Research Article

Transscalene Brachial Plexus Block: A novel Approach for Brachial Plexus Block

Sachin Rameshrao Totawar[1*], Niteen Khanderao Nandanwankar[2]

[1]Assistant Professor, [2]Associate Professor, Department of Anaesthesiology, Dr. Shankarrao Chavan Government Medical College, Nanded, Maharashtra, INDIA.
Email: sachin.totawar@gmail.com

Abstract

Introduction: Various approaches to brachial plexus block have been described. Interscalene approach has been conventionally used since many decades and is found to be highly useful in blocking the brachial plexus. However since the block is performed in the cervical region there is possibility of various complications. The new transscalene approach has been recently described in literature where the puncture site is more posterolateral compared to conventional interscalene approach and hence the risk of complications is likely to be less. **Aims and objective:** To study the new transscalene Brachial Plexus Block with respect to success rate, complication rate and duration of analgesia achieved. **Materials and method:** In the present study 30 patients undergoing various shoulder and upper limb surgeries were selected for novel transscalene brachial plexus block. Detail history and clinical examination was done in all the study patients. The block was induced by using standard protocol. The time required for induction of block and number of attempts was noted down in the proforma. Continuous monitoring of patients was done in the surgery and was done till the effect of block is withdrawn completely. The occurrence of complication was also noted. In the circumstance of inadequate or patchy action of the block, the block was converted to general anesthesia. If in case surgery was unduly prolonged and the effect of the block wore off, rescue analgesia with intravenous ketamine given. The data obtained in this study was analyzed using unpaired 't' test. **Results:** The success rate of Transscalene Brachial Plexus Block was 86.67%. In 56.67% patients block was established in first attempt whereas in 43.33% patients second attempt was required. The mean time taken for procedure of block was 4.42±1.20min. No complication was observed in the present study. The mean time required for onset of sensory action was 8.93±3.09 whereas for motor onset action was 19.39±5.97 min. The sensory duration of block was 400.36±70.21min and motor duration of block was 336.57±57.96min. **Conclusion:** Transscalene approach is safe and effective approach. However it needs further studies and more number of cases to establish significant clinical advantages of transscalene approach over interscalene approach.
Key Word: Transscalene brachial plexus block, success rate, complication.

[*]**Address for Correspondence:**
Dr. Sachin Rameshrao Totawar, Assistant Professor, Department of Anaesthesiology, Dr. Shankarrao Chavan Government Medical College, Nanded, Maharashtra, INDIA.
Email: sachin.totawar@gmail.com
Received Date: 03/04/2015 Revised Date: 14/04/2015 Accepted Date: 23/04/2015

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 27 April 2015

INTRODUCTION

"Regional anaesthesia" is the term first used by Harvey Cushing in 1901 to describe pain relief by nerve block.[1] Regional nerve blocks are based on the concept that pain is conveyed by nerve fibers, which are amenable to interruption anywhere along their pathway.[2] Various approaches to brachial plexus block have been described. Interscalene approach has been conventionally used since many decades and is found to be highly useful in blocking the brachial plexus. However since the block is performed in the cervical region there is possibility of vascular puncture[3,4,5,6] ipsilateral phrenic nerve palsy, ipsilateral vocal cord paralysis, pneumothorax, Horner's syndrome etc. Also rarely one may have total spinal / epidural injection while performing interscalene block. Since the plexus's roots are widely placed in the neck area there is at times sparing of few distal dermatomes as well. The new transscalene approach has been recently

How to site this article: Sachin Rameshrao Totawar, Niteen Khanderao Nandanwankar. Transscalene Brachial Plexus Block: A novel Approach for Brachial Plexus Block. *International Journal of Recent Trends in Science and Technology* April 2015; 14(3): 683-686 http://www.statperson.com (accessed 28 April 2015).

described in literature where the puncture site is more posterolateral compared to conventional interscalene approach and hence the risk of complications is likely to be less[7]. Thus the present study was conducted to study the safety and effectiveness of transscalene Brachial Plexus Block in terms of success rate, complication rate and duration of analgesia achieved.

AIMS AND OBJECTIVE

To study the new transscalene Brachial Plexus Block with respect to success rate, complication rate and duration of analgesia achieved.

MATERIALS AND METHOD

The present study was conducted to study novel transscalene (TS) approach of brachial plexus block used in various shoulder and upper limb surgeries. After obtaining approval from hospital academic and ethics committee the study was conducted. For the purpose of study total 30 patients admitted for various shoulder and upper limb surgeries were selected by using below mentioned inclusion and exclusion criteria.

Inclusion criteria

- Age group 18-70 years
- ASA grade 1 and 2 , 3
- Upper limb surgery

Exclusion criteria

- Patient refusal for regional anaesthesia
- Any bleeding disorder
- Severe Respiratory dysfunction
- Neuro deficit involving upper limb.
- Local infection at the injection site.
- Contralateral pneumonectomy,
- Contralateral hemidiaphragm paralysis
- Contralateral vocal cord paralysis
- Allergy to L.A agents.

All the selected patients were randomly divided in two groups.

- **TS Group:** Transscalene approach (Novel approach)
- **IS Group**: Interscalene approach (Conventional approach)

Detail history and clinical examination was done in all the study patients. And the findings were recorded in a prestructured proforma. 7mg/kg of 2 % lignocaine with adrenaline (5 micro gm/ml) + 1 ml/ 10 ml of soda bicarbonate + 1.5 mg / kg of 0.5 % bupivacaine with 150 micro gram buprenorphine (Total volume – 30-40ml) was used to induce the transscalene block. The block was induced by using standard protocol. The time required for induction of block and number of attempts was noted down in the proforma. An intravenous drip was started before undertaking the procedure which continued throughout the length of surgery. Vital parameters were observed throughout the procedure and oxygen at the rate of 2L/min administered through oxygen mask. Continuous monitoring of patients was done in the surgery and was done till the effect of block is withdrawn completely. The occurrence of complication was also noted. In the circumstance of inadequate or patchy action of the block, the block was converted to general anesthesia. If in case surgery was unduly prolonged and the effect of the block wore off, rescue analgesia with intravenous ketamine given. The data obtained in this study was analyzed using unpaired 't' test.

RESULTS

Table 1: Demographic data of study patients

Variable		Number
Sex	Male	20 (66.67%)
	Female	10 (33.33%)
Age		33.1±12.74
Height		163.83±6.55
Weight		54.73±5.66

It was observed that mean age of patients 33.1±12.74 years. The proportion of male patients was 66.67% whereas female were 33.33%. Mean height was 163.83±6.55 cm and mean weight was 54.73±5.66 kg.

Table 2: Success rate of Transscalene Brachial Plexus Block

Success rate	No. of patients (%)
Complete	26 (86.67%)
Partial (required supplementation)	2 (6.67%)
General anesthesia	2 (6.67%)

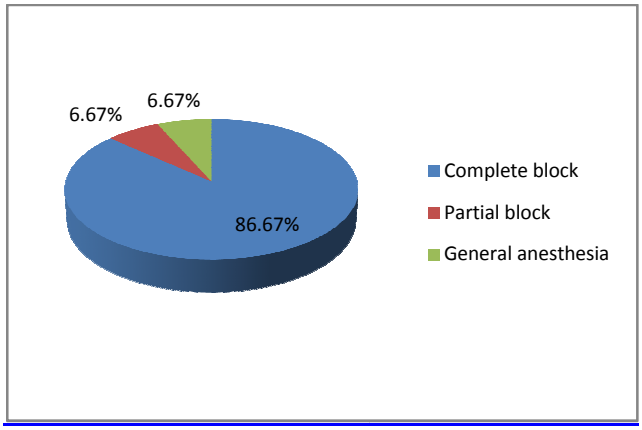

Figure 1: Success rate of Transscalene Brachial Plexus Block

The success rate of Transscalene Brachial Plexus Block was 86.67%. In two patients block was not established hence they required general anesthesia with endotracheal tube. Two patients required intravenous ketamine Supplementation.

Table 3: Distribution according to Number of attempts and time taken for procedure

		No. of patients (%)
Number of attempts	1	17 (56.67%)
	2	13 (43.33%)
	3	0
	≥4	0
Time taken for procedure (min)		4.42±1.20
Complication	Horner syndrome	0
	Vocal cord palsy	0

It was observed that in 56.67% patients block was established in first attempt whereas in 43.33% patients second attempt was required. The mean time taken for procedure of block was 4.42±1.20min. No complication was observed in the present study.

Table 4: Distribution according to onset of action and duration of sensory and motor block

Duration	Mean ± SD
Onset of action (min)-Sensory	8.93±3.09
Onset of action (min)-Motor	19.39±5.97
Duration of Block (min)-Sensory	400.36±70.21
Duration of Block (min)-Motor	336.57±57.96

It was evident from the table that the mean time required for onset of sensory action was 8.93±3.09 whereas for motor onset action was 19.39±5.97 min. The sensory duration of block was 400.36±70.21min and motor duration of block was 336.57±57.96min.

DISCUSSION

In the present study it was observed that the mean age of the patients was 33.1 ± 12.74 years whereas the sex ratio M: F was 2:1. Mean height was 163.83±6.55 cm and mean weight was 54.73±5.66 kg. It was observed that in two patients block was not established hence they required general anesthesia with endotracheal tube. Two patients required intravenous ketamine Supplementation. Thus the overall success rate of Transscalene Brachial Plexus Block was 86.67%. In the study done by Hoang C. Nguyen *et al.*[8] on transscalene brachial plexus block the success rate was 85.2% which was consistent with the present study. Harald C. Rettig M.D. Mathieu J.M[9] found the success rate by posterior approach (90%). Ignace Sandefo *et al.*[10] studied clinical efficacy of the brachial plexus block via the posterior approach and the success rate of the block was 98%. It was seen that in 56.67% patients of TS group the block was established in first attempt whereas in 43.33% patients, second attempt was required. Ignace Sandefo M.D. Gabriella Iohom M.D[10] studied clinical efficacy of the brachial Plexus Block via the Posterior Approach and observed that the block was established in 85% of patients in first attempt. However in the present study we required one attempt in 56% patients. This may be because of that our block is performed by inexperienced person and their by experienced person. The mean time taken for the procedure was 4.41 ± 1.20 min. Harald C. Rettig M.D. Mathieu J.M[9] also observed similar findings in their study. No complication due to block was observed in the present study. In a study done by Hoang C. Nguyen[8] on Transscalene Brachial Plexus Block (TBPB) none of the patients undergoing a TBPB experienced respiratory distress or a decrease in oxygen saturation after the plexus block. There were no vascular punctures or persistent pain at the insertion sites. Two patients (7.4%) experienced an ipsilateral reversible recurrent laryngeal nerve blockade, whereas one patient (3.7%) experienced a reversible Horner syndrome. Both of those side effects were temporary and resolved completely. No additional serious regional or systemic side effects or complications were observed. Ignace Sandefo M.D. Gabriella Iohom M.D[10] found dysphonia and Horner's syndrome in 7% and 6% patients respectively via posterior approach. One patient had documented hemidiaphragmatic paresis. The rate of complication is much more in interscalelene block as compared to transscalelene block. In 1991, William F. Urmey *et al.*[11] in their study observed that 100% patients with standard interscalene brachial plexus anesthesia developed ipsilateral hemidiaphragmatic paresis as detected by ultrasonography. But hemidiaphragmatic paresis was evident clinically in the form of mild dyspnea or altered respiratory sensations in only 5 out of 13 patients (38%). In a study conducted by Janet L. Dewees *et al.*[12] (2006) who found Horner syndrome in 50 % patients, recurrent laryngeal nerve block in 21% patients and symptomatic hemidiaphragmatic paralysis in 15% patients who received standard interscalelene block. Thus as compared to the conventional interscalelene block the new transscalene brachial plexus block has less rate of complication. According to various literature The puncture site for a brachial plexus block should be as far away as possible from the cervical vertebra and as cranial to the lung as possible in order to avoid or diminish the risk of potentially serious and dangerous complications of interscalene brachial plexus blocks, such as cervical and thoracic epidural blockade[13], total spinal anesthesia[14,15,16] associated with persistent neurologic damage[17,18], inadvertent injection into the vertebral artery [19], and pneumothorax during a supraclavicular brachial plexus block[20,21]. Additionally, the puncture needle should be directed slightly more medial and from dorsal to ventral. The new transscalene approach has been recently described in literature where the puncture site is more posterolateral compared to conventional interscalene approach and hence the risk of complications is less. It is a novel approach which can be used for shoulder, arm, and forearm surgeries.[7] With brachial plexus stimulation,

the mean time of onset of sensory block was 8.92 ± 3.09 min while that of motor block was 19.39 ± 5.97 min. The mean duration time of motor block was 336.57 ± 57.95 min and the mean duration time of sensory block was 400.35 ± 70.21min. Harald C. Rettig M.D. Mathieu J.M[9] also observed similar findings in their study.

CONCLUSION

Thus from the above results and discussion we Transscalene approach is safe and effective approach. However it needs further studies and more number of cases to establish significant clinical advantages of transscalene approach over interscalene approach.

REFERENCES

1. Atkinson RS, Rushwan GB, Lee AJ. Regional technique. 10th ed. Chapter 31. Synopsis of Anaesthesia; 1987: 593-4.
2. Raj PP. Historical aspects of regional anaesthesia. 1st ed. Chapter 1. In: Text Book of Regional Anaesthesia; 2002 May. p.3.
3. Miller RD. Editor, Miller's Anesthesia, sixth edition 2005, Page 1688-1689, Elsevier Churchill Livingstone.
4. www.nysora.com/equipment/stimulators/.
5. Satish Deshpande. Editor, Principles of Anaesthesia, Paras Medical Publishers, first edition 2007, Page 995.
6. Thomas E J Healy, Paul R Knight Editor, Wylie and Churchill-Davidson's, A Practice of Anaesthesia, seventh edition 2003, Page 621.
7. Hoang C. Nguyen, MD , Erwin Fath, MD, Sebastian Wirtz, MD, and Tareg Bey, MD: Transscalene Brachial Plexus Block: A New Posterolateral Approach for Brachial Plexus Block. Anaesthesia & Analgesia 2007; 105:872-875.
8. Hoang C. Nguyen, MD *et al.*: Transscalene Brachial Plexus Block: A New Posterolateral Approach for Brachial Plexus Block. Anesthesia &Analgesia 2007; 105:872-875
9. Harald C. Rettig M.D. *et al.*: A Comparison of the Lateral and Posterior Approach for Brachial Plexus Block. Regional Anaesthesia and Pain Medicine, Volume 31, Issue 2, March 2006, Pages 119-126.
10. Ignace Sandefo M.D. *et al.*: Clinical Efficacy of the Brachial Plexus Block via the Posterior Approach. Regional Anaesthesia and Pain Medicine, Volume 30, Issue 3, May-June 2005, Pages 238-242.
11. Urmey WF, Talts KH, Sharrock NE. One hundred percent incidence of hemidiaphragmatic paresis associated with interscalene brachial plexus anesthesia as diagnosed by ultrasonography. Anesth Analg 1991; 72:498-503.
12. Dewees JL, Schultz CT, Wilkerson FK, Kelly JA, Pellergrini AR. Comparision of two approaches to brachial plexus anesthesia for proximal upper extremity surgery: interscalene and intersternocleidomastoid. AANA Journal, june 2006, vol 74, no. 3: 201- 206.
13. Kumar A, Battit GE, Froese AB, Long MC. Bilateral cervical and thoracic epidural blockade complicating interscalene brachial plexus block: report of two cases. Anesthesiology 1971;35:650–2
14. Dutton RP, Eckhardt WF III, Sunder N. Total spinal anesthesia after interscalene blockade of the brachial plexus. Anesthesiology 1994;80:939–41
15. Iocolano CF. Total spinal anesthesia after an interscalene block. J Perianesth Nurs 1997;12:163–70
16. Norris D, Klahsen A, Milne B. Delayed bilateral spinal anaesthesia following interscalene brachial plexus block. Can J Anaesth 1966;43:303–5
17. Benumof JL. Permanent loss of cervical spinal cord function associated with interscalene block performed under general anesthesia. Anesthesiology 2000;93:1541–4
18. Passannante AN. Spinal anesthesia and permanent neurologic deficit after interscalene block. Anesth Analg 1996;82:873–4
19. Durrani Z, Winnie AP. Brainstem toxicity with reversible locked-in syndrome after intrascalene brachial plexus block. Anesth Analg 1991;72:249–52
20. Hamelberg W. Pneumothorax following brachial plexus block. Anesth Analg 1959;38:251–3
21. Wishart HY. Pneumothorax complicating brachial plexus block anaesthesia. Br J Anaesth 1954;26:120–3

Source of Support: None Declared
Conflict of Interest: None Declared