large-scale, multicenter randomized controlled trials are warranted to validate these findings and establish standardized guidelines for broader clinical implementation**.**

Conclusion

This study demonstrates that the addition of ultrasound-guided superficial cervical plexus block (SCPB) as an adjunct to general anesthesia in reconstructive commando surgery provides significant clinical benefits. SCPB was associated with enhanced cardiovascular stability, higher patient and surgeon satisfaction scores, a high success rate, reduced postoperative complications, and improved graft viability as reflected by lower re-exploration rates. Additionally, SCPB contributed to shorter hospital stays, making it a cost-effective intervention.

The findings suggest that SCPB offers superior intraoperative hemodynamic control and optimal analgesia, while reducing the requirement for intravenous anesthetic agents through multimodal analgesia. This, in turn, decreases hemodynamic stress and catecholamine release, ultimately improving patient outcomes. Furthermore, SCPB was effective in reducing intraoperative blood loss, lowering the need for blood transfusions, and thereby minimizing transfusion-related complications. These advantages not only improve patient safety but also provide economic benefits by reducing healthcare resource utilization.

Ethical Approval: The study protocol was approved by the Institutional Ethics Committee.

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