

Supraorbital/Supratrochlear Nerve blocks: Clinical Significance of the Superior and Anterior Approaches



Muhammad A*

Plastic & Hair Restorative Surgeon, Aesthetic Plastic Surgery & Hair Transplant Institute, Pakistan

Submission: January 12, 2017; **Published:** May 30, 2017

***Corresponding author:** Muhammad Ahmad, Plastic & Hair Restorative Surgeon, Aesthetic Plastic Surgery & Hair Transplant Institute, Pakistan, Tel: +923005239465; Email: plasticsurgeon999@yahoo.com

Introduction

Hair restoration is one of the commonest cosmetic surgery procedure in men [1]. The procedure is performed under local anaesthesia. Many of the patients are anxious about the degree of pain to be expected during and after the surgery. The pain of the local anaesthetic agent is dependent on various factors like needle gauge, composition, temperature, pH, speed of injection, anatomical structure/area etc. Various maneuvers are used to decrease the pain during the administration of local anaesthesia like vibration anaesthesia Cryotherapy etc [2-4]. With the introduction of newer drugs for local anaesthesia, the safety is increased.

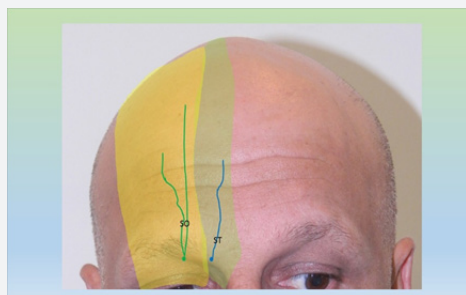


Figure 1: Nerve supply by supraorbital and supratrochlear nerves.

Peripheral nerve blocks constitute a major tool in the armamentarium in the office-based cosmetic surgery procedures. Supraorbital (SO) and supratrochlear (ST) nerve are the terminal branches of the frontal nerve [5]. These nerves supply mainly the skin of the forehead. These nerve blocks are beneficial in many procedures. The SO/ST nerve block during hair transplant surgery decreases the severity of the pain for recipient site injections. Their blockage is beneficial in treating disorders like trigeminal neuralgia, migraine etc [6,7]. These nerve blocks also result in significant decrease in the need of additional analgesics and opioids [8]. The SO/ST nerves collectively provide sensory innervation to the forehead and frontal scalp as well as to the

vertex (Figure 1). The anatomical details and variations of these nerves is very essential for a proper anaesthesia.

The supraorbital (SO) nerve emerges from the supraorbital foramen or notch. The foramen or notch is located about 27 mm lateral to the glabellar midline. However, the distance varies if different races [9,10]. The nerve divides into medial and lateral branches. Similarly supratrochlear (ST) nerve emerges through supraorbital notch about 17mm from glabellar midline. It follows one of the four courses i.e., Ia (ST nerve emerges independently from SO nerve as a single nerve through Corrugator Supercilli muscle), Ib (ST emerges independently from SO nerve and bifurcates into 2 branches prior to entering the Corrugator

Supercilli muscle), IIa (ST nerve emerges from SO notch with SO nerve and passes through Corrugator Supercillimuscle as a single nerve), and IIb (ST emerges from SO notch with SO nerve and bifurcates into 2 branches prior to entering the Corrugator Supercillimuscle) [11].

There are two techniques to accomplish SO/ST nerve block, i.e., anterior and superior. In superior approach, the needle is inserted from the cephalic side in such a way that the tip of the needle is felt at SO foramen by the palpating finger of the physician's other hand. Whereas in the anterior approach, the physician stands on the side of the patient and the needle is directed towards the midline. The following study was undertaken to compare the pain levels of anterior and superior approaches.

Materials and Methods

The study was conducted in 30 patients undergoing SO/ST nerve block for hair restoration surgery. The patients undergoing 1st session were included. The informed consent was taken. All the injections were administered by the surgeon. A 3ml syringe with 30 oG needle was used containing 1% Xylocaine with adrenaline is 1;100,000 dilution. Separate needle was used for each side.

Superior approach

The needle was introduced about 2cm above the SO foramen palpated. About 0.5ml of the anaesthetic solution was injected. The needle was advanced caudally till the tip was felt at the foramen and 0.5ml was injected here. The needle was withdrawn slightly and directed laterally injecting about 1.0ml in a ‘fanning out’ way. The needle was again withdrawn and directed medially injecting about 1.0ml. This technique encompassed all the possible branches of the SO/ST nerves (Figure 2).

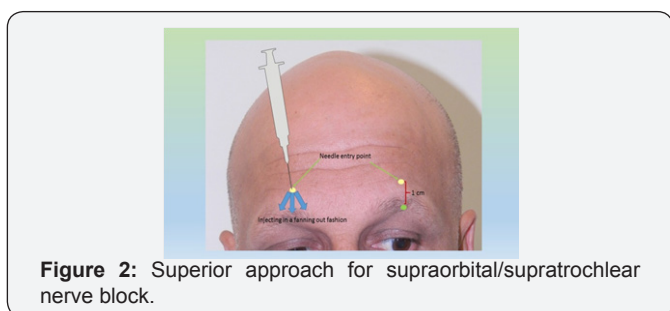


Figure 2: Superior approach for supraorbital/supratrochlear nerve block.

Anterior approach

The SO foramen was palpated and the needle was inserted from the front side of the patient. Care was taken not to puncture the SO nerve. About 1.0ml was injected here. The needle was withdrawn and 1.0ml was injected on medial and 1.0ml on lateral side (Figure 3). At the end of the procedure, the patients were asked to rate the pain according to the Wong Baker Faces Pain Scale [12] (Figure 4). The patients were also asked to give their feedback on the choice of technique for the next time. The data was analyzed statistically by Mann-Whitney’s U-test (using the Easy Statistics Calculator©, version 1.2.0, Saitama, Japan, copyright 2016).

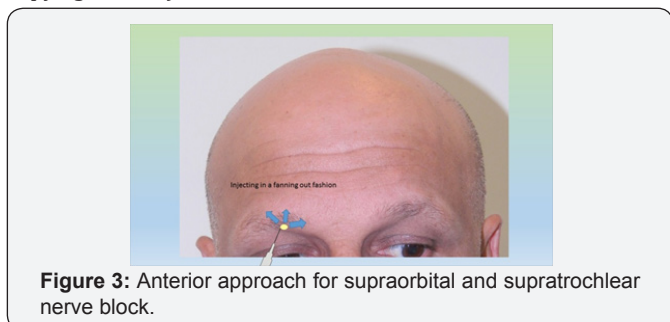


Figure 3: Anterior approach for supraorbital and supratrochlear nerve block.

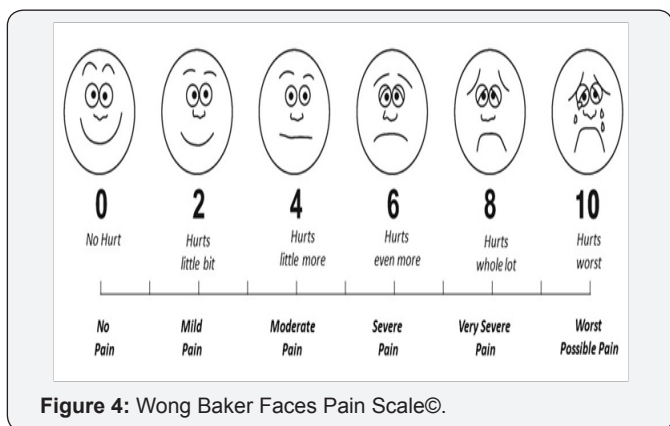


Figure 4: Wong Baker Faces Pain Scale©.

Results

A total of 35 patients were included in the study. The mean age was 33.4 years (range; 18 to 56). The mean pain score was 4.14 in anterior approach whereas 2.85 in superior approach (Table 1). About 31.4% of the patients were smokers. The pain score in smokers vs non-smokers was 4.09 vs 2.82 in anterior approach respectively. Where as in superior approach, the mean score was 4.27 vs 2.86 in smokers and non-smokers respectively. About 20% patients were anxious about the anterior approach that the needle may hit the eyeball. About 71.4% of the patients voted for superior approach on both sides for the next time.

Table 1: Statistical Analysis.

Anterior Approach	Superior Approach
Mean=4.142857	Mean=2.857143
SEM=0.1553113	SEM=0.1885052
SD(n)=0.93021834	SD(n)=1.0991648
n=35	n=35
R1=1603.5	R2=881.5
Zo=402403393	
P=0.000022 (2 tails)	
(Corrected for the same rank)	
Zo=4.383447	
P=0.000012 (2 tails)	

Discussion

The role of SO/ST nerve block is well established in plastic surgery. It is routinely performed for the management of different kinds of headaches like tension headache, chronic headaches, migraine etc [6,7]. It is also the mainstay of regional anaesthesia in office-based cosmetic surgery procedures like hair restoration procedure [13]. To carry out a successful SO/ST nerve block, the relevant anatomy is of utmost importance which helps to locate the nerves and block them.

The sensory innervation of the face is supplied by trigeminal nerve which has five branches. The frontal nerve enters the orbit via superior orbital fissure and passes anteriorly beneath the periosteum of roof of the orbit. The frontal nerve gives off a larger lateral branch, the supraorbital nerve, and a smaller medial, supratrochlear nerve. The SO nerve exits the SO foramen or notch along the superior rim of orbit, accompanied by the artery and vein. In the notch or foramen, SO nerve gives off branches which supply mucosal membrane of frontal sinus and filaments which supply upper eyelid. Above the rim, SO nerve divides into superficial and deep branches.

The medical (superficial) branch passes over the frontalis muscle and divides into multiple smaller branches with cephalic distribution towards the hairline. It provides sensory innervation to the forehead skin and anterior scalp as far as the vertex. The deep branch (laterla0 runs deep in the frontalis across lateral forehead between galeaapo neuroticanad pericranium. It provides sensory innervation to underlying periosteum and frontal parietal scalp. The ST nerve is the branch of the frontal

nerve and supplies sensory innervation to the bridge of the nose, medial part of upper eyelid and medial forehead. Usually ST nerve is located about 17mm from midline and SO nerve at 27 mm from midline.

The two approaches for SO/ST nerve block are well-established. The current study is first of its kind to compare the differences in terms of pain and patients' anxiety. The superior approach was found to be clinically/statistically significant ($p < 0.5$). There are many factors which influence the experience of pain perceived by patient but the technique of SO/ST nerve block remained one of the significant factors. The visualization of watching the injection near the eyeball probably resulted in high level of anxiety in anterior approach.

The study by Chang et al described the pain of SO/ST nerve block to be between 1 and 2 (out of 10) whereas in the present study, the average pain score was 4.4 (out of 10) [14]. In another study, the average pain score was 3.9 (out of 10) and 6.8 9 out of 10) in SO/ST nerve block with and without the use of topical anaesthetic cream [15]. In another study, the mean score also remained 3.86 [16]. In these two studies, the anterior approach was used for administering SO/ST nerve block. In the present study, the pain score was found to be doubled in anterior approach as compared to the superior approach. The pain of superior approach remained 2.85.

Distraction during the administration of local anaesthesia injection plays a very important role [4,17]. In the present study, all the injections were administered by the surgeon. The needle gauge, room temperature and environment were kept the same in all the patients. The speed of the injection was kept slow and maintained by the surgeon to a very slow in all the patients. The Wong Baker Faces pain scale was used for rating as the scale gives the opportunity to the patients to express how they feel as it has a well established reliability and validity even in children [18,19].

Conclusion

The superior approach for administration of supraorbital/supratrochlear nerve block proved to be better approach as far as the patient's anxiety about the injections is concerned. It also proved to be less painful.

References

- ASPS (2014) Quick facts: Cosmetic and Reconstructive Plastic Surgery Trends. The American Society of Plastic Surgeons USA.
- Elbay M, Elbay SÜ, Yıldırım S, Uğurluel C, Kaya C, et al. (2015) Comparison of injection pain caused by the Dental Vibe Injection System versus a traditional syringe for inferior alveolar nerve block anaesthesia in paediatric patients. *Eur J Paediatr Dent* 16(2): 123-128.
- Mahshidfar B, Cheraghi Shevi S, Abbasi M, Kasnavieh MH, Rezai M, et al. (2016) Ice Reduces Needle-Stick Pain Associated With Local Anesthetic Injection. *Anesth Pain Med* 6(5): e38293.
- Abdelmoniem SA, Mahmoud SA (2016) Comparative evaluation of passive, active, and passive-active distraction techniques on pain perception during local anesthesia administration in children. *J Adv Res* 7(3): 551-556.
- Countryman NB, Hanke CW (2012) Practical review of peripheral nerve blocks in dermatologic surgery of the face. *CurrDerm Rep* 1: 49-54.
- Waldman ST (2009) Pain Review. Saunders, Philadelphia, USA.
- Ilhan Alp S, Alp R (2013) Supraorbital and infraorbital nerve blockade in migraine patients: results of 6-month clinical follow-up. *Eur Rev Med Pharmacol Sci* 17(13): 1778-1781.
- Levin M (2010) Nerve blocks in the treatment of headache. *Neurotherapeutics* 7(2): 197-203.
- Suresh S, Voronov P (2012) Head and neck blocks in infants, children, and adolescents. *PaediatrAnaesth* 22(1): 81-87.
- Zheng WX, Guo JL, Song BX, Liu XL, Lv DL, et al. (2012) Location of the supraorbital and infraorbital foramen with references to the soft tissue landmarks in a Chinese population. *J Craniofac Surg* 23(4): 1154-1155.
- Ashwini LS, Mohandas Rao KG, Saran S, Somayaji SN (2012) Morphological and morphometric analysis of supraorbital foramen and supraorbital notch: a study on dry human skulls. *Oman Med J* 27(2): 129-133.
- Lee HJ, Choi KS, Won SY, Apinuntrum P, Hu KS, et al. (2015) Topographic Relationship between the Supratrochlear Nerve and Corrugator Supercilii Muscle-Can This Anatomical Knowledge Improve the Response to Botulinum Toxin Injections in Chronic Migraine? *Toxins (Basel)* 7(7): 2629-2638.
- <http://wongbakerfaces.org/>
- Seager D, Cam S (2004) Supraorbital and supratrochlear nerve blocks in hair transplantation. *Hair transplantation Pp.* 255-258.
- Chang SC (2009) Virtual painless hair transplant anaesthesia. *Hair Transpl Forum Int* 19(4): 124-127.
- Ahmad M, Ahmad N (2012) The efficacy of supra-orbital/supratrochlear nerve block in hair transplant surgery: the use of local anaesthetic cream. *Hair Transpl Forum Intl* 22(3): 84-85.
- Ahmad M, Mohmand MH (2015) Nerve blocks or subcutaneous injections: comparison of pain levels in patients undergoing hair transplant surgery. *Pak J PlastSurg* 4(1): 19-22.
- Nusbaum BP (2004) Techniques to reduce pain associated with hair transplantation: optimizing anaesthesia and analgesia. *Am J ClinDermatol* 5(1): 9-15.
- American Academy of Pediatric Dentistry (2015) Guidelines on behaviour guidance for the pediatric dental patients. *Pediatr Dent* 36(6): 180-190.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/JAICM.2017.02.555595](https://doi.org/10.19080/JAICM.2017.02.555595)

Your next submission with Juniper Publishers
will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission
<https://juniperpublishers.com/online-submission.php>