

A Comparative Evaluation of Superficial Cervical Plexus Block Versus Local Infiltration for Pain Relief during Internal Jugular Vein Cannulation in Awake Patients - A Prospective Randomised Study

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Abstract: Introduction: Cannulation of Internal Jugular Vein is an important requirement in patients undergoing major surgeries. It is usually established before the surgery under local infiltration and mild sedation. However, most patients experience significant pain which increases the stress and anxiety to patient who about to undergo a major procedure. The superficial cervical plexus block is a better alternative to local infiltration in these patients and increases patient satisfaction and decreases preoperative stress. Methods: A prospective randomized controlled study was done to compare the effect of superficial cervical plexus block and local infiltration on pain during Internal Jugular Vein Cannulation. Sixty patients of ASA I - III were enrolled in the study. They were randomly assigned to group S to receive Superficial Cervical Plexus Block or group L to receive local infiltration. The patients vital data were monitored throughout the procedure and pain scores were assessed during various stages of the cannulation. Results: There was significant difference in pain scores between the groups during subcutaneous tunnelling and suturing. None of the patients in either group developed any complications. Conclusion: Superficial cervical plexus block is superior to local infiltration for pain relief during internal jugular vein cannulation.

Keywords: internal jugular vein, superficial cervical plexus block, local infiltration

1. Introduction

Central venous cannulation is an indispensable requirement for patients undergoing major surgery¹. These patients may require a prior central venous catheter placement for numerous reasons such as volume replacement, administration of vasopressors, highly concentrated and irritant medications, inability to cannulate peripheral veins following chemoradiation and nutritional support after surgery, emergency venous access, CVP measurement, transvenous pacing and PCWP measurement⁷.

Cannulation of the right internal jugular vein is preferred at our centre for such cases before the proposed surgery. Generally it is established before induction of anaesthesia or well before the surgery by giving sedation and local infiltration of local anaesthetic in the neck. In spite of that, patients do complain of pain especially during subcutaneous tunneling and suturing. The incidence of pain is increased when multiple attempts are required to cannulate the vein in the awake patient.

The superficial cervical plexus innervates the skin of jaw and neck upto clavicle thus enables a field block when anaesthetized thus allowing adequate anaesthesia not only for performing the cannulation but also for securing the catheter with sutures. It has been used successfully for surgeries like carotid endarterectomy². However administration of superficial cervical plexus block as an effective alternative to local infiltration before IJV cannulation is less studied and underutilized. This study was designed to compare analgesic efficacy of superficial

cervical plexus block versus local infiltration and assess the pain score of the patient.

The cervical plexus is situated in a groove between the longuscapitis and the middle scalene muscles, underneath the prevertebral fascia but not in the interscalene groove, as the anterior scalene muscle is almost absent cranially proximal to the C4 or C3 levels. Two nerve loops, which are formed by the union of the adjacent anterior spinal nerves from C2 to C4, give off four superficial sensory branches, listed in cranio-caudal order as follows: lesser occipital (C2, C3), great auricular (C2, C3), transverse cervical (C2, C3), and supraclavicular nerves (C3, C4). Afterwards, they pass through the interfascial space between the sternocleidomastoid and the prevertebral muscles before reaching the skin and superficial structures of the neck via the nerve point of the sternocleidomastoid muscle⁴.

The block is simple to perform and lacks major complications when administered properly and can improve patient satisfaction and decrease the stress of the patient preoperatively who is about to undergo a major surgery².

2. Aims and Objectives

The main objective of our study was to compare the pain relief caused by superficial cervical plexus block and local infiltration of 1% lignocaine when performing Internal Jugular vein cannulation.

3. Methodology

A prospective randomized study was conducted to compare pain relief during IJV cannulation using superficial cervical plexus block using fan technique and local infiltration. After approval from hospital ethics committee thirty patients of ASA grade 1 to 3 of age 20-60 years were allocated randomly to each group by computer generated tables. Appropriate consent was taken from the patients prior to performing the procedure. The study was conducted in the Government General Hospital, Kakinada from January to December 2019.

The following patients were excluded from the study:

- Patients with coagulopathy
- thrombocytopenia (below 50,000)
- infection at the site of insertion
- neck masses
- patients with psychiatric illness.
- Patients with focal neurological deficits

The patients were placed in supine position with the neck slightly extended and turned towards the left side to make the right sternocleidomastoid muscle prominent. The patient was draped after following sterile aseptic technique. The patients in group S were administered superficial cervical plexus block with 6-8 ml of 1% lignocaine by using the fan technique at the mid-point of posterior border of sternocleidomastoid^{5,8}. Patients in group L were given local infiltrations subcutaneously with 6-8 ml of 1% lignocaine at the apex of Sellidot's triangle. Negative aspiration was done every 3ml to confirm inadvertent puncture of blood vessels in both the groups. Patient's pulse rate, BP, ECG and SpO₂ were monitored during the procedure. A simple verbal pain rating scale was used to assess pain. Verbal contact was maintained with the patient throughout the procedure in order to assess the pain experienced by the patient.

Verbal Pain Rating Scale⁶:

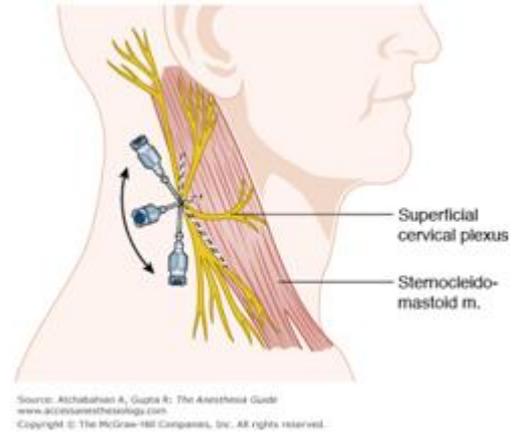
- No pain
- Mild pain
- Moderate pain
- Severe pain
- Very severe pain
- Worst possible pain

Student's unpaired t-test was used to analyze the continuous statistical data and chi square test was used for categorical data. The data showed a normal distribution.

Pain scores were assessed at the following time points during the procedure:

- During procedure
- During needle puncture
- Subcutaneous tunnelling
- Catheter insertion
- Securing and suturing

Possible complications like accidental puncture of carotid artery, hematoma, intravascular injection of local anaesthetic drug and local anaesthetic toxicity were assessed for.



4. Results

Demographic data of both groups was compared. There was no significant difference among both the groups.

The mean age of patients in group S was 49.7+/-7.24 and group L was 49.9+/-6.21. The difference was statistically insignificant. (p=0.89)

The mean height of patients in group S was 1.59+/-0.06 and group L was 1.58+/-0.05. The difference was statistically insignificant. (p=0.48)

The mean weight of patients in group S was 59.73+/-5.02 and group L was 59.16+/-5.62. The difference was statistically insignificant. (p=0.68)

There was statistically significant difference in pain scores during subcutaneous tunneling and suturing in these groups.

Time point	Cervical plexus block	Local infiltration
During procedure	1.37	1.33
During needle puncture	1.06	1.20
Subcutaneous tunnelling	1.13	2.33
Catheter insertion	1.16	1.23
Securing and suturing	1.20	2.5

No complications were observed in either of the groups.

5. Discussion

The mean pain score during administering the block was 1.37+/-0.49 in group S and 1.33+/-0.48 in group L which was not statistically significant (p=0.79). The mean pain score during IJV needle puncture in group S was 1.06+/-0.25 and 1.20+/-0.41 in group L which was not statistically significant (p = 0.13). The mean pain score during subcutaneous tunnelling in group S was 1.13±0.35 and 2.33±0.48 in group L which was statistically highly significant (p<0.0001). The mean pain score during insertion of the catheter was 1.16+/-0.38 in group S and 1.23 +/-0.43 in group L (p=0.53) which is not statistically significant. The mean pain score during suturing of catheter was 1.20 +/-0.41 in group S and 2.50+/-0.51 in group L (p<0.0001).

Thus the patients who were given superficial cervical plexus block had a better pain relief when compared to patients who

were given local infiltration especially during when dilating the tract and during securing the catheter.

Similar findings were observed by **Tikle et al.** who published a randomized control trial in 2018 where superficial cervical plexus block was compared to local infiltration for IJV cannulation in patients undergoing cardiac surgery¹.

Akelma et al. published a study in 2019 comparing the same techniques for port catheter placement in oncology patients and concluded that superficial cervical plexus block is superior to local infiltration for port placement also³.

Pain relief during central line placement is often a neglected aspect in patient care. More number of awake patients are undergoing central line placements for various indications and these patients expect to have satisfactory pain relief during invasive procedures like central line placement especially under the background of experiencing pain during multiple invasive investigations and therapeutic procedures which already cause increased stress to the patient.

6. Conclusion

The superficial cervical plexus block is superior to local infiltration for pain control during IJV cannulation. The result of our study concludes that superficial cervical plexus block provides better analgesia compared to local anaesthesia especially during the two painful stages of central line insertion ie subcutaneous tunneling and suture placement.

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