

# “Standard” Versus “Lower” Approach Interscalene Brachial Plexus Block for Upper Extremity Surgery: A Comparative Study

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## Research Article

**Abstract: Aims and Objectives:** To study and compare the “standard” and “lower” approach interscalene block in terms of Time required performing the block, success rate, onset and duration of sensory and motor block and Complications if any.

**Results:** We observed that, success rate of “lower” approach was 90% versus “standard” approach which has success rate of only 74%. “Lower” approach required lesser time ( $6.78 \pm 2.64$  mins. (Mean  $\pm$  S.D.)) to perform the block compared to “standard” approach which required  $10.06 \pm 2.44$  mins. (Mean  $\pm$  S.D.). When we compared the two approaches in terms of onset of sensory block for axillary, musculocutaneous, radial, median, and ulnar nerves, we found no significant difference except ulnar nerve which showed significant difference ( $p < 0.05$ ). Ulnar sparing was more (17.8%) in “standard” approach as compared to (2.1%) of “lower” approach. There was no significant difference ( $p > 0.05$ ) for onset and duration of motor block as well as duration of sensory block. Rate of occurrence of complications was more for “standard” approach (Horner syndrome-50%, Recurrent Laryngeal nerve palsy-22%, Hemidiaphragmatic palsy-30%) as compared to “lower” approach in which only 2% patients developed Horner’s syndrome.

**Conclusion:** Lower approach interscalene brachial plexus block can be safely used for surgeries of upper extremity with advantages like lesser time required to perform the block, with higher success rate, lesser sparing of ulnar nerve and negligible complications. Thus lower approach interscalene brachial plexus block is superior to standard approaches of interscalene block as well as general anesthesia.

## Introduction

**Background:** Inter-scalene brachial plexus block was first described by Winnie in 1970<sup>(1)</sup> known as “standard approach” (Winnie’s approach) given at inter-scalene groove at the level of cricoid cartilage (C6 level) for surgery on shoulder and arm. Providing adequate analgesia is a major challenge for anaesthesiologist in patient undergoing surgeries like-shoulder manipulation, surgery on shoulder, proximal 1/3 arm surgery. It was common observation that these procedures are still being performed under general anaesthesia due to one or other reason like-Technical difficulties and significant

complications. To take over the drawbacks of proximal Winnie’s approach which is difficult to master, and significant side effects, alternative technique is lower approach inter-scalene brachial plexus block. In this prospective observational study, we evaluated the time required to perform the block, differences in onset and duration of the sensory-motor blocks, success rate and complication rate between standard and lower approach interscalene brachial plexus block.

## Methods

### Source of Data

The present study was designed as a hospital based prospective study carried out in the Department of Anaesthesiology at Government Medical College and Hospital during period from August 2010 to September 2012. 100 patients aged between 18-70 yrs admitted to S.R.T.R.G. Medical College, Ambajogai, undergoing surgeries on upper 1/3<sup>rd</sup> humerus were included in the study. The elective surgical interventions were shoulder dislocation, fixation of neck humerus with k-wire, interlocking and plating for # shaft humerus. The patients were randomly divided into two groups of 50 patients each.

□ □ **Group S (Standard approach)** – block given, using standard approach interscalene brachial plexus block.

□ □ **Group L (Lower approach)** – block given, using lower approach interscalene brachial plexus block.

Patients with ASA I and II physical status, within the age group of 18 to 70 years, of both sexes, patients undergoing elective surgeries on upper 1/3<sup>rd</sup> humerus and shoulder dislocation were included in the study. Patient’s refusal, local skin infection, patients with coagulopathy or on anticoagulants, patients with peripheral neuropathy, ASA grade III and IV patients, patients with allergy to local anesthetics were excluded from study.

## Preparation

After obtaining the approval of the study protocol by the hospital ethical committee, all the patients underwent thorough preanaesthetic evaluation on the day prior to surgery. Thorough general and systemic examination was done including airway and the surface anatomy where the block was to be given.

## Investigations

The following investigations were done.

- Blood investigations: Hb%, TLC, DLC, BT, CT, serum urea, serum creatinine, serum bilirubin, blood sugar and blood group.
- Urine: routine and microscopy.
- ECG and Chest x-ray PA view.

## Local anaesthetic used

Injection Lignocaine Hydrochloride 2% 10 ml, diluted up to 15 ml. Injection Bupivacaine 0.5% 10 ml, diluted up to 15 ml. Both were diluted using sterile water, making total volume up to 30 ml.



Landmarks to perform the interscalene brachial plexus block

1. Clavicle
2. Posterior border of the clavicular head of the sternocleidomastoid muscle
3. External jugular vein

## Technique for standard (Winnie's) approach ISB

Standard ISB is given at the level of cricoid cartilage (C6 level). A line extended laterally from the cricoid cartilage and intersecting the interscalene groove indicates the level of the transverse process of C6. Middle and index fingers were placed at this level at posterior border of clavicular head of sternocleidomastoid muscle and interscalene groove is palpated. Just creating space between middle and index finger needle was inserted perpendicular to skin at 45 degree caudad and slightly posterior angle. Nerve stimulator set to deliver 1 mA, 1 Hz and at pulse 0.1 second. Needle advanced slowly until stimulation of brachial plexus was obtained. Once any motor response of brachial plexus was elicited current reduced from 1 mA and accepted at 0.4-0.6 mA. Local anaesthetic agent i.e. 10 ml 2% inj. Lignocaine

hydrochloride + 10 ml 0.5 % inj. Bupivacaine hydrochloride diluted to 30ml, injected slowly with intermittent aspiration to rule out intravascular injection. If the twitch disappeared on decreasing the current strength, needle position was adjusted by one to two millimetres in such a way as to elicit the twitch response and again the procedure was repeated.



Image showing technique of "standard" approach

## Technique for lower approach ISB

Procedure for the lower ISB is same as the standard approach ISB except block is given more caudad than standard approach ISB. Middle and index fingers placed at posterior border of clavicular head of sternocleidomastoid muscle so as middle or index fingers should touch to clavicle depending on left or right side to be blocked. After palpating interscalene groove, needle was advanced perpendicular to skin plane and in slight caudal direction. The needle is advanced till stimulation of brachial plexus was obtained.



Image showing technique of "lower" approach

**Successful block:** we considered our block was successful when analgesia was present in all areas supplied by the five major nerves with complete motor blockade.

**Partial block:** we considered our block was partial when there was blunted sensation in one or more neural distribution after 20 mins of the block.

**Failure of the block:** was defined as the absence of sensory block in at least one neural distribution and / or absence of motor block after 20 mins of the block and/or the need of another anaesthetic technique to allow surgery.

## Results

- It was observed that 36 male patients and 14 females had received standard ISB with mean

age 34.72 yrs and 32.14 yrs respectively. 35 males and 15 females had received lower ISB with mean age 41.82 yrs and 43 yrs respectively.

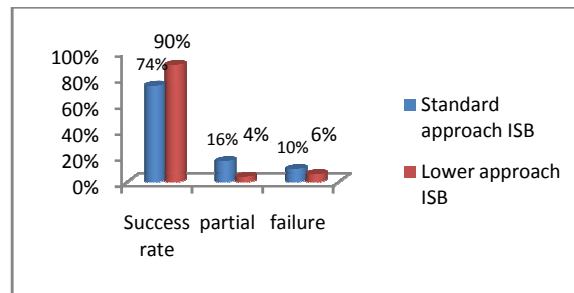
- It was observed that mean time required to perform lower ISB approach ( $6.78 \pm 2.64$  mins) was lesser than standard ISB approach ( $10.06 \pm 2.44$  mins) and the difference was statistically significant. (SE= 0.5083, t test= 6.451, p=0.0000)
- The mean duration of onset of motor block in standard ISB was  $9.02 \pm 2.22$  min and in lower ISB was  $8.21 \pm 2.40$ mins. But the difference was not statistically significant.
- The duration of sensory block in lower ISB ( $9.30 \pm 1.49$  hrs) was more than standard ISB ( $8.84 \pm 2.34$  hrs), but the difference was not statistically significant.
- The duration of motor block in standard ISB was  $4.11 \pm 1.14$  hrs whereas duration of lower ISB

was  $3.96 \pm 0.92$  hrs. The difference was not statistically significant.

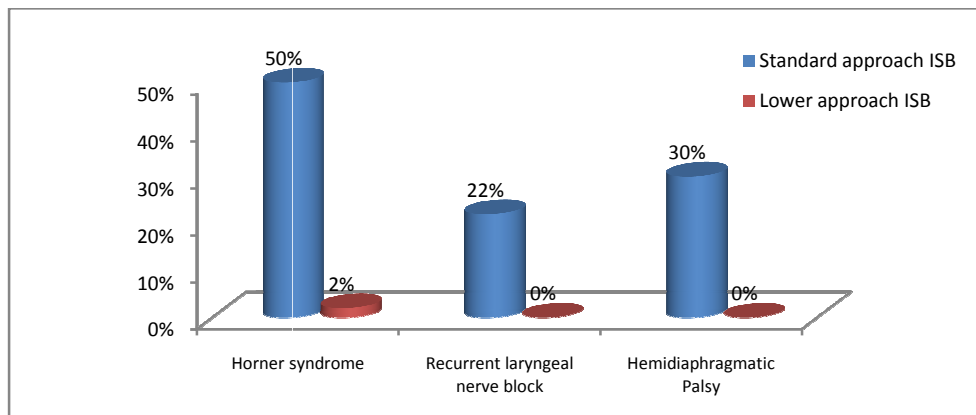
- In lower approach ISB success was in 90% cases and partial block was in 4% cases. Standard approach ISB had success rate in 74% cases whereas failure was in 10% cases.  $p < 0.05$  (significant). Ulnar sparing was more (17.8%) in “standard” approach as compared to (2.1%) of “lower” approach.
- In standard ISB 50% patients developed horner’s syndrome, 22% had recurrent laryngeal nerve block and 30% had hemidiaphragmatic palsy whereas only 2% patients had horner’s syndrome in lower ISB.
- When we compared the two approaches in terms of onset of sensory block for axillary, musculocutaneous, radial, median, and ulnar nerves, we found no significant difference except ulnar nerve which showed significant difference ( $p < 0.05$ ).

**Table 1:** Showing Characteristics of sensory onset

Nerve	S Group (mins) (mean $\pm$ SD)	L Group (mins) (mean $\pm$ SD)	P Value
Radial	11.51 $\pm$ 1.49	11.49 $\pm$ 2.33	0.9608
Median	12.20 $\pm$ 2.16	12.09 $\pm$ 2.47	0.8223
Ulnar	14.65 $\pm$ 2.37	12.35 $\pm$ 2.58	0.0000
Axillary	11 $\pm$ 1.60	11.30 $\pm$ 2.24	0.4620
Musculocutaneous	12.07 $\pm$ 2.13	11.26 $\pm$ 2.15	0.0728



Graph showing success rate



Graph showing complication rates

## Discussion

Mean time to perform the block with lower ISB approach ( $6.78 \pm 2.64$  mins) was significantly shorter when compared to standard ISB group ( $10.06 \pm 2.44$  mins). Janet L. Dewees *et al* (2006) found the mean performance time for standard ISB to be  $9.62 \pm 5.31$  minutes. The shorter time for the block performance found in group of lower ISB can be explained by more superficial location of brachial plexus at this level. Mean duration of sensory onset for ulnar nerve in standard ISB was  $14.65 \pm 2.37$  min whereas it was  $12.35 \pm 2.58$  min in lower ISB and the difference was statistically significant & it was not significant in remaining nerve distribution. The significant difference can be explained as local anesthetic preferentially reaches the superior and middle trunks of the brachial plexus and arrives later and in lower concentrations at the inferior trunk.

- Standard approach ISB had success rate in 74% cases whereas in lower approach ISB success was in 90% cases. In standard ISB ulnar nerve analgesia was present in 36 patients (72%) whereas it was present in lower ISB in 46 patients (92%). These results resemble with study conducted by Wanna Srirojanakul *et al* (2008) & Jeff C. Gadsden *et al* by (2008).
- In standard ISB 50% patients developed horner's syndrome, 22% had recurrent laryngeal nerve block and 30% had hemidiaphragmatic palsy

whereas only 2% patients had horner's syndrome in lower ISB. This result resemble with study conducted by Janet L. Dewees *et al* (2006) & Jeff C. Gadsden *et al* by (2008).

- No significant difference was found in respect to onset of motor block, duration of sensory & motor block.

## Conclusions

From our study it was concluded that lower ISB-

- Requires short performance time.
- It has higher success rate with more distal spread of sensory-motor coverage compared to the standard approach
- It is associated with low complication rate.

## References

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