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CLINICAL PAPER

The Safety and Effectiveness of Superficial Cervical Plexus Block in Oral and Maxillofacial Surgery as an Alternative to General Anesthesia in Selective Cases: A Clinical Study

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Abstract
Aim To assess the safety and effectiveness of superficial cervical plexus (SCP) block in oral and maxillofacial surgical (OMFS) practice as an alternative to general anesthesia in selective cases.
Subjects and Methods The total number of patients was 10, out of which 6 were male and 4 were female patients. Five patients had incision and drainage of perimandibular space infections, two patients had enucleation of cyst in the body of mandible, one patient had open reduction and internal fixation isolated angle fracture, and two patients had submandibular lymph node biopsies. Informed & written consent were obtained from the patients after they had the procedure explained to them. Medically compromised patients and those who were excessively anxious and apprehensive, patient who did not want the procedure to be done under regional anesthesia, and patients with a history of allergy to local anesthetic were excluded. All patients had their surgical procedures under regional anesthesia (SCP block with supplemental nerve blocks) performed by the same surgeon under the supervision of anesthesiologist with continuous monitoring.
Results SCP block with concomitant mandibular nerve and long buccal nerve block has a high success rate, low complication rate, and high patient acceptability as shown in the study.
Conclusion Superficial cervical plexus block anesthesia is a safe and useful anesthetic technique with the low risk of accidents and complications, thus a good alternative for regional anesthesia in selected cases in oral and maxillofacial surgery.

Keywords Regional anesthesia · Superficial cervical plexus block · Incision & drainage · Lymph node biopsy

Introduction

Oral surgical and dental procedures are routinely performed in an outpatient setting. Regional anesthesia is the most common method to anesthetize the patient prior to office-based procedures. Many techniques can be employed to achieve anesthesia of the dentition and surrounding hard and soft tissues of the maxilla and mandible. The type of procedure to be performed as well as the location of the procedure will determine the technique of anesthesia to be used. The superficial cervical plexus block (SCPB) is simple and easy to perform, but unfortunately it is often overlooked as an option to general anesthesia [1]. Contemporary medicine uses general anesthesia (GA) as rather safe, useful, and simple way to achieve surgical anesthesia. The downside of GA is high economic cost, a number of highly trained personnel, morbidity, mortality, and high-cost equipment. The advantage of regional anesthesia includes stress-free anesthesia as it prevents high catecholamine release, lower rate of blood loss because of local vasoconstrictors and sympathetic blockade, easy-to-perform techniques, and lower morbidity rates in appropriate dosages of local anesthesia (LA) [2]. Cervical plexus block (CPB) was first performed by Halstead in 1884 at Bellevue, and later, Kappis in Germany described the posterior route. Although Heidenhein introduced the lateral approach, it was Labat who popularized this technique in America. The SCP block has been well described for anesthesia of the neck, submandibular area, and the ear lobe

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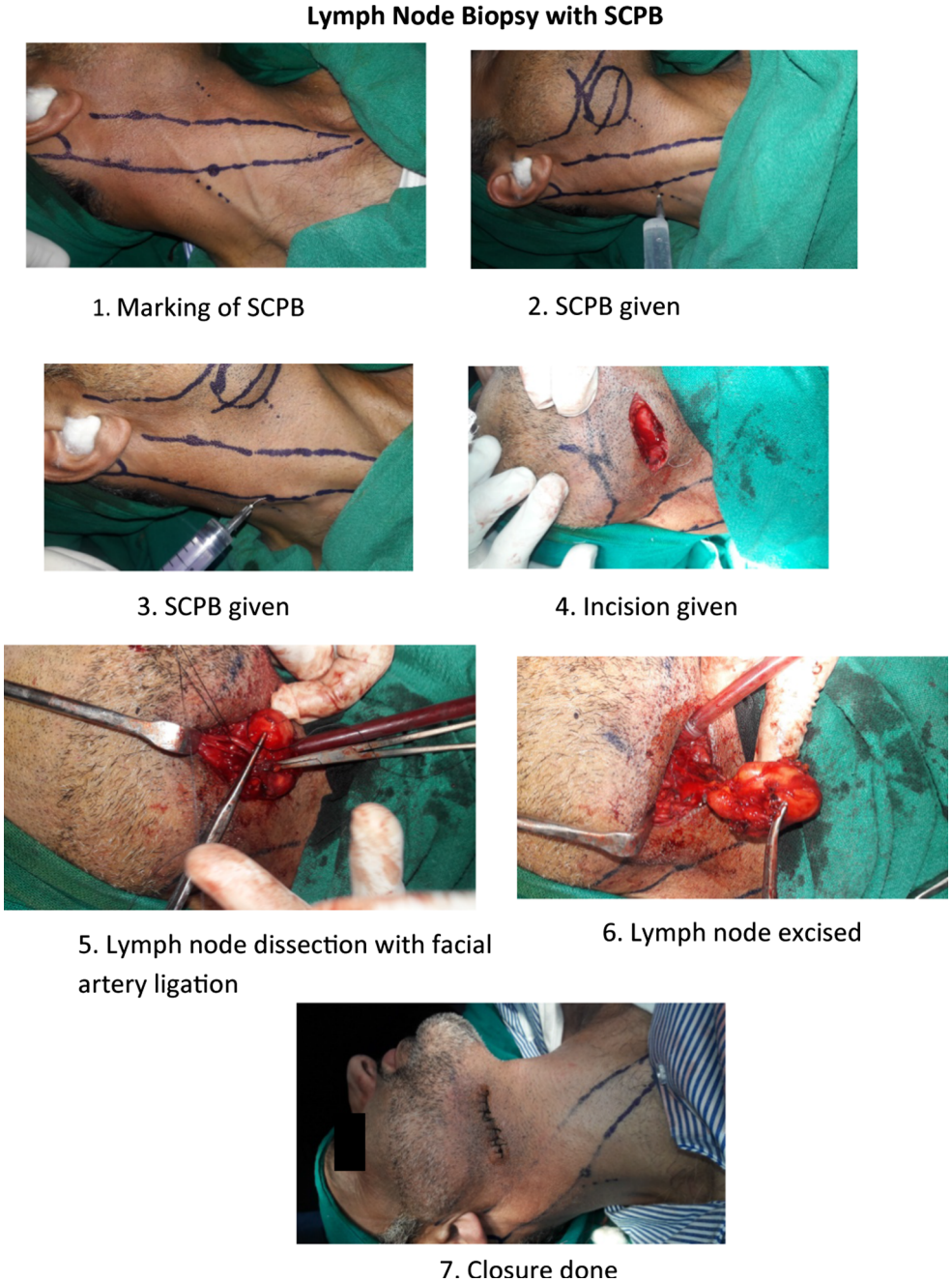
and is potentially useful for patients with ear lobe lacerations, submandibular abscesses, or injuries to the neck. Its application in oral and maxillofacial surgical (OMFS) has been in surgical drainage of an abscess in perimandibular region, excisions of superficial lesions, and skin suturing in the corresponding dermatome [3–6].

Materials and Methods

The study was conducted in the postgraduate department of oral and maxillofacial surgery, Government Dental College and Hospital Srinagar, Jammu and Kashmir. Total number of patients included in the study was 10, out of which 6 were male and 4 were female. The mean age was 25 years.

Inclusion criteria were healthy patients aged between 15 years and 60 years, patients requiring surgical intervention in mandible/perimandibular areas along the distribution of superficial cervical plexus, and patients ready to participate in the study after informed consent and proper explanation of the procedure.

Exclusion criteria included medically compromised patients and those who are excessively anxious and apprehensive, patient who do not want the procedure to be



done under regional anesthesia, and patient with a history of allergy to local anesthetic.

Out of 10 patients included in the study, five required incision drainage of perimandibular spaces, two required cervical lymph node biopsies, two required cyst enucleation of mandible, and one patient required open reduction and internal fixation of mandibular angle fracture.

All the patients were given superficial cervical plexus block along with the supplemental nerve blocks. SCPB was given by the same maxillofacial surgeon after thorough evaluation of the regional anatomy with constant monitoring of all the vitals by the anesthetist in adequately equipped theatre setting.

Regional Anatomy of Superficial Cervical Plexus

The cervical plexus (CP) is formed from the first four cervical spinal nerves, C-1, C-2, C-3, and C-4. These spinal nerves emerge from the intervertebral foramina and pass behind the vertebral artery and vein in the gutter formed by the anterior and posterior tubercles of the corresponding transverse process of the cervical vertebrae (Fig. 1). As the nerves approach the lateral edge of the transverse process, all but C-1 divide into an ascending and descending branch. The nerve roots of C-2, C-3, and C-4 then enter a perineural space created by tendons and muscles that are attached to the anterior and posterior tubercles of the corresponding cervical vertebrae and form a fascial compartment. This compartment is lined anteriorly by the scalenus anterior muscle and posteriorly by the scalenus medius muscle. The ventral primary divisions of C-2, C-3, and C-4 separate into descending and ascending branches that form a pattern of three loops. These loops constitute the plexus formation, and they also communicate with sympathetic fibers derived from the superior, middle, and inferior cervical ganglia. In addition, there is an intricate fiber network that communicates with several cranial nerves. The vagus, hypoglossal, and accessory nerves all communicate with the cervical plexus. Such communication may partially explain some of the side effects often seen with CPB. Early in the formation of the CP, motor fibers course deep into the neck and separate from sensory fibers, which spread out superficially over the neck. This rare anatomical characteristic allows selective sensory blockade of the CP. The series of loops of the CP form the development of superficial and deep branches. The anterior branches course behind the anterior scalene muscle and then separate from the motor branches, continuing laterally to emerge superficially under the posterior border of the sternocleidomastoid muscle (Fig. 2). This anatomical separation enables the sensory branches of the CP, via the superficial cervical plexus (SCP) to be blocked selectively without any motor blockade within the neck.

The four sensory nerves of the CP innervate the neck as follows

1. The *lesser occipital nerve,* with its origin predominately at C-2, emerges as the first of these sensory nerves. It ascends from the posterior border of the sternocleidomastoid muscle and supplies a band-like area behind the ear both superiorly and inferiorly.
2. The *great auricular nerve*, derived from C-2 and C-3, provides sensation to the skin over the parotid gland and posteriorly to the surface of the ear, as well as inferiorly to the angle of the mandible.
3. The third cutaneous nerve, which also arises from C-2 and C-3, is the *transverse cervical or anterior cutaneous nerve,* which passes anteriorly and perforates the platysma of the neck, where it divides into anterior and posterior branches. Sensory innervation from the

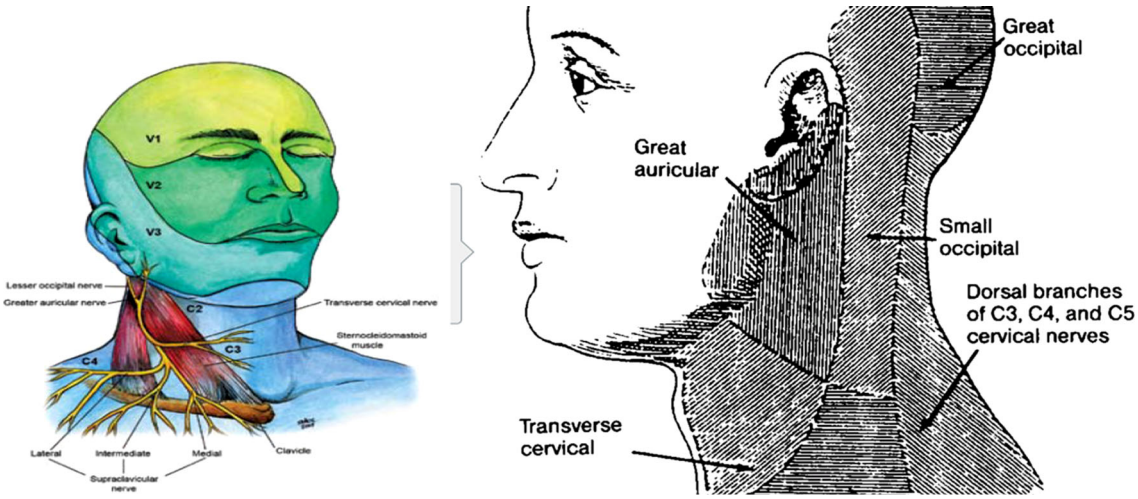


Fig. 1 Superficial cervical plexus branches and cutaneous innervation

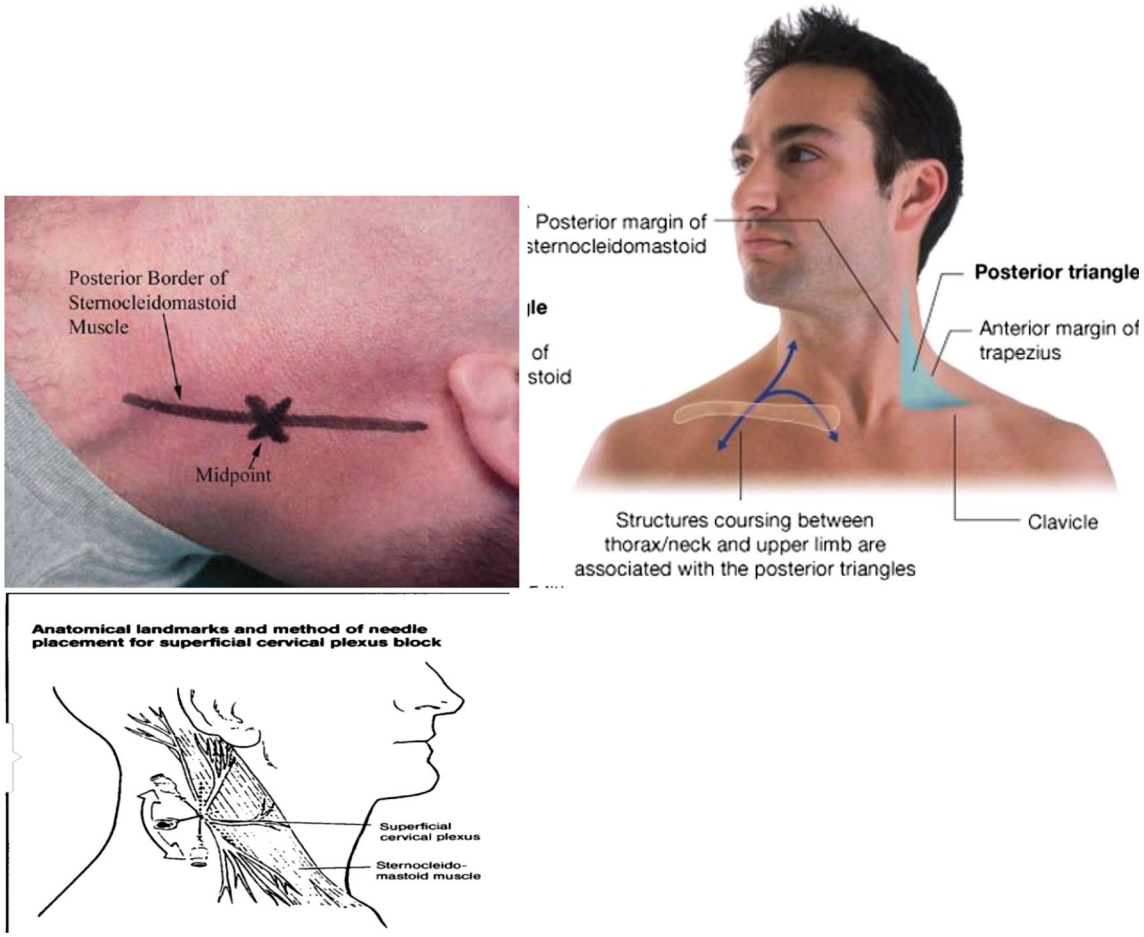


Fig. 2 Technique of superficial cervical plexus block

mandible to the sternum and as far posteriorly as the angle of the mandible is supplied.

4. The *supraclavicular nerve*, which arises from C-3 and C-4, plies the largest surface area, because its branches penetrate the platysma and innervate inferiorly below the clavicle to the second rib and laterally over the deltoid area. The surface of the trapezius and acromion is also supplied by the branches of the supraclavicular nerve. All of these nerves make up the SCP and are easily blocked by infiltration with a local anesthetic.

Armamentarium.
22-Gauge, 4–5 cm, short bevel needle.
10–15 ml of local anesthetic.
Marker.
Preferably a monitor for vitals.

Procedure

Patient was prepared and scrubbed under all aseptic precautions. Vitals were constantly monitored by the anesthetist throughout the procedure;

1. The patient lied supine with a small towel under the head, which was turned slightly toward the side that is not being blocked.
2. Against gentle resistance from the anesthetist's hand, the patient was instructed to lift his or her head. A simultaneous slight Valsalva's maneuver was encouraged to help outline the sternocleidomastoid muscle and locate the external jugular vein.
3. The midpoint of the posterior border of the sternocleidomastoid muscle was located and marked. This usually corresponds with the external jugular vein as it crosses the border of the muscle.
4. A 22-gauge 4-cm needle was advanced from 2 to 3 cm superiorly and inferiorly into the subfascia along the border of the muscle, and 5–10 mL of local anesthetic was then infiltrated. Paresthesia was not sought. Ten to 15 min was allowed after injection of the local anesthetic before the adequacy of the block was determined.
5. Objective symptoms were checked after the block along the distribution of the SCP, and the surgical procedure was carried out.

Table 1 Case distribution

S. no.	Patient	Age/sex	Diagnosis	Treatment	Complication
1.	Shabnum	35/f	Submandibular space infection	I & D	Nil
2.	Adil	24/m	Antibioma	I & D	Nil
3.	Ishfaq	25/m	Submental and submandibular space infection	I & D	Nil
4.	Ashiq	30/m	Residual cyst	I & D	Nil
5.	Ishrat	20/f	Dentigerous cyst	Cyst enucleation	Nil
6.	Mymoona	50/f	Submental and submandibular space infection	I & D	Nil
7.	Irfan	28/m	Submental and submandibular space infection	Cyst enucleation	Nil
8.	Javaid	26/m	Mandibular angle fracture	ORIF of angle fracture	Nil
9.	Gh hassan	44/m	Submandibular swelling	Lymph node excisional biopsy	Nil
10.	SAJA	50/F	Submandibular swelling	Lymph node excisional biopsy	NIL

I & D incision and drainage, *ORIF* open reduction and internal fixation

Results

Of the total number of 10 patients, 6 were male and 4 were female. All patients had SCP block supplemented by inferior alveolar nerve block and long buccal nerve block depending on the anatomical location of surgery to achieve surgical anesthesia. The case distribution is shown in Table 1.

All patients had their surgical procedures under regional anesthesia (SCP block with supplemental nerve blocks) performed by the same surgeon with satisfactory anesthesia and analgesia without any complication (Fgures 1–5).

Case No. 01 Shabnum 35/F

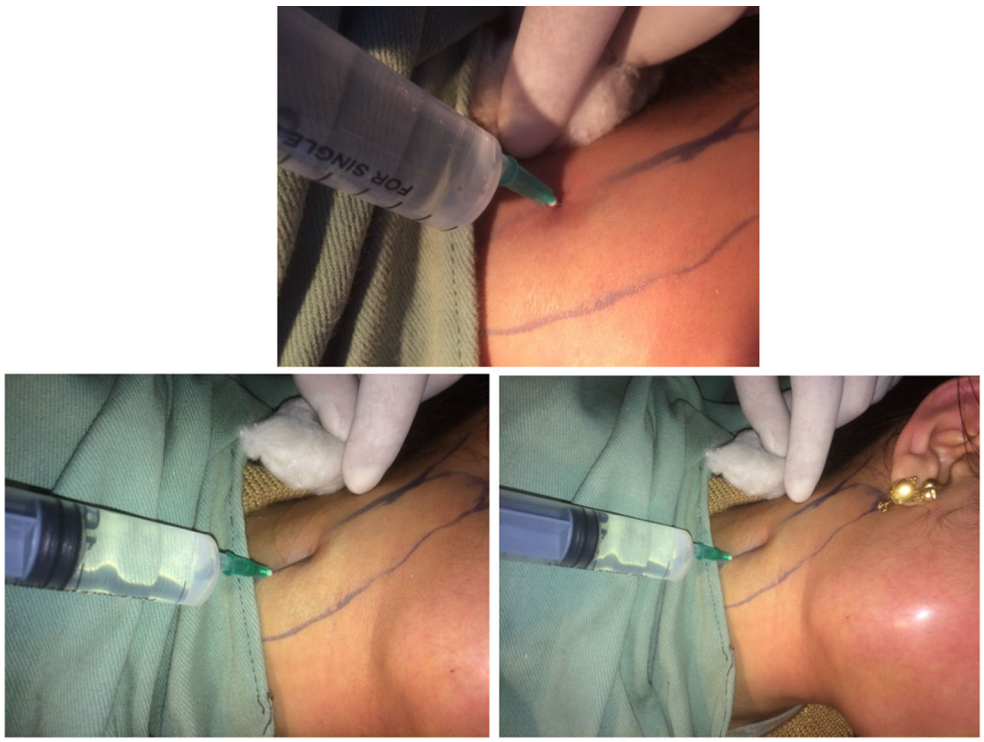
INCISION DRAINAGE

1. Pre-operative photograph

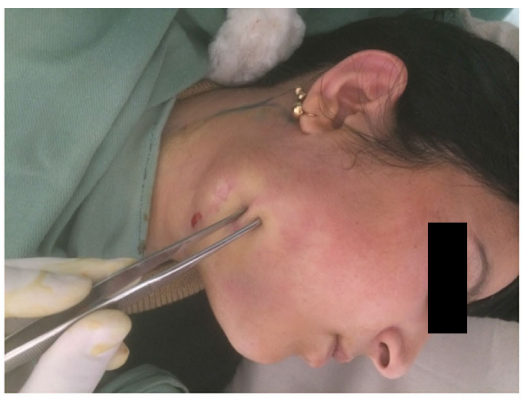
2. MARKING OF SCM

Discussion

The cervical plexus block provides anesthesia and analgesia to the head and neck region. In maxillofacial surgery, pain management is a critical component. Conventional local anesthetic blocks provide adequate anesthesia, but in certain situations, it does not provide enough analgesia like space infections of peri-mandibular spaces where abscess involves the deeper facial spaces, submandibular and cervical lesions that require dissection in the deeper planes and fractures of mandibular angle region. In such situations, general anesthesia is usually used, but its downside is high cost, morbidity, and mortality. The effective use of LA by SCPB can provide both patient comfort and safety to perform surgery in deeper planes of the neck and per-imandibular region. SCP block takes care of the pain in skin incision and the necessary tissue dissection. By combining SCP block with conventional nerve blocks such as the inferior alveolar and long buccal nerve blocks, good anesthesia and positive outcomes were achieved as was seen by Kamal Kanthan [2] in a study of 10 patients. Arun [7] used this block in drainage of Ludwig's angina and concluded that superficial cervical plexus block permits the surgical decompression in their



3. Injecting local anesthesia at mid point of posterior porder of SCM



4. Checking for objective symptoms of the block

5. Incision drainage done

case and in a rural hospital with limited resources, it should be considered as an option. A thorough knowledge of the pertinent anatomy and the proper technique for the block is essential in order to achieve good clinical results. A number of potential side effects and complications like infection, hematoma, phrenic nerve blockade, LA toxicity, nerve injury, and spinal anesthesia are inherent to CPB, but they usually are of minimal significance if they are properly managed [1]. No adverse drug or technique incidents were recorded in our case series, which is in accordance with the previous studies. The main complications of the SCP block is inadvertent deep injection of local anesthetic leading to blockade of the deeper neural structures including the phrenic nerve, cervical plexus, brachial plexus, and the recurrent laryngeal nerve, but these are very rare and easily avoided through standard block precautions [8].

Conclusion

SCP block with concomitant mandibular nerve and/or long buccal nerve block has a high success rate, low complication rate, and high patient acceptability as shown in the study and can be used as an alternative to general anesthesia in selective OMFS cases.

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