e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(3); 1055-1065

Original Research Article

A Comparative Study of Anatomical Landmark V/S USG Guided Technique for Superior Laryngeal Nerve Block to Facilitate Awake Fibreoptic Intubation with Predicted Difficult Airway: A Randomized Interventional Study at SMS Medical College and Attached Group of Hospitals, Jaipur During 2020-2022

Samiksha Meena[1*], Shriphal Meena[2], Gopal Bansal[3], Navleen Khurana[4]

[1]Junior Resident, Department of Anaesthesiology, SMS Medical College and Hospital, Jaipur, India
[2]Head of Department, Department of Anaesthesiology, SMS Medical College and hospital, Jaipur, India
[3]Assistant professor, Department of Anaesthesiology, SMS Medical College and hospital, Jaipur, India
[4]Junior Resident, Department of Anaesthesiology, SMS Medical College and Hospital, Jaipur, India

Received: 25-12-2023 / Revised: 23-01-2024 / Accepted: 26-02-2024
Corresponding Author: Dr. Samiksha Meena
Conflict of interest: Nil

Abstract:

Aims and Objectives: This study was undertaken to evaluate a comparison of anatomical landmark v/s USG guided technique for superior laryngeal nerve block to facilitate awake fiberoptic intubation with predicted difficult airway-a randomized interventional study at SMS medical college and hospitals, Jaipur.

Material and Methods: The Hospital based randomized comparative interventional study was conducted at S.M.S medical college and attached group of hospitals, Jaipur. The study was conducted in following two groups of patients. GROUP A (n=30/group): Patients received 2 ml of 2% lignocaine injection via anatomical landmark guided technique to block bilateral SLN. GROUP B (n=30/group): Patients received 2 ml of 2% lignocaine injection via USG guided technique to block bilateral SLN.

Results: There was statistically significant difference between the mean PR, SBP, DBP and MAP in two groups starting from after block which was significantly lower recorded in group 2 then group 1. Mean quality of airway anaesthesia was 1.98 in group 1 and mean quality of airway anaesthesia was 0.97 year in group 2. Mean NRS was 2 in group 1 and mean NRS was 1.09 year in group 2. Mean duration of intubation was 5.26 in group 1 and mean duration of intubation was 1.05 year in group 2. There was statistically significant difference between two groups in terms of quality of airway anaesthesia, NRS and duration of intubation distribution.

Conclusion: Using ultrasound in the longitudinal orientation to identify the greater horn of the hyoid bone and the thyroid cartilage as landmarks, combined with an out-of-plane technique, may be an alternative method for ultrasound-guided ibSLN block. However, more studies are necessary to prove the reliability of the new method, especially in live patients.

Keywords: Fiberoptic Intubation, SLN block, Anatomical Landmark.

Introduction

Awake intubation remains the gold standard for anticipated difficult airway management where performance time and ease, patient comfort and safety primarily depend on the quality of upper airway anaesthesia provided either topically or by regional blocks. [1] Topical anaesthesia is relatively easy, effective and well tolerated, but not without risks. In a patient with a tongue base abscess, systemic local anaesthetic toxicity has been reported after topical anaesthesia with lidocaine for awake fiberoptic intubation. [2] In heavily sedated patients with unstable cervical fracture, insufficient topicalization led to laryngospasm with total upper airway obstruction as a result of fiberoptic pharyngeal mucosa stimulation.[3] Airway blocks, on the other hand, are considered technically more difficult to perform and generally carry a higher risk of complications including bleeding, nerve damage, and intravascular injection. However, in experienced hands, they can be useful as they provide excellent anaesthesia and intubating conditions.[4] For complete upper airway anaesthesia, a bilateral glossopharyngeal nerve (GPN) block, bilateral superior laryngeal nerve (SLN) block and translaryngeal injection are required. Children are not the small size adults and have the distinct physiology of their own, distinct from adult which makes the paediatric anaesthesia diverse from adult anaesthesia. Paediatric larynx is funnel shaped which is markedly different from cylindrical adult airway. [5]Functional residual capacity of children`s airway is smaller than adults which makes them more prone for hypoxemia. It is known to have proportionately higher complications if inappropriate endotracheal tube (ETT) is used in paediatric airways. [6] The superior laryngeal nerve slants forward to the greater horn of the hyoid bone before dividing into an internal and an external branch. The former enters the thyrohyoid membrane through a foramen and provides visceral sensory and secret motor innervation to the larynx above the true cords, whereas the latter descends along the outside of the thyrohyoid membrane beneath the sternothyroid muscle to the cricothyroid muscle, which it supplies with motor fibers.

A block of the internal branch of the superior laryngeal nerve (iSLN) provides anaesthesia to the base of the tongue, posterior surface of the epiglottis, aryepiglottic folds and arytenoids, [7] and abolishes the glottis closure reflex. Thus far, various techniques have been suggested. The standard 'blind' landmark approach uses the close anatomical relation of the iSLN to the greater horn of the hyoid bone and the thyrohyoid membrane and requires some degree of neck extension, access to the anterior and lateral neck, and the ability to identify the aforementioned structures. [8] Nevertheless, it carries the risk of vessel puncture with hematoma formation or local anaesthetic toxicity. The SLN block is performed in a supine patient with the hyoid bone firmly displaced towards the side to be blocked. The short needle is then advanced just below its great horn, 1-2 cm deep into the thyrohyoid membrane, after which 2-4 mL of 1%-2% lidocaine is injected. [9]

Ultrasonography (US) has already been applied in assisting the performance of iSLN block, however, yielding conflicting results. Barberet G (2012) [10] et al., for instance, describe a 'SLN space' as an anatomical basis for echo-guided SLN block after being unable to identify the SLN in 100 volunteers using a 12 MHz linear probe. They could not exclude the nerve being present in the SLN space, defined by them to be located between the hyoid bone superiorly, thyroid cartilage inferiorly, thyrohyoid muscle anteriorly and thyrohyoid membrane posteriorly – the structures optimally visualized in 81% of their scans. Iida et al. demonstrated clinical usefulness of a similar approach by injecting lidocaine at the surface of the greater horn of the hyoid bone, using an US-guided in-plane technique in a patient with laryngeal abscess. [11] Thus taking into consideration the above studies and the life-saving advantages of awake intubation, especially in difficult airway conditions this study was undertaken to evaluate a comparison of anatomical landmark v/s USG guided technique for superior laryngeal nerve block to facilitate awake fiberoptic intubation with predicted difficult airway-a randomized interventional study at SMS medical college and hospitals, Jaipur.

Aim: To compare anatomical landmark technique v/s USG guided technique for Superior laryngeal nerve block to facilitate awake fiber-optic intubation in cases with predicted difficult airway.

Objectives:

Primary Objectives: To assess and compare the duration of intubation and quality of airway anaesthesia by anatomical landmark V/S USG guided technique among the two groups.

Secondary Objectives

1. To assess and compare hemodynamic parameters: Heart Rate, Mean Blood Pressure, Systolic Blood Pressure, Diastolic Blood Pressure at different time intervals in between the two groups.
2. To assess and compare pain and discomfort by NRS score in 1H postoperative period in between the two groups.
3. To find out and compare the proportion of cases with complications.

Materials and Methods

Study Location: The study was conducted at S.M.S medical college and attached group of hospitals, Jaipur. Due permission from institutional ethics committee and research review board was obtained.

Study Design: Hospital based randomized comparative interventional study.

Study Duration: After approval of the research review board till the completion of sample size.

Sample Size: A sample size of 30 cases in each of two groups was required at 95% confidence and 80% power to verify the expected difference of 38±9.57 seconds in mean duration of intubation in both groups. This sample size was adequate to cover patient tolerance score, hemodynamic variable. Sample size is adequate to cover patient tolerance score, hemodynamic variables. (Ambi US et al)

Randomisation: It was a statistical procedure by which the participants were be allocated into 2 different groups. In this study randomization was done by opaque sealed envelope technique.

Study Groups: The study was conducted in following two groups of patients. Each group was consisting of 30 patients (n=30/group)

Group A: Patients was received 2 ml of 2% lignocaine injection via anatomical landmark guided technique to block bilateral SLN.

Group B: Patients was received 2 ml of 2% lignocaine injection via USG guided technique to block bilateral SLN.

Inclusion Criteria

- Patient undergoing surgeries requiring nasal intubation.
- Patient willing to give written informed consent
- Patient of either sex
- Patient with anticipated difficult intubation (Mallampati grade 3 4, inter incisior gap< 2.5 cm)
- Age group 18-50

Exclusion Criteria

- Allergic to the drugs involved in the study.
- Bleeding disorders.
- Patients with situation in which we are unable to give block (i.e neck contracture, burn, neck mass)
- Patient with Psychiatric and mental disorders
- BMI > 30 kg/m2
- Pre-existing cardiovascular disease

Procedure

Prior to surgery all Patients was explained about the anaesthetic technique and a detailed PAC with general physical examination, present and past medical and surgical history, vitals and routine investigations was done. On arrival of patient in the operation theatre patient was identified, overnight fasting status confirmed, pre-anaesthestetic checkup, written and informed consent was checked. All routine monitors were attached and baseline parameters like heart rate, systolic blood pressure, diastolic blood pressure, saturation and end tidal carbon dioxide will be noted. Peripheral IV line secured and IV Fluid infusion ringer lactate was started. Nebulisation with 3 mL 4% lignocaine was given over 10 min to the patients, and patient was mpre-medicated with intravenous glycopyrrolate 10 µg/kg and midazolam 1mg. Oxygen supplementation was given throughout the procedure.

Group A In anatomical landmark technique, with patient in supine position and head slightly extended, greater horn of hyoid (GHH) bone and thyroid cartilage was identified, and under aseptic precautions, the internal branch SLN will be blocked by inserting the 23-gauge hypodermic needle below and slightly anterior to the GHH. 1 mL 2% lignocaine was deposited, and the procedure will be repeated on the contralateral side. Group B In ultrasound technique, the portable ultrasound device and linear 6–13 MHz ultrasound transducer will be used. Under aseptic precautions, the probe was placed over the submandibular area with parasagittal orientation. The GHH bone and thyroid cartilage was identified as hyper echoic structures on sonography.

The thyrohyoid muscle and thyrohyoid membrane were between these two structures. SLN space was defined as that bounded by hyoid bone cephalad, thyroid cartilage caudally, thyrohyoid muscle anteriorly and thyrohyoid membrane and pre-epiglottic space posteriorly.

By the out-of-plane approach, 1 mL 2% lignocaine was injected using 23-gauge hypodermic needle between GHH bone and thyroid cartilage just above the thyrohyoid membrane. The procedure was repeated on contralateral side. Transtracheal injection with 3 mL 2% lignocaine between thyroid cartilage and cricoid ring was administered to all patients.

An endotracheal tube (ETT) of appropriate size (softened in warm water) was mounted over the fiberscope and introduced. The fiber-optic will be maneuvered across the vocal cord into the trachea. A lubricated ETT was passed over it into the trachea and positioned 2-3 cm above the carina. The cuff inflated, and the Fiberscope withdrawn.

Hemodynamic parameters, including heart rate (HR), systolic blood pressure (SBP), and diastolic blood pressure (DBP), as well as oxygen saturation, will be recorded during Pre-Oxygenation, at the starting of introduction of scope and then every minute until the placement of endotracheal tube and 1 minute and 3 minute after intubation. Anaesthesia was induced with Inj propofol 2mg/kg intravenously slowly and Inj Atracurium loading 0.5 mg/kg, the surgical procedure proceeded as planned.

Anaesthesia was maintained with 40% O_2+60% N_2O, Inj Atracurium 0.1 mg/kg and Sevoflurane 1-2 MAC. At the end of surgery neuromuscular blockade was reversed with Inj Neostigmine 0.05 mg/kg iv and Inj Glycopyrrolate 0.01 mg/kg iv and after extubation patient will be shifted to recovery room. Patient pain and discomfort score was assessed after 1h postoperatively by NRS.

Outcome Variables

1. Mean time of duration of Intubation
2. Median score of Quality of airway Anaesthesia.
3. Hemodynamic Parameters (Mean SBP, DBP, MAP, HR)
4. Proportion of cases with complications.
5. Pain and discomfort score in12h post operatively (NRS scale).

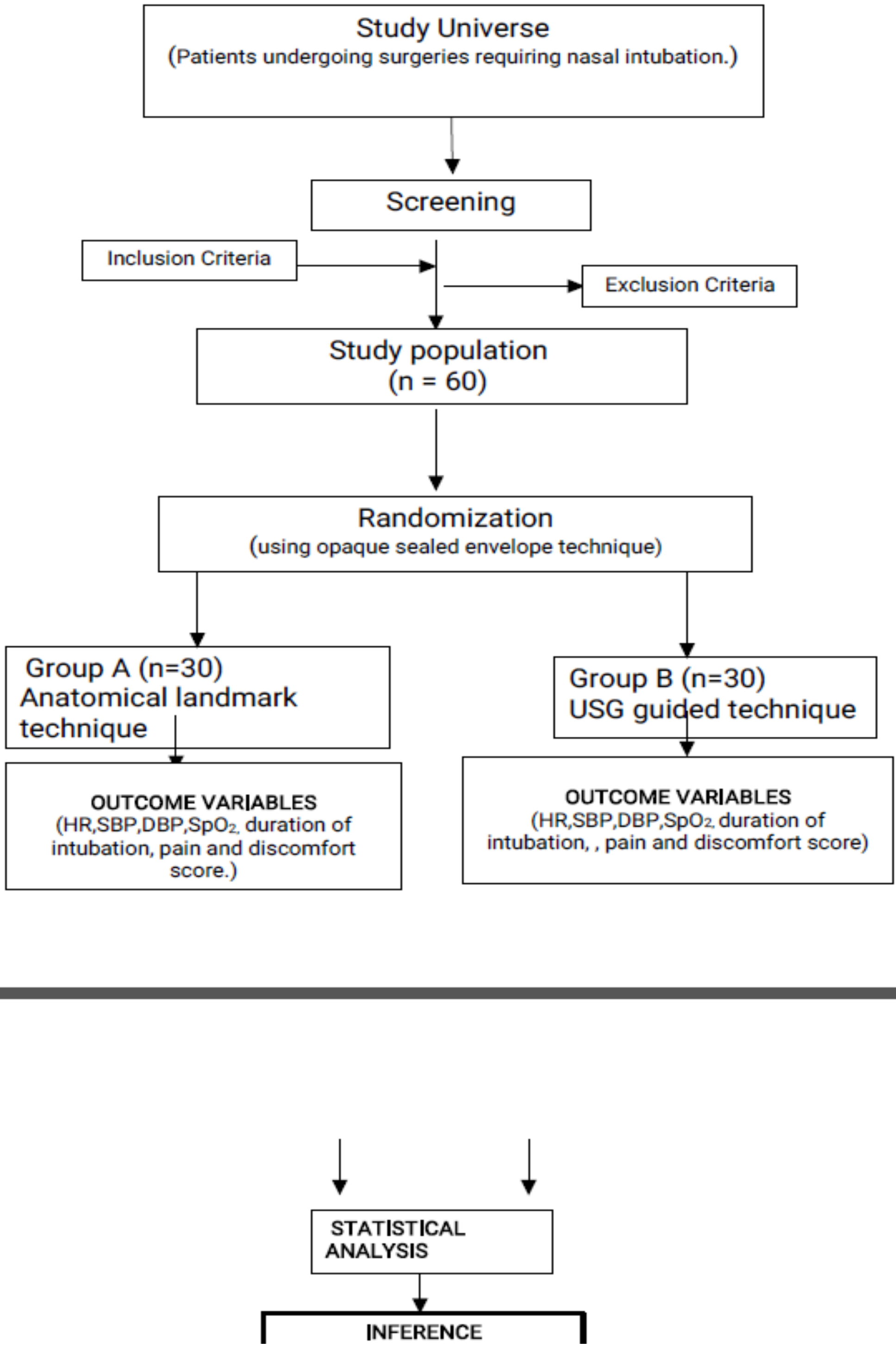

Chart 1:

Flow Chart

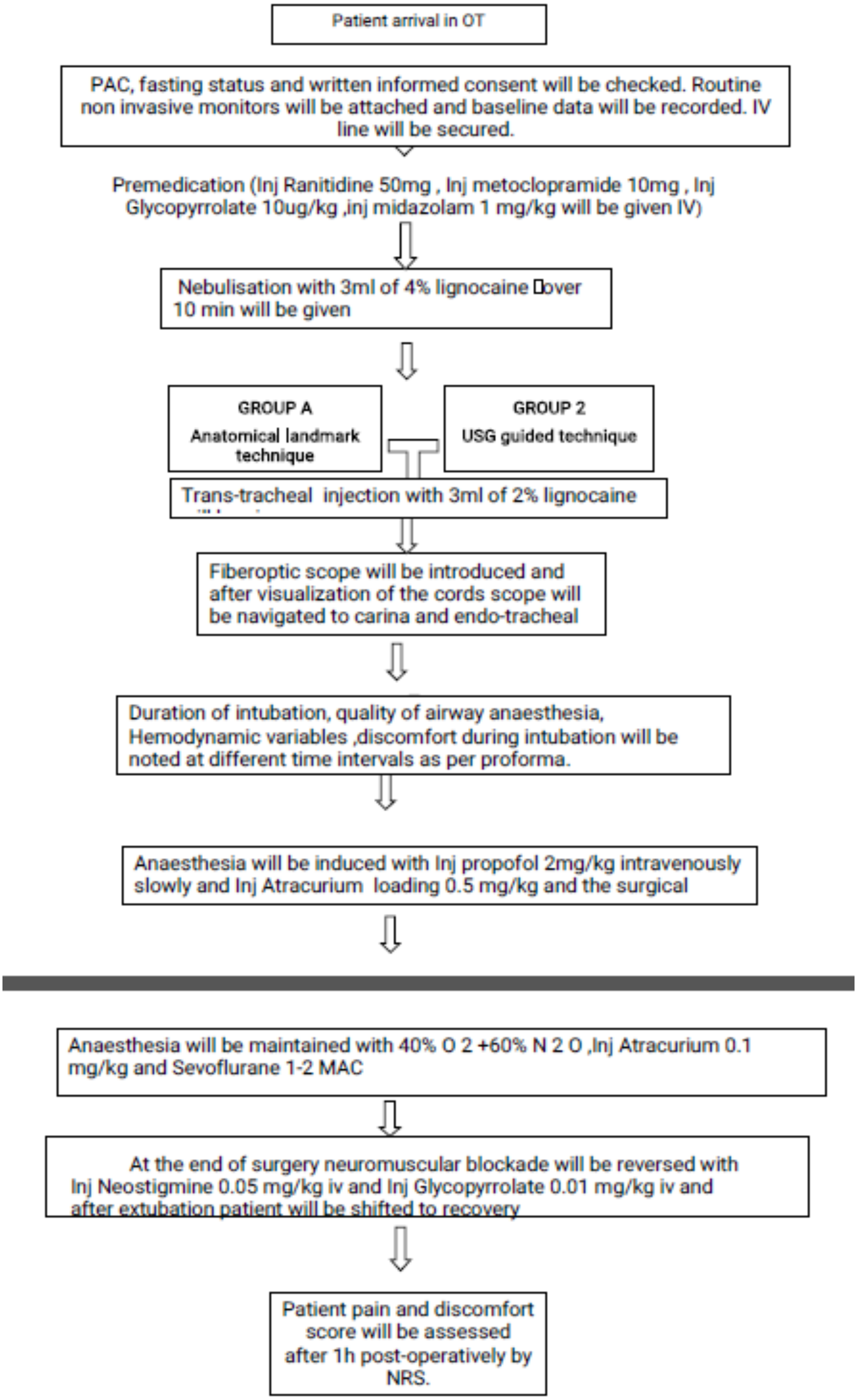
Patient arrival in OT
PAC, fasting status and written informed consent will be checked. Routine non invasive monitors will be attached and baseline data will be recorded. IV line will be secured.
Premedication (Inj Ranitidine 50mg , Inj metoclopramide 10mg , Inj Glycopyrrolate 10ug/kg ,inj midazolam 1 mg/kg will be given IV)
Nebulisation with 3ml of 4% lignocaine over 10 min will be given
GROUP A
Anatomical landmark technique
GROUP 2
USG guided technique
Trans-tracheal injection with 3ml of 2% lignocaine
Fiberoptic scope will be introduced and after visualization of the cords scope will be navigated to carina and endo-tracheal
Duration of intubation, quality of airway anaesthesia, Hemodynamic variables ,discomfort during intubation will be noted at different time intervals as per proforma.
Anaesthesia will be induced with Inj propofol 2mg/kg intravenously slowly and Inj Atracurium loading 0.5 mg/kg and the surgical
Anaesthesia will be maintained with 40% O 2 +60% N 2 O ,Inj Atracurium 0.1 mg/kg and Sevoflurane 1-2 MAC
At the end of surgery neuromuscular blockade will be reversed with Inj Neostigmine 0.05 mg/kg iv and Inj Glycopyrrolate 0.01 mg/kg iv and after extubation patient will be shifted to recovery
Patient pain and discomfort score will be assessed after 1h post-operatively by NRS.

Chart 2:

Statistical Analysis: Statistical analysis was performed with SPSS, version 25 for windows statistical software package (SPSS INC., CHICAGO, IL, USA).

• The continuous data (PR, SBP, DBP, MAP and SPO2) were presented as mean and standard deviation and compared between groups using **student's t-test**.

• The categorical data were presented as numbers and percentage and compared between groups using **chi square test**.

• The probability was considered to be statistically significant if < 0.05 and highly significant if < 0.001.

Observation and results

Mean age was 44.6 year in group 1 and mean age was 45.9 year in group 2. There was no statistically significant difference between two groups in terms of age distribution with P- value of 0.448 by using student's t- test

Male were 86.7% and female were 13.3% in group 1 and male were 936.3% and female were 6.7% in group 2. The observations were compared using Chi- square test. There was no statistically significant difference between the groups in terms of sex distribution with p-value of 0.38

ASA grade I was 40% and ASA grade II was 60% in group 1 and ASA grade I was 50% and ASA grade II was 50% in group 2. The observations were compared using Chi- square test. There was no statistically significant difference between the groups in terms of sex distribution with p-value of 0.43

1 finger mouth opening was 60% and 2 finger mouth opening was 40% in both group 1 and 2. The observations were compared using Chi- square test. There was no statistically significant difference between the groups in terms of sex distribution with p-value of 1.00

Mallampati score 3 was 60% and Mallampati score 4 was 40% in group 1 and ASA grade IMallampati score 3 was 40% and Mallampati score 4 was 50% in group 2. The observations were compared using Chi- square test. There was no statistically significant difference between the groups in terms of sex distribution with p-value of 0.12.

Table 1: PR wise distribution of the study

	Group 1		**Group 2**		**P value**
	Mean	**Std. Devi**	**Mean**	**Std. Dev**	
Baseline	76.93	10.26	77.57	10.378	0.86
After pre medication	87.67	16.187	81.17	9.563	0.06
After block	93.87	14.818	82.63	9.272	0.001 (S)
Introduction of Scope	98.67	12.890	85.87	8.569	0.001 (S)
During intubation	104.33	13.599	89.33	9.908	0.001 (S)
After 1 min	93.33	11.807	82.53	9.104	0.001 (S)
After 3 min	88.87	15.231	79.47	7.842	0.001 (S)

There was statistically significant difference between the mean PR in two groups starting from after block which was significantly lower recorded in group 2 then group 1 by using student's t- test.

Table 2: SBP wise distribution of the study

	Group 1		**Group 2**		**P value**
	Mean	**Std. Devi**	**Mean**	**Std. Dev**	
Baseline	109.80	31.228	118.67	6.609	0.13
After pre medication	115.80	11.651	119.17	7.307	0.18
After block	113.40	12.615	118.93	6.938	0.04 (S)
Introduction of Scope	113.40	12.615	77.56	5.89	0.001 (S)
during INTUBATION	126.17	7.86	124.09	8.98	0.001 (S)
After 1 min	111.40	9.576	120.90	9.700	0.001 (S)
After 3 min	108.47	11.470	121.87	8.003	0.001 (S)

There was statistically significant difference between the mean SBP in two groups starting from after block which was significantly good recorded in group 2 then group 1 by using student's t- test.

Table 3: DBP wise distribution of the study

	Group 1		**Group 2**		**P value**
	Mean	**Std. Devi**	**Mean**	**Std. Dev**	
Baseline	79.73	4.705	78.6	4.12	0.97
After pre medication	77.60	5.035	75.37	5.893	0.12
After block	77.56	5.89	74.57	6.897	0.01 (S)

Introduction of Scope	79.67	7.434	76.05	5.37	0.001 (S)
during INTUBATION	84.87	6.580	80.73	5.953	0.001 (S)
After 1 min	76.14	6.89	78.67	7.734	0.001 (S)
After 3 min	76.13	6.17	78.93	6.953	0.001 (S)

There was statistically significant difference between the mean DBP in two groups starting from after block which was significantly good recorded in group 2 then group 1 by using student's t- test.

Table 4: MAP wise distribution of the study

	Group 1		**Group 2**		**P value**
	Mean	**Std. Devi**	**Mean**	**Std. Dev**	
Baseline	91.87	6.101	90.50	4.216	0.31
After pre medication	89.93	7.469	89.77	5.456	0.92
After block	86.33	7.526	90.86	5.67	0.01 (S)
Introduction of Scope	86.47	8.874	92.87	5.680	0.001 (S)
during Intubation	92.07	5.36	96.74	5.11	0.001 (S)
After 1 min	85.73	5.959	92.63	7.881	0.001 (S)
After 3 min	90.78	6.03	89.08	5.13	0.001 (S)

There was statistically significant difference between the mean MAP in two groups starting from after block which was significantly slightly higher recorded in group 2 then group 1 by using student's t- test.

There was statistically non-significant difference between the mean SPO2 in two groups by using student's t-test.

Table 5: Descriptive data of the study

	Group 1		**Group 2**		**P value**
	Mean	**Std. Devi**	**Mean**	**Std. Dev**	
Quality of airway anaesthesia	1.98	0.11	.97	.556	0.001 (S)
NRS	2.00	.910	1.09	0.24	0.001 (S)
Duration of intubation	5.26	0.89	1.05	0.56	0.001 (S)

Mean quality of airway anaesthesia was 1.98 in group 1 and mean quality of airway anaesthesia was 0.97 year in group 2. There was statistically significant difference between two groups in terms of quality of airway anaesthesia distribution with P-value of 0.001 by using student's t- test.

Mean NRS was 2 in group 1 and mean NRS was 1.09 year in group 2. There was statistically significant difference between two groups in terms of NRS distribution with P- value of 0.001 by using student's t- test.

Mean duration of intubation was 5.26 in group 1 and mean duration of intubation was 1.05 year in group 2. There was statistically significant difference between two groups in terms of duration of intubation distribution with P- value of 0.001 by using student's t- test.

Discussion

The present study was conducted in the Department of Anaesthesiology, S.M.S. Medical College and Attached Group of Hospitals, Jaipur with permission from institutional ethics committee. In this study, we aimed to compare the hemodynamic response of anatomical landmark versus USG guided SLN block to facilitate awake fiberoptic intubation in patients with anticipated difficult airway.

For this study 60 patients aged between 18 to 55 years, with ASA grade 1 or 2, undergoing elective surgeries under general anaesthesia were randomly selected after applying inclusion and exclusion criteria. These patients were divided into two groups, 30 patients in group A (anatomical landmark SLN block group) and 30 patients in group B (USG guided SLN block group). There was no statistically significant difference between both groups with regards to age (p- value > 0.05). Other factors like sex distribution, ASA grade distribution and Mallampati grade distribution were also comparable in both groups (p- value > 0.05). The mean baseline hemodynamic parameters (HR, SBP, DBP, MAP) were comparable in both the groups (p - value > 0.05). Thus, the randomization was done adequately and the desired study and control populations were achieved.

There is one report revealing that the anatomic location of the ibSLN is not influenced by factors such as age, sex or ethnicity, using landmarks as a guide is reliable. [12] In the study, age and gender showed statistically non-significant result. In addition, the pulse of the superior laryngeal artery could probably be detected using color Doppler and used as a surrogate to locate the position of the superior laryngeal nerve and inject local anaesthetic agents. [13]

In the present study, mean age was 44.6 year in group A and mean age was 45.9 year in group B. Male were 86.7% and female were 13.3% in group A and male were 93.3% and female were 6.7% in group B. HassaneinA et al [14] was recorded mean age was 40.67 year in group A (nebulisation) and 37 years in group B (nebulisation and airway nerve block). There was 15 males and 10 female patients in group A while 13 males and 12 females patients in group B. Ambi et al [15] was also showed that mean age mean age was 38.3 years in group U(ultrasound technique)and mean age was 37.8 years in group L(anatomical landmark technique). Male were 12 and female were 8 in group U and male were 11 and female were 9 in group L. Ramkumar R et al [16] was found mean age was 49.9 years in group C and 52.5 years in group L with higher number of male patients in group C (19) and group L (17). [17]

In this study, haemodynamic stability was significantly maintained by USG guided technique group.

The baseline mean heart rate in group A and group B was 76.93 ± 10.26 beats per minute (bpm), and 77.57 ± 10.37 bpm respectively. The difference between baseline mean heart rate of two groups was statistically not significant (p - value > 0.05). In our study after giving block; the mean heart rate increased in both groups from baseline that was 93.87 ± 14.82 bpm in group A and 82.63 ± 9.20 bpm in group B at start of fiberoptic scope insertion. The difference between mean heart rate of two group at start of fiberoptic scope insertion was statistically significant (p - value < 0.05). During fiberoptic scopy the mean heart rate increased in both the groups. In group A it was 98.67 ± 12.89 bpm at introduction of scope, 104.33 ± 13.59 bpm during intubation, 93.33 ± 11.81 bpm after 1 min and 88.87 ± 15.23 bpm 3 min post intubation.

In group B the mean heart rate was 85.87 ± 8 .56 bpm at introduction of scope, 89.33 ± 9.91 bpm during intubation, 82.53 ± 9.10 bpm after 1min, and 79.47 ± 7.84 bpm 3min post intubation. When the mean heart rates at different time points during the fiberoptic scopy were compared between both groups, it was found that the mean heart rates in group A were higher than in group B with significant differences during intubation, after 1 minute and 3 minute. (p - value < 0.001). Similar observation was made by Ambi et al, [15] that the effect of tracheal intubation on HR and MAP was significantly higher in Group L (anatomical landmark technique) than Group U (ultrasound technique). Ramkumar R et al [16] were also showed significantly improvement in SBP and DBP. The baseline mean SBP in group A and group B was 109.8 ± 31.228 mmHg and 118.67 ± 6.609 mmHg respectively. The difference between baseline mean heart rate of two groups was statistically not significant (p - value > 0.05). In our study after giving block; the mean SBP increased in both groups from baseline that was 113.4 ± 12.61 mmHg in group A and 118.93 ± 6.938 mmHg in group B at start of fiberoptic scope insertion. The difference between mean SBP of two group at start of fiberoptic scope insertion was statistically significant (p - value < 0.05). During fiberoptic scopy the mean SBP increased in both the groups. In group A it was 113.4 ± 12.615 mmHg at introduction of scope, 126.17 ± 7.86 mmHg during intubation, 111.4 ± 9.57 mmHg after 1 min and 108.47 ± 11.47 mmHg 3 min post intubation. In group B the mean SBP was 77.56 ± 5.89 mmHg at introduction of scope, 124.09 ± 8.98 mmHg during intubation, 120.9 ± 9.7 mmHg after 1min, and 121.87 ± 8.003 mmHg 3 min post intubation. When the mean SBP at different time points during the fiberoptic scopy were compared between both groups, it was found that the mean SBP rate in group A were higher than in group B with significant differences during intubation while slightly increased at after 1 minute and 3 minute among group B. (p - value < 0.001).

The baseline mean MAP in group A and group B was 91.87 ± 6.101 mmHg and 90.5 ± 4.21 mmHg respectively. The difference between baseline mean MAP of two groups was statistically not significant (p - value > 0.05). In our study after giving block; the mean MAP increased in both groups from baseline that was 86.33 ± 7.52 mmHg in group A and 90.86 ± 5.67 mmHg in group B at start of fiberoptic scope insertion. The difference between mean MAP of two groups at start of fiberoptic scope insertion was statistically significant (p - value < 0.05). During fiberoptic scopy the mean MAP increased in both the groups. In group A it was 86.47 ± 8.87 mmHg at introduction of scope, 92.07 ± 5.36 mmHg during intubation, 85.73 ± 5.95 mmHg after 1 min and 90.78 ± 6.03 mmHg 3 min post intubation. In group B the mean DBP was 92.87 ± 5.68 mmHg at introduction of scope, 96.74 ± 5.11 mmHg during intubation, 92.63 ± 7.88 mmHg after 1min, and 89.08 ± 5.13 mmHg 3 min post intubation. When the mean MAP rates at different time points during the fiberoptic scopy were compared between both groups, it was found that the mean MAP in group 2 were higher than in group 1 with significant differences during intubation and after 1 minute. (p - Value < 0.001).

The results were supported by Ambi, et al.: [15] the baseline means MAP in group U and group L was 79.8.9 mmHg and 83.4 mmHg respectively. The difference between baselines means MAP of two groups was statistically not significant (p - value > 0.05). When the mean MAP rates at different time points during the fiberoptic scopy were compared between both groups, it was found that the mean

MAP in group L were higher than in group U with significant differences during post intubation [group L=90.4, group U=80.7] and duration of intubation [group L=109.1, group U=71.1]. (p - Value < 0.001).

Hassanein A et al [14] was showed that hemodynamic change in group A (nebulization) and group B (nebulization and airway nerve block). Intragroup comparison of baseline HR (heart rate) and MAB (mean arterial pressure), obtained just after nebulization in GroupA or nebulization and nerve block in Group B and 1 minute after awake fiberoptic intubation, revealed a significant reduction in heart rate and blood pressure in both groups, which returned to near baseline levels at 3-, 5- and 10-min post intubation. Heart rate and mean arterial pressure were comparable between the groups 10 minutes after fiberoptic intubation. There were no significant differences regarding oxygen saturation among the study group.

The mean baseline oxygen saturation in group A was 99.40 ± 1.52 and in group B was 99.60 ± 0.49 (p- value > 0.05). Patients were pre-oxygenated with 100% O2 for 5 min after premedication. Continuous oxygenation at the rate of 4 L/min was done through the side port of fiberoptic bronchoscope. Mean SPO_2 remained above 97% in both the groups during fiberoptic intubation as well as 5 min and 10 min post-intubation. There was no statistically significant difference in mean Sp02 at different time period between both the study groups (p >0.05).

Our results were comparable with the study done by Yousuf et al, [17] who compared the effect of dexmedetomidine and fentanyl-midazolam combination. It was observed that mean SPO2 at post intubation in both dexmedetomidine and fentanyl-midazolam groups were comparable (96.80 ± 4.16 vs 95.00 ± 5.30; P-value >0.05). However, in study conducted by Agrawal et al., who compared the effect of dexmedetomidine and fentanyl-midazolam combination in 60 patients undergoing AFOI, it was observed that there were significant decline in oxygen saturation (SPO2) in fentanyl-midazolam group as compared to dexmedetomidine group before intubation (after giving the study drugs) and after intubation (98.07 ± 1.93 vs 99.47 ± 0.78 and 98.13 ± 3.48 vs 99.73 ± 0.83 respectively) and the difference was statistically significant (P-value).

Kundra p et al also observed that Combination of bilateral SLN block with topical airway anaesthesia has been reported to produce better haemodynamic stability and patient comfort. [18] However, literature search revealed no randomised studies comparing landmark and ultrasound guided technique for ibSLN block. Kaur et al presented transverse oriented ultrasound-guided SLN block. [19] Our report also confirmed that ultrasound-guided SLN block is feasible. However, differences exist between these two studies. Kaur et al placed the probe in the sagittal plane first and then rotated it to the transverse view to locate the SLN. This technique may not be easy for inexperienced practitioners to perform. We used only the longitudinal view, which can identify all landmarks at once and is easy to perform.

In this study, duration of intubation was significantly lower in USG guided technique. In the present study, mean duration of intubation was 5.26 in group A which was significantly higher than group B (1.05). Similar observations were made by Ambi et al, The duration of tracheal intubation was shorter in Group U (mean 71.05 ± 9.57s) as compared to Group L (mean 109.05 ± 30.09 s, P < 0.001).

According to A study conducted by Gupta et al [20] ,also showed average time of 123.0 seconds taken for awake intubation under regional nerve blocks. The mean time taken for endotracheal intubation was 2.12 min. [21]

Several limitations have been reported with the landmark-guided technique. The deep palpation of hyoid bone can be uncomfortable to the patient and is difficult in patients who have a short or thick neck, with higher failure rates. Deep palpation of hyoid and excessive manipulation of larynx in anatomical landmark technique group resulted in higher patient perception of discomfort and pain during intubation (NRS score) than USG guided technique. The patient perception of pain and discomfort during intubation assessed postoperatively based on NRS was significantly lower with better patient tolerance in Group U with mean NRS score of 2.75 as compared to Group L with mean NRS score of 4.0 (P < 0.001) [Ambi et al]. In the present study, Mean NRS was 2 in group 1 which was highly significant than group 2 (1.09).

USG-guided block is very useful in patients with distorted neck anatomy: swellings, vascular malformations, and burns. Longitudinal technique has been described previously, wherein the probe is kept parasagitally and the following structures are identified: thyrohyoid muscle, thyrohyoid membrane, the interface between the luminal surface and the superficial mucosae of the larynx. Initially, authors had suggested depositing the drug in superior laryngeal space. [22] Lately in a case series by Sawka et al., they successfully visualized the SLN and accurately placed local anaesthetic around it followed by awake fiberoptic intubation (AFOI). [23] There are many reports revealing that the ibSLN is difficult to visualize using ultrasound. [24,25,26] The nerve might be too small to be seen using sonography and the resolution of our ultrasonic transducer was not good enough to identify the nerve. A higher resolution ultrasonic transducer might be necessary for SLN identification. One limitation of this study is that the dye we used is different from local anaesthetic agents. The different viscosities of methylene blue and local anaesthetic agents perhaps will affect the spread area. Although the nerves were bathed well in the dye, the same results may not be obtained when local anaesthetic agents are used as the blockade agent. In addition, thawed, frozen tissue may lack elasticity, influencing the spread of the dye and make the spread between live patients and cadaver different. Third, the numbers of studied cadavers were limited. The success rate should not be interpreted universally. It is necessary to perform the study on a larger scale. Finally, the ibSLNs in all cadavers were not visualized. The application of ultrasound marks a new era in airway management. Further studies are required to assess feasibility of ultrasound-guided airway blocks, particularly in obese patients and patients with limited neck extension where identification of anatomical landmarks is difficult.

Conclusion

Using ultrasound in the longitudinal orientation to identify the greater horn of the hyoid bone and the thyroid cartilage as landmarks, combined with an out-of-plane technique, may be an alternative method for ultrasound-guided ibSLN block. However, more studies are necessary to prove the reliability of the new method, especially in live patients. Ultrasound-guided block of ibSLN used as a part of preparation of the airway for awake fibre-optic intubation improves the quality of airway anaesthesia and patient tolerance during the procedure.

References

1. Novak-Jankovič V. Management of the difficult airway. Acta Clin Croat. 2012;51(3):505-10
2. Giordano D, Panini A, Pernice C, Raso MG, Barbieri V. Neurologic toxicity of lidocaine during awake intubation in patient with tongue base abscess. Case report. Am J Otolaryngol 2014; 35(1):62-5.
3. Mcguire G, El-Beheiri H. Complete upper airway obstruction during awake fiberoptic intubation in patients with unstable cervical spine fractures. Can J Anesth. 1999;46:176-8
4. Simmons ST, Schleich AR. Airway regional anesthesia for awake fiberoptic intubation. Reg Anesth Pain Med 2002;27:180-92
5. Kodippara MT JR. Neoanates are different. New Delhi: Wolters Kluwer 2015
6. Divatia J, Bhowmick K. Complications of endotracheal intubation and other airway management procedures. Ind J anaes. 2005; 49(4):308-318
7. Stockwell M, Lozanoff S, Lang SA, Nyssen J. Superior laryngeal nerve block: an anatomical study. Clin Anat 1995;8:89-95
8. Vannier JL, Vilett M, Bouaziz H, Ibrahim H, Marty J, Desmons JM. Block of the superior laryngeal nerve for ORL endoscopy. Description of a simplified technique. Ann Fr AnesthReanim. 1989;8:379-81
9. Hsu CH, Lin TC, Yeh CC, Ho ST, Wong CS. Convulsions during superior laryngeal nerve block – a case report. Acta Anaesthesiol Sin 2000; 38:93-6.
10. Barberet G, Henry Y, Tatu L, Berthier F, Besch G, Pili- Floury S, et al. Ultrasound description of a superior laryngeal nerve space as an anatomical basis for echo-guided regional anaesthesia. Br J Anaesth 2012; 109:126-8.
11. Iida T, Suzuki A, Kunisawa T, Iwasaki H. Ultrasound-guided superior laryngeal nerve block and translaryngeal block for awake tracheal intubation in a patient with laryngeal abscess. J Anesth 2013; 27:309-10.
12. Furlan JC. Anatomic study applied to anesthetic block technique of the superior laryngeal nerve. Acta Anaesthesiol Scand 2002;46:199e202
13. Manikandan S, Neema PK, Rathod RC. Ultrasound guided bilateral superior laryngeal nerve block to aid awake endotracheal intubation in a patient with cervical spine disease for emergency surgery. Anaesth Intensive Care 2010;38:946e8
14. Hassanein A, Talaat M, Shehataha O. Airway nerve blocks as an adjunct to lignocaine nebulization for awake fiberoptic intubation. Egyptian Journal of Anaesthesia 2020;36(1):162–169
15. Ambi US, Arjun BK, Masur S, Endigeri A, Hosalli V, Hulakund SY. Comparison of ultrasound and anatomical landmark-guided technique for superior laryngeal nerve block to aid awake fibre-optic intubation: A prospective randomised clinical study. Indian J Anaesth 2017;61:463-8
16. Ramkumar R, Arora S, Bhatia N, Bansal S. Ultrasound guided superior laryngeal nerve block as an adjuvant to generalanesthesia during endoscopic laryngeal surgery: A prospective, randomized, double-blind trial. Am J Otolaryngol 2019;40:30–35
17. Yousuf A, Ahad B, Mir AH, Mir AW, Wani JG, Hussain SQ. Evaluation of effectiveness of dexmedetomidine and fentanyl-midazolam combination on sedation and safety during awake fiberoptic intubation: A randomized comparative study. Anesthesia, essays and researches. 2017 Oct;11(4):998
18. Kundra P, Kutralam S, Ravishankar M. Local anaesthesia for awake fibreoptic nasotracheal

intubation. Acta Anaesthesiol Scand 2000; 44:511-6.
19. Kaur B, Tang R, Sawka A, Krebs C, Vaghadia H. A method for ultrasonographic visualization and injection of the superior laryngeal nerve: volunteer study and cadaver simulation. Anesth Analg 2012;115:1242e5
20. Gupta B, Kohli S, Farooque K, Jalwal G, Gupta D, Sinha S, et al. Topicalairway anesthesia for awake fiberoptic intubation: Comparison betweenairway nerve blocks and nebulized lignocaine by ultrasonic nebulizer. Saudi J Anaesth 2014;8 Suppl1:S15-9
21. Chatrath V, Sharan R, Jain P, Bala A,Ranjana, Sudha. The efficacy of combined regional nerveblocks in awake orotracheal fiberoptic intubation. Anesth EssaysRes 2016; 10:255-61.
22. Barberet G, Henry Y, Tatu L, Berthier F, Besch G, Pili-Floury S, et al. Ultrasound description of a superior laryngeal nerve space as an anatomical basis for echoguided regional anaesthesia. Br J Anaesth 2012;109:126-8
23. Sawka A, Tang R, Vaghadia H. Sonographically guided superior laryngeal nerve block during awake fiberoptic intubation. A A Case Rep 2015; 4:107-10.
24. Green JS, Tsui BC. Application of ultrasonography in ENT: airway assessment and nerve blockade. Anesthesiol Clin 2010;28:541e53
25. Singh M, Chin KJ, Chan VW, Wong DT, Prasad GA, Yu E. Use of sonography for airway assessment. An observational study. J Ultrasound Med 2010;29:79e85
26. Vaghadia H, Lawson R, Tang R, Sawka A. Failure to visualize the superior laryngeal nerve using ultrasound imaging. Anaesth Intensive Care 2010; 39:503.