

GENERAL ANAESTHESIA WITH ADJUNCT SUPERFICIAL CERVICAL PLEXUS BLOCK VERSUS GENERAL ANAESTHESIA ALONE FOR CAROTID ENDARTERECTOMY: A COMPARATIVE STUDY

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ABSTRACT

Background: The aim is to compare peri-operative profiles and early outcomes of general anaesthesia with adjunct superficial cervical plexus block (GA+SCPB) versus general anaesthesia alone (GA) in patients undergoing carotid endarterectomy (CEA). **Materials and Methods:** Retrospective single-centre cohort (January 2023–May 2025). 50 Adults undergoing primary CEA received either GA+SCPB (n=25) or GA (n=25) according to clinician preference. Primary outcomes were intra-operative opioid (fentanyl, µg), time to extubation, and need for post-operative nitroglycerin infusion for hypertension. Secondary outcomes were 2-hour pain (0–10), 24-hour morphine-equivalent consumption, length of stay (LOS), and 30-day complications (stroke/TIA, myocardial ischaemia, neck haematoma). Group comparisons used standard parametric/non-parametric tests (two-tailed $\alpha=0.05$). **Result:** Baseline characteristics were comparable between groups. GA+SCPB was associated with lower intra-operative fentanyl use (129 ± 19 vs 180 ± 32 µg; $p<0.001$) and faster extubation (8.6 ± 3.0 vs 14.9 ± 5.5 min; $p<0.001$). Early analgesia was better with GA+SCPB: lower pain at 2 h (3.4 ± 1.0 vs 4.5 ± 1.4 ; $p=0.001$) and reduced 24-h opioid consumption (6.0 ± 2.3 vs 9.8 ± 3.3 mg; $p<0.001$). Fewer GA+SCPB patients required nitroglycerin infusion for hypertension (32.0% vs 60.0%; $p=0.089$, trend). LOS was shorter (4.9 ± 1.6 vs 5.9 ± 1.3 days; $p=0.015$). Major events were infrequent and similar (stroke/TIA 0% vs 4%; myocardial ischaemia 4% vs 0%; haematoma 0% both; Fisher's exact $p \geq 0.99$). **Conclusion:** In the current study, GA+SCPB improved analgesic and emergence profiles and showed signals of haemodynamic benefit versus GA alone, without compromising safety. Incorporating SCPB into GA-based CEA pathways may enhance recovery when delivered within protocolised haemodynamic management.

INTRODUCTION

Carotid endarterectomy (CEA) offers durable stroke risk reduction in appropriately selected patients with significant carotid stenosis when performed in centres with low peri-operative morbidity and protocolised haemodynamic control.^[1] Contemporary European Society for Vascular Surgery (ESVS) guidelines emphasise peri-operative blood-pressure surveillance, selective shunting strategies, and centre expertise as key drivers of outcomes.^[2]

Whether GA or regional/locoregional anaesthesia confers superior outcomes remains unsettled. The multicentre GALA randomized trial found no

difference in the composite of stroke, myocardial infarction, or death between GA and local/regional anaesthesia, suggesting institutional protocols may matter more than anaesthetic mode.^[3,4]

Adjunct superficial cervical plexus block (SCPB) can attenuate nociception from the incision, blunt sympathetic responses, and reduce opioid needs.^[5] Dexmedetomidine as an adjuvant to ropivacaine prolongs block duration and improves early analgesia in neck surgery, although high-quality CEA-specific trials are limited.^[6,7]

During carotid cross-clamping, cerebral protection depends on collateral perfusion and vigilant monitoring; selective shunting guided by neuromonitoring or stump pressure thresholds

around ~40 mmHg is widely practiced, though cut-offs and protocols vary.^[8,9]

Against this background, in the current study we compared peri-operative profiles of GA+SCPB versus GA alone in a 50-patient with CEA, hypothesising that the adjunct block would reduce opioid use and facilitate smoother emergence without increasing complications.

MATERIALS AND METHODS

Study design & setting: A Retrospective observational study was conducted at a tertiary care centre in Southern India between January 2023–May 2025

Participants: 50 Adults (≥ 18 y) undergoing primary CEA under GA with or without adjunct SCPB were the study participants. Patients with Redo CEA, combined procedures (e.g., CEA+CABG), missing key peri-operative data, known allergy to local anaesthetics, or block conversion/failed block were excluded

Exposure groups

- GA+SCPB: Standard GA plus ultrasound-guided SCPB using ropivacaine (0.25–0.5%) with or without low-dose dexmedetomidine as adjuvant, performed pre-incision.
- GA alone: Standard GA per institutional protocol.

Peri-operative management (both groups): Five-lead ECG, invasive arterial pressure, ETCO₂ monitoring; targeted MAP management during cross-clamp; selective shunting per surgeon/anaesthetist preference using stump pressure and/or neurophysiological indices when available; standard recovery room surveillance per ESVS-aligned local protocol.

Outcomes:

- Primary: (1) intra-operative opioid (fentanyl, μg), (2) time to extubation (min), (3) post-operative nitroglycerin infusion for hypertension.
- Secondary: pain at 2 h (0–10), 24-h morphine equivalent (mg), length of stay (LOS, days), 30-day stroke/TIA, myocardial ischaemia (clinical/ECG/troponin), and neck haematoma requiring re-exploration.

Data analysis: Data was collected with the help of a pre-formed proforma. Data was entered in MS Excel and analysed with the help of SPSS v25. Categorical data presented as n (%); continuous as mean $\pm$ SD. Between-group comparisons used χ^2 or Fisher's exact test (categorical) and Student's t-test or Mann–Whitney U (continuous) based on distribution (Shapiro–Wilk). Two-tailed $\alpha=0.05$.

RESULTS

A total of 50 patients undergoing CEA were analysed; 25 (50.0%) received GA+SCPB and 25 (50.0%) received GA alone. The overall mean age

was 61.0 ± 6.5 years, and 32 (64.0%) were male. Comorbidities included hypertension in 32 (64.0%) and diabetes mellitus in 28 (56.0%); ASA class III was recorded in 34 (68.0%). The indication was symptomatic stenosis in 32 (64.0%).

Baseline Characteristics of the study participants

[Table 1] shows the Baseline characteristics. The two groups were well matched at baseline. Mean age was virtually identical (GA+SCPB 60.9 ± 6.7 vs GA 61.0 ± 6.5 years). Sex distribution was comparable (males 60.0% vs 68.0%; females 40.0% vs 32.0%). Clinical status and comorbidities were similar, with ASA III in 76.0% vs 60.0%, hypertension in 60.0% vs 68.0%, and diabetes mellitus in 52.0% vs 60.0% in the GA+SCPB and GA groups, respectively. Symptomatic presentation was likewise balanced (68.0% vs 60.0%).

Intra-operative findings

[Table 2] shows that cross-clamp duration was comparable between groups (GA+SCPB 16.2 ± 5.8 vs GA 18.3 ± 5.8 min; $p=0.213$), and the proportion experiencing intra-operative hypertensive surges was similar (36.0% vs 48.0%; $p=0.567$). In contrast, GA+SCPB was associated with a significantly lower intra-operative fentanyl requirement (129 ± 19 vs 180 ± 32 μg ; $p<0.001$) and a shorter time to extubation (8.6 ± 3.0 vs 14.9 ± 5.5 min; $p<0.001$), indicating a more favourable analgesic and emergence profile without prolonging cross-clamp time or increasing haemodynamic lability.

Post-operative outcomes

[Table 3] shows that patients in the GA+SCPB group experienced less early pain (mean pain score at 2 h: 3.4 ± 1.0 vs 4.5 ± 1.4 ; $p = 0.001$) and lower 24-hour opioid consumption (6.0 ± 2.3 vs 9.8 ± 3.3 mg morphine-equivalent; $p < 0.001$) compared with GA alone. There was a trend toward fewer requiring post-operative nitroglycerin infusions for hypertension in GA+SCPB (32.0% vs 60.0%; $p = 0.089$) also displayed in Figure 1. Major complications were infrequent and comparable between groups (stroke/TIA 0.0% vs 4.0%, $p = 1.000$; myocardial ischaemia 4.0% vs 0.0%, $p = 1.000$; cervical haematoma requiring re-exploration 0% in both; Fisher's exact). Length of stay was shorter with GA+SCPB (4.9 ± 1.6 vs 5.9 ± 1.3 days; $p = 0.015$), indicating a more favourable early recovery profile without an apparent increase in adverse events.

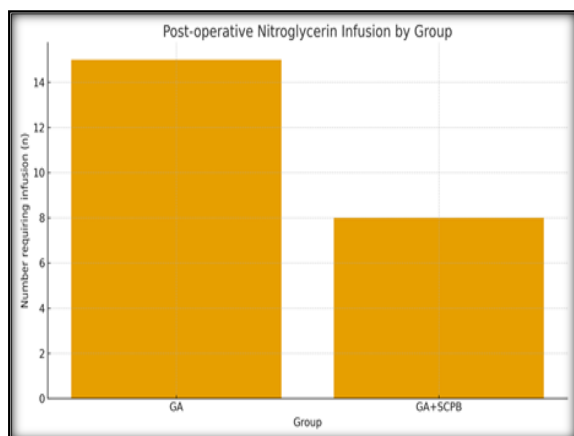


Figure 1: Post-operative nitroglycerin infusion by group

Table 1: Baseline characteristics

Characteristic		GA+SCPB (n=25)	GA (n=25)
Age, years		60.9 ± 6.7	61.0 ± 6.5
Sex	Male	15 (60.0%)	17 (68.0%)
	Female	10 (40.0%)	8 (32.0%)
ASA III		19 (76.0%)	15 (60.0%)
Hypertension		15 (60.0%)	17 (68.0%)
Diabetes mellitus		13 (52.0%)	15 (60.0%)
Symptomatic presentation		17 (68.0%)	15 (60.0%)

Table 2: Intra-operative findings

Outcome	GA+SCPB (n=25)	GA (n=25)	p-value
Cross-clamp time, min	16.2 ± 5.8	18.3 ± 5.8	0.213
Intra-op hypertensive surge, n (%)	9 (36.0%)	12 (48.0%)	0.567
Opioid dose, fentanyl µg	129 ± 19	180 ± 32	<0.001
Extubation time, min	8.6 ± 3.0	14.9 ± 5.5	<0.001

Table 3: Post-operative outcomes

Outcome	GA+SCPB (n=25)	GA (n=25)	p-value
Pain score at 2 h (0–10)	3.4 ± 1.0	4.5 ± 1.4	0.001
Morphine-equivalent 24 h, mg	6.0 ± 2.3	9.8 ± 3.3	<0.001
Post-op nitroglycerin infusion, n (%)	8 (32.0%)	15 (60.0%)	0.089
Stroke/TIA within 30 d, n (%)	0 (0.0%)	1 (4.0%)	1.000*
Myocardial ischaemia within 30 d, n (%)	1 (4.0%)	0 (0.0%)	1.000*
Neck haematoma needing re-exploration, n (%)	0 (0.0%)	0 (0.0%)	1.000*
Length of stay, days	4.9 ± 1.6	5.9 ± 1.3	0.015

*Fisher's exact test.

DISCUSSION

In the current study, GA supplemented by SCPB was associated with lower peri-operative opioid requirements, faster extubation, and less early pain than GA alone, with similar safety. These findings align with the central message of modern guidelines: outcomes after CEA hinge on disciplined monitoring and haemodynamic protocols more than on anaesthetic mode per se.^[2]

Our results are consistent with prior evidence that the choice of GA vs regional does not clearly alter major adverse outcomes, as shown by the GALA randomized trial, but that practice patterns and peri-operative pathways may influence recovery metrics.^[3,4] Recent observational analyses suggest potential advantages of regional techniques in some settings, though residual confounding cannot be

excluded and RCT data remain neutral on hard outcomes.^[10,11]

Mechanistically, SCPB likely reduced nociceptive input and sympathetic surges, explaining the lower opioid needs and quicker emergence we observed; prolonged block duration with dexmedetomidine adjuvancy has been demonstrated in neck surgery populations, supporting the analgesic signal here.^[6] Regarding cerebral protection, our centre's selective shunt approach guided by stump pressure and clinical/physiological indices reflects common practice; while a ~40 mmHg stump-pressure threshold is frequently cited, the literature underscores heterogeneity and the primacy of protocolised management.^[8,9] ESVS guidelines further highlight the need for structured post-operative BP control to mitigate risks including cervical haematoma and cerebral hyperperfusion syndrome—an approach mirrored in our study.^[3]

CONCLUSION

Among patients undergoing CEA at a tertiary centre, GA+SCPB was associated with improved analgesic and emergence profiles and signals of haemodynamic benefit versus GA alone, with comparable safety. Integrating SCPB into GA pathways is reasonable where expertise exists, alongside guideline-based cerebral protection and rigorous blood-pressure protocols.

Strengths include a uniform surgical pathway and clearly defined outcomes; limitations include single-centre design, clinician-selected anaesthetic technique (confounding by indication), and modest sample size limiting power for rare events. Larger prospective studies could clarify whether GA+SCPB improves haemodynamic endpoints robustly and whether these translate into shortened LOS or fewer resource-intensive interventions.

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