USE OF SUPERFICIAL CERVICAL PLEXUS BLOCK IN SUBMANDIBULAR AND SUBMENTAL SPACE ABSCESS DRAINAGE

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ABSTRACT

Introduction

Methods for lessening the sensation of pain during surgery date back to ancient times. Although general anesthesia is preferred over locoregional anesthesia in incision and drainage of space infection in neck region, it is expensive, with increased morbidity and mortality. Sometimes, anesthetist experienced in fiber optic-guided nasal intubation may be required due to reduced mouth opening. Hence, in such cases and poor risk patients, Superficial Cervical Plexus Block can be used in association with trigeminal V3 block.

Objective

To evaluate the efficacy of Superficial Cervical Plexus Block in incision and drainage of submandibular and submental space infection.

Methodology

A prospective clinical study was carried out at Nobel Medical College and Teaching Hospital, Biratnagar, Nepal from June 2018 to May 2019. Patients suffering from submandibular and submental space infection arising from odontogenic causes who required incision and drainage were included in study. Pain response was measured using Visual Analogue Scale.

Result

Out of Twenty four patients sixteen were female and eight were male. The age ranged from 16 to 82 years with a mean age of 40.5±18.53. The Visual Analogue Scale score ranged from 0 to 8 with a mean score of 1.5 ±1.87. One patient complained of unbearable pain and had to be converted into general anesthesia (4.16%).

Conclusion

Superficial Cervical Plexus Block with trigeminal mandibular local anesthesia has a high success rate and low complication rate. However, caution should be exercised to ensure a low complication rate.

KEYWORDS

Incision and drainage, submandibular and submental space infection, superficial cervical plexus block

INDRODUCTION

Methods for lessening the sensation of pain during surgery date back to ancient times. The Peruvian natives, the Incas, were the first to use cocaine to achieve local anesthesia.[1] Halstead performed Cervical Plexus Block (CPB) for the first time in 1884 at Bellevue[2] and Kappis introduced posterior route in Germany.[3] Although, Labat popularized this technique in America, it was Heidenhein who introduced the lateral approach.[2,4] Winnie described an alternative single-injection technique in an effort to simplify the procedure and reduce the incidence of potential complications from the block.[5]

Odontogenic space infection extending into the neck is not a rare finding in the developing countries which often requires incision and drainage under General anesthesia (GA) often requiring fiberoptic intubation technique. The Superficial Cervical Plexus Block (SCPB) is simple and easy to perform technique which can be used in such cases, but most of the time it is overlooked as an option to general anesthesia.[6]

The aim of this study was to evaluate the efficacy of SCPB in incision and drainage of submandibular and submental space infection.

METHODOLOGY

A prospective clinical study was carried out at Nobel Medical College and Teaching Hospital (NMCTH), Biratnagar, Nepal from June 2018 to May 2019.Convenience sampling technique was used. Out of the patients attending Emergency Department and Department of Oral and Maxillofacial Surgery at NMCTH, twenty four patients who fulfilled the inclusion criteria were enrolled in the study. The patients suffering from submandibular and submental space infection of odontogenic origin with American Society of Anesthesiologists (ASA) physical status I-III and who consented to participate were included in this study. For the patient below 18 years of age, consent was obtained from their parents. Those patients who were unable to understand Visual Analogue Scale (VAS), those with known or suspected allergy to local anesthesia and those with psychiatric disorders were excluded from the study.

The response to pain was recorded on VAS (Fig.1). A VAS is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured.[7] The visual analogue scale (VAS) is commonly used as the outcome measure for comparing analgesia. It is usually presented as a 100-mm horizontal line on which the patient's pain intensity is represented by a point between the extremes of “no pain at all” and “worst pain imaginable.” Its simplicity, reliability, and validity, as well as its ratio scale properties, make the VAS the optimal tool for describing pain severity or intensity.[8] For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain which is measured on scale of zero to 10. Visual Analogue Scale used in this study was adapted from Yale Assessment Module Training-Yale University.

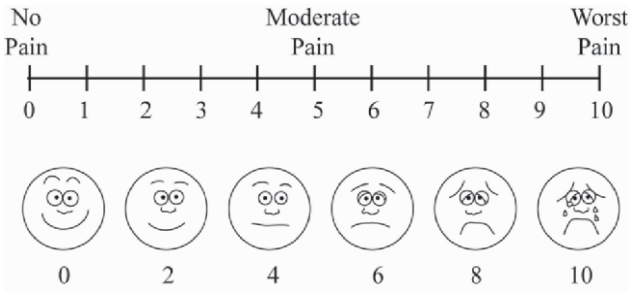

Figure 1: Visual Analogue Scale (Adapted from Yale Assessment Module Training-Yale University)

Approval was taken from institutional review committee and informed written consent was taken prior to surgery and the source data was collected in enclosed proforma.

Technique Armamentarium

1. Local Anesthetic agent: 2% Lignocaine (1:1,00,000 adrenaline), 0.5% Bupivacaine (1:2,00,000)
2. 20 ml syringe
3. 22 gauge 4-5cm, short bevel needle
4. Marking pen
5. Surface antiseptic/alcohol swipes
6. Sterile towels and gauze packs
7. A monitor for vitals

Regional anatomy and landmarks

The cervical plexus is formed by the C1, C2, C3, and C4 spinal nerves and supplies branches to the prevertebral muscles, strap muscles of the neck, and phrenic nerve.[9] While the deep cervical plexus supplies the musculature of the neck segmentally and the cutaneous sensation of the skin between the trigeminally innervated face and the T2 dermatome of the trunk, blockade of the superficial cervical plexus results in anesthesia of only the cutaneous nerves innervating the skin and superficial structures of the head, neck and shoulder(Fig 2).[6,9]

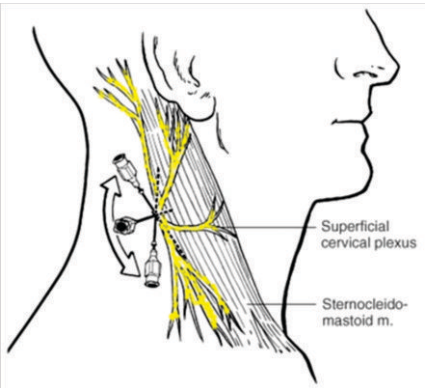

Figure 2: Anatomical landmarks and method of needle placement for Superficial Cervical Plexus Block (Adapted from Miller's Anesthesia, 6th Edition)

The landmarks that are useful for injection are mastoid process and Chassaignac's tubercle of C6 (parallel to the cricothyroid cartilage, aka, “Adam's apple”).[6]

The needle insertion site is marked at the midpoint of the line connecting the mastoid process with Chassaignac's

tubercle of C6 transverse process. This is the location of the branches of the SCP as they emerge behind the posterior border of the sternocleidomastoid muscle.[6]

Procedure

All the patients were operated in operation theatre under standard monitoring. All patients received 2% lignocaine with 1:100,000 adrenaline mixed with 0.5% Bupivacaine with 1:200000 adrenaline in equal volume. Adequate sedation was considered to alleviate anxiety. Midazolam 0.025mg/kg body weight and fentanyl 0.5mcg/kg body weight was administered five minutes prior to procedure for adequate sedation and analgesia.

Technique

The patient was placed in a supine position with a small towel under his head, with his head turned to the side contrary to the one to be blocked.[10] 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.[10] 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(Fig 3).[10] After skin cleansing with an antiseptic solution, a skin wheal was raised at the site of the needle insertion using a 22-gauge, 4-cm needle injecting 5 mL of solution along the posterior border of the sternocleido-mastoid muscle (Fig 4). The needle was inserted in multiple direction using a "fan" technique as shown in figure2. It is possible to block the accessory nerve with this injection, resulting in temporary ipsilateral trapezius muscle paralysis.[9] An Inferior Alveolar nerve block and Long Buccal nerve block (Trigeminal V3) was obtained using a closed mouth technique (Vazirani-Akinosi). After ten to 15 minutes of injection of the local anesthetic the adequacy of the block was determined.[2]

Figure 3: Marking for SCPB

Figure 4: Injection of local anesthetic solution

(Note: Because of the close proximity of the accessory nerve [cranial nerve XI], the ipsilateral trapezius muscle is often paralyzed for the duration of the SCPB).[10]

Injection Ketorolac 30 mg was given as rescue analgesic.

RESULT

Of the total 24 patients enrolled in this study, 16 were female and 8 were male. The age ranged from 16 to 82 years with a mean age of 40.5±18.53. Six patients were suffering from submandibular abscess, 12 from submandibular and submental abscess while 6patients had progressed to the stage of Ludwig's angina. The VAS score ranged from 0 to 8 with a mean score of 1.5 ±1.87.More than two third (83.32%) of the patient reported no pain or minimal pain (Table 1). One patient complained of unbearable pain and had to be converted into GA (4.16%). The frequency table of VAS scoring are given in table 1.

Table 1: Frequency table of VAS of all the patients

VAS Score	Number of Patient	Percentage (%)
0	8	33.33
1	8	33.33
2	4	16.66
3	1	4.16
4	1	4.16
5	1	4.16
6	0	0
7	0	0
8	1	4.16
9	0	0
10	0	0
Total	24	100

DISCUSSION

The most common cause of abscesses involving the deep fascial planes of the head and neck is odontogenic infection.[11] The teeth carry abscess-producing bacteria deeply into the jaw bones along the external surfaces and internal canals of the roots. Infection spreading beyond the roots of the mandibular molar teeth tends to rupture the thin medial cortical plate of the mandible below the attachment of the mylohyoid muscle. This then directs the infection into the submandibular space, from where the infectious process can spread to the sublingual, submental, or lateral pharyngeal spaces. Thus, dental infections tend to penetrate deeply into the face and neck and usually require surgical drainage, because natural anatomic pathways for drainage do not exist. Deep fascial space infections of the head and neck can rapidly progress to threaten vital structures and to obstruct the airway.[12]

So a timely incision and drainage followed by an empirical antibiotic therapy and removal of the causative agent is required. When the abscess involves deeper spaces mostly general anesthesia is preferred to local anesthesia. Although, general anesthesia (GA) is a safe, useful and simple way to

achieve surgical anesthesia, it has the drawback of high economic cost, requirement of a number of highly trained personnel, morbidity and mortality, and high cost equipment. On the contrary, regional anesthesia warrants stress free anesthesia preventing 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 dosage of local anesthetics.[6]

Hakim et al, conducted a clinical study to evaluate the safety and efficacy of SCPB in combination with supplemental nerve blocks in Oral and Maxillofacial Surgery in 10 patients.[13]Shteif et al, reported three cases with submandibular and submental abscess drained under SCPB in combination with trigeminal V3 nerve block.[6] Kanthan KR, used SCPB in 10 patients, out of which six patient had perimandibular space infections, two patient had Level Ib node biopsies, one patient had enucleation of cyst in the body of mandible, one patient had open reduction internal fixation of isolated angle fracture.[14]All these studies reported high success rate with low complication and better patient acceptance.

Perisanidis et al, examined 19 patients by application of an ultrasound-guided combined, intermediate and deep cervical plexus nerve block for regional anaesthesia in patients undergoing oral and maxillofacial surgery. Cervical plexus nerve block was satisfactory in all the patients. There was no requirement of analgesic postoperatively for next 24 hours. In two cases there was instance of blood aspiration. There was no further cervical plexus block-related complications.[15]

This study had 24 patients with perimandibular space infection out of which 23 patient successfully underwent incision and drainage after administration of SCPB in combination with trigeminal V3 nerve block. One patient complained of unbearable pain and had to be converted to GA (4.16%) while in a study by Davies et al, out 924 in which 1000 SCP blocks were given, 25 patient had to be conveted to GA with a conversion rate of 2.5%.[16] Patients who complained of mild pain were given infiltration of local anesthesia. There was no complication and all patients did well postoperatively in this study as observed by Hakim et al, Shteif et al and Kanthan KR.[6,13,14]

Apart from Oral and Maxillofacial Surgery, SCPB has been used either independently or in combination with Deep Cervical Plexus Block for Carotid endarterectomy[17], Lymph node biopsies[13], Thyroidectomy[18], Tracheostomy[19] and Vocal Cord Surgery[20] with good success rate.

Superficial Cervical Plexus Block is considered generally safe but complications may arise due inadvertent injection into deeper layers which are more often associated with Deep Cervical Plexus Block. Complications include toxic reaction due to intravascular injections or high blood levels with a resultant overdose. Accidental injection of volumes as small as 0.5 mL into the vertebral or carotid artery can produce reversible blindeness, immediate transient loss of consciousness, convulsions, or both.[10]Another possible complication is hematoma formation which can not only compress the major vessels in the neck but in some cases the pharynx and larynx as well. Furthermore, the surgeon may encounter difficult operating conditions caused by the hematoma within the neck.[21] Other complications may include phrenic nerve blockade, nerve injury, spinal anesthesia, hoarseness of voice although most of these complications are related to deep cervical plexus block. Therefore, patients with significant respiratory disease should not be considered for SCPB .[10,17]

CONCLUSION

This study concludes that, SCPB in combination with trigeminal V3 nerve block has a high success rate, low complication rate in incision and drainage of submandibular and submental space abscess. However, precaution should be taken to avoid complications.

RECOMMENDATION

Superficial Cervical Plexus Block can be performed under the guidance of ultrasonography. This may result in more predictable anesthesia.

LIMITATION OF THE STUDY

The limitations of this study include small sample size and failure of determination of duration of rescue analgesic intake.

CONFLICT OF INTEREST

None

FINANCIAL DISCLOSURE

None

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