

ORIGINAL RESEARCH

Ultrasound guided cervical plexus block versus local infiltration during internal jugular vein cannulation: Patient satisfaction

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ABSTRACT

Central venous cannulation is a commonly performed procedure which facilitates resuscitation, nutritional support and long-term vascular access. Two commonly used methods to reduce pain experienced by patient while undergoing placement of internal jugular vein access by local infiltration and cervical plexus block. After obtaining the approval from the Ethical committee and the Institutional review board and obtaining a well-informed written consent, 100 ASA Grade I, II, III patients who were undergoing various elective and emergency surgeries requiring central venous cannulation were chosen. The patients were randomized into two groups using computer generated random number tables. It shows significant difference in patient satisfaction scores between two study groups at all time points during internal jugular vein (IJV) cannulation except time 0 (baseline). Overall patient satisfaction was much better in ultrasound guided intermediate cervical plexus block group during various procedural steps of IJV cannulation.

Key words: Central venous cannulation, ultrasound guided cervical plexus, versus local infiltration

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INTRODUCTION

Regional anesthesia can be part of a multi-modal treatment plan to mitigate pain for clinical scenarios frequently seen in an emergency department and in the perioperative setting. Regional anaesthesia traces its origin to Dr. Carl Kohler who in 1884 employed a solution of cocaine for topical corneal anaesthesia in patients undergoing eye surgery. This marked the start of a new era in medicine namely the use of regional anaesthetics for prevention of pain associated with surgery in 1904, Einhorn, the chemist synthesized procaine, an ester formed by the combination of para-amino benzoic acid and diethyl amine ethanol further was contributed by Nils Lofgren who synthesized Lignocaine in 1943.^{1,2}

Perhaps almost as important as the synthesis of lignocaine was Lofgren's systematic study of a whole range of compounds (Lofgren 1948), so laying

the foundation for all subsequent studies of local anaesthetic drugs. From these studies have come derivatives of lignocaine such as mepivacaine, prilocaine, ropivacaine, bupivacaine and etidocaine. Preoperatively, Cervical Plexus blocks can be employed for a variety of surgical procedures. In the emergency department, it can be utilized for insertion of internal jugular central venous catheters, treatment of clavicular fractures and repairing lacerations, and draining abscesses that involve the earlobe and submandibular areas. Cervical plexus blocks are easy to perform and provide anesthesia and analgesia for the surgical procedure in the distribution of C2 to C4, including carotid endarterectomies, lymph node dissection, and plastic surgery. There are three methods of Cervical plexus blocks: Superficial, Intermediate and Deep.^{3,4}

Central venous cannulation is a commonly performed procedure which facilitates resuscitation, nutritional support and long-term vascular access. Two commonly used methods to reduce pain experienced by patient while undergoing placement of internal jugular vein access by local infiltration and cervical plexus block. Cervical plexus block produces a field of anaesthesia from superior border running diagonally from the occiput through the lower ear to the tip of the chin. Inferior border of this area runs from the sternoclavicular joint along the inferior border of the clavicle, lateral side of shoulder, and also anaesthetises muscle in subcutaneous plane. Internal Jugular Vein cannulation using ultrasound guidance has become a common practice as it provides improved safety profile. Ultrasound imaging of IJV and surrounding anatomy during central venous cannulation both facilitates identification of the vein and improves first-pass cannulation but also decreases the incidence of injury to adjacent arterial vessels and underlying pleura.^{5,6}

METHODOLOGY

STUDY DESIGN: A prospective comparative study.

STUDY POPULATION: After obtaining the approval from the Ethical committee and the Institutional review board and obtaining a well-informed written consent, 100 ASA Grade I, II, III patients who were undergoing various elective and emergency surgeries requiring central venous cannulation were chosen. The patients were randomized into two groups using computer generated random number tables.

Likert scale used for assessing patient satisfaction.

Likert Scale: Very much satisfied- 5, Somewhat satisfied-4, Undecided-3, Not really satisfied-2, Not at all satisfied-1

Patient satisfaction assessed by likert scale at following procedural steps during IJV cannulation:
Time 0: At baseline 5 minutes prior to start of procedure.

Time 1: During administration of block/local infiltration.

Time 2: During needle puncture.

Time 3: During subcutaneous tunneling.

Time 4: At insertion of catheter.

Time 5: During securing and suturing.

Time 6: 5 minutes after procedure.

BLINDING: Single blind study.

SAMPLE SIZE: Considering dropouts, and to have better power we studied 50 patients in each group. Total 100

RANDOMIZATION: Patients were randomized based on computer generated randomization into two groups.

GROUP 1: (n=50) Patients who were given ultrasound guided intermediate cervical plexus block with 5-7ml of 0.75% Ropivacaine.

GROUP 2: (n=50) Patients who were given local infiltration with 5-7ml of 0.75% Ropivacaine.

INCLUSION CRITERIA

- Age group 18-75 years.
- ASA grade I, II, III patients of either sex.
- Patients undergoing various elective surgeries requiring Internal jugular vein cannulation.
- Patients undergoing various emergency surgeries requiring Internal jugular vein cannulation.

EXCLUSION CRITERIA

- Patient refusal for the study.
- Age <18 or >75 years.
- Patients receiving anticoagulants.
- Patients with infection/local pathology at the site of administration of block.
- Patients allergic to local anaesthetic agents.
- Patients with coagulation disorder.
- ASA grade \geq IV.
- Patients with distorted local anatomy.

RESULTS

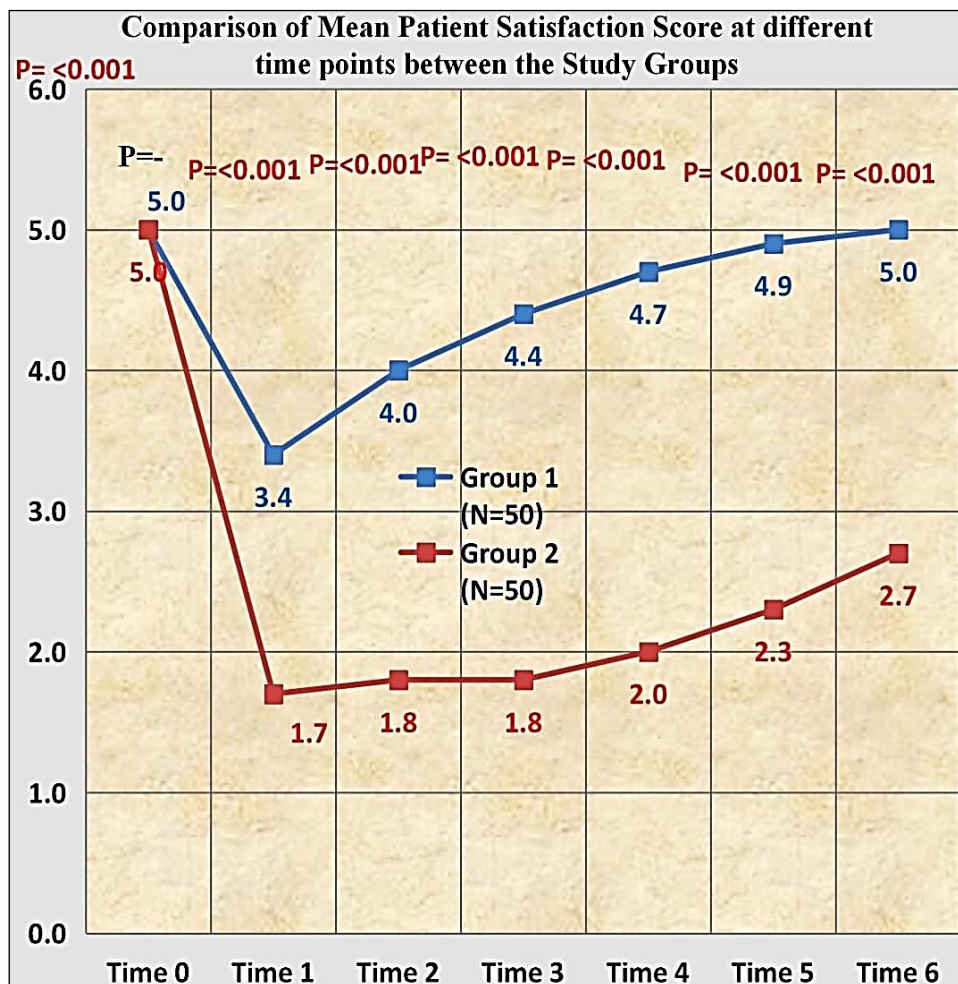
Table 1: Comparison of Patient Satisfaction scores between the study groups at different time points

Time	Group	N	Mean	SD	Min	Max.	p value
Time 0	Group 1	50	5.0	<0.001	5	5	_*
	Group 2	50	5.0	<0.001	5	5	
Time 1	Group 1	50	3.4	0.525	2	4	<0.001
	Group 2	50	1.7	0.863	1	4	
Time 2	Group 1	50	4.0	0.622	3	5	<0.001
	Group 2	50	1.8	0.864	1	4	
Time 3	Group 1	50	4.4	0.571	3	5	<0.001
	Group 2	50	1.8	0.857	1	4	
Time 4	Group 1	50	4.7	0.463	4	5	<0.001
	Group 2	50	2.0	0.948	1	4	
Time 5	Group 1	50	4.9	0.328	4	5	<0.001
	Group 2	50	2.3	0.886	1	4	
Time 6	Group 1	50	5.0	<0.001	5	5	<0.001

	Group 2	50	2.7	0.991	1	5	
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*Not applicable as time 0 is preprocedural.

It shows significant difference in patient satisfaction scores between two study groups at all time points except time 0 (baseline). Overall patient satisfaction was much better in Group 1 during various procedural steps of IJV cannulation.



Graph 1: Comparison of mean Patient Satisfaction Scores between study groups

There were no complications noted in both study groups.

DISCUSSION

Table 2: Comparison of Patient Satisfaction and Incidence of Complications

Study	Patient Satisfaction	Complications
Arun Nagdev, MD and Andrew Herring, MD ⁷	Better in SCPB	Nil
Taner Ciftci, Hayrettin Daskaya, Mehmet B Yıldırım, Haluk Söylemez ⁸	Significantly better in terms of patient satisfaction in SCPB	Nil
Harshwardhan A. Tikle, Bhaskar Murlidhar Patil ⁹	Significantly better in SCPB group than local infiltration group	Nil
Dr. Venkata Karthik Reddy Kovvuri, Dr. Vishnumahesh Babu Batchu ¹⁰	Significantly better in SCPB group as compared to local infiltration group	Nil
Present Study	Statistically significant and better in Intermediate CPB as compared to local infiltration group at all time points in various procedural steps of IJV cannulation	Nil

The patient satisfaction is better at all time points of procedure in superficial cervical plexus block (SCPB) in the study conducted by Arun Nagdev, MD, and Andrew Herring, MD. The study conducted by Taner Ciftci, Hayrettin Daskaya, Mehmet B Yıldırım, Haluk Söylemez shows better patient satisfaction at time of skin puncture, dilatation and skin suturing in SCPB. Harshwardhan A. Tikle, Bhaskar Murlidhar Patil documented that significantly better patient satisfaction at all time points of IJV cannulation in SCPB group as compared with local infiltration group. In a study conducted by Dr. Venkata Karthik Reddy Kovvuri, Dr. Vishnumahesh Babu Batchu shows the significantly better patient satisfaction during subcutaneous tunnelling and suturing in SCPB group as compared to local infiltration group.

In present study, significantly better patient satisfaction in intermediate CPB as compared to local infiltration group at all time points in various procedural steps of IJV cannulation. No complications documented in studies conducted by Arun Nagdev, MD, and Andrew Herring, MD, Taner Ciftci, Hayrettin Daskaya, Mehmet B Yıldırım, Haluk Söylemez, Harshwardhan A. Tikle, Bhaskar Murlidhar Patil, Dr. Venkata Karthik Reddy Kovvuri, Dr. Vishnumahesh Babu Batchu. No complications in present study also.

CONCLUSION

Chi Square test shows significant difference in the Patient Satisfaction Scores between two study groups at time of needle puncture, subcutaneous tunneling, at insertion of catheter and securing and suturing and 5 minutes after procedure. Based on these observations from the study it is concluded that Ultrasound guided Intermediate Cervical Plexus Block is superior to local infiltration in terms of pain relief and patient satisfaction during internal jugular vein cannulation.

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