Journal of Pakistan Association of Dermatologists. 2017; **27(3)**: 247-251.

Original Article

Use of vibration anesthesia in hair restoration surgery

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Abstract

Objective To compare the pain levels in supraorbital/supratrochlear nerve blocks with and without the use of vibration in patients undergoing hair restoration.

Methods The study was conducted on 20 patients undergoing 1st session of hair restorative surgery. The nerve block, on one side, was administered with the vibrator and on the other side without it. The vibration was started 3-5 seconds prior the insertion of the needle. The patients pain scores were recorded using the Wong-Baker Faces Pain scale (0-10).

Results The mean age 29.7 years (range, 24-37 years). The mean pain score with the vibrator was 2.4 (range, 1-4) whereas the mean pain score was 4.6 (3-6) without the vibrator. There were 30% smokers. The average pain score in smokers vs. non-smokers was 6.2 vs. 4.3 on the side without vibrator and it was 3.8 vs .2.0 on the side with the vibrator, respectively. None of the patients opted to undergo procedure without the vibrator for the next session.

Conclusion The use of vibration decreases the severity of pain perceived by the patients.

Key words
Pain, local anesthesia, hair restoration, nerve block.

Introduction

Pain is a complex and multidimensional constant that involves sensory, emotional and cognitive processes.[1] Pain due to local anesthesia is caused not only by mechanical trauma to the region of the injection but also by the rapid expansion of the tissues in which anesthetic solution is injected. In fact, tissue tension can cause more pain and discomfort than the needle puncture.[2] There are various methods to minimize the pain while administering local anesthesia like using the topical anesthetics, slow infiltration, computer-assisted local anesthesia (WAND), vibration, hypothermia/ cold, transcutaneous electrical nerve stimulation etc.[3-8]

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The following study was conducted to compare the pain-levels in supraorbital/supratrochlear (SO/ST) nerve blocks with and without the use of vibration in patients undergoing hair restoration.

Methods

The study was conducted on 20 patients undergoing 1st session of hair restorative surgery. Standard technique of SO/ST nerve block was used on each side. The nerve block, on one side, was administered with the vibrator and on the other side without it

Techniques

First of all, the supraorbital foramen was palpated with the index finger of right hand. The vibrator was placed over the foramen. The needle of the syringe was inserted (after 2-3

seconds) into the skin close to the vibrator's pad. The local anesthetic was injected very slowly. About 3ml of 1% lidocaine with adrenaline in 1:200,000 dilution without any buffering agent was used. On the other side, similar technique was employed without the use of vibrator **(Figure 1)**. The Wong-Baker Faces Pain scale (0-10) was used to assess the severity of pain experienced by the patient **(Figure 2)**.

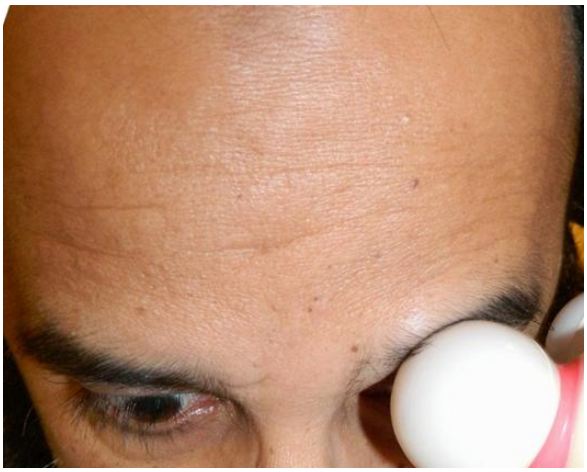

Figure 1 Use of the vibrator

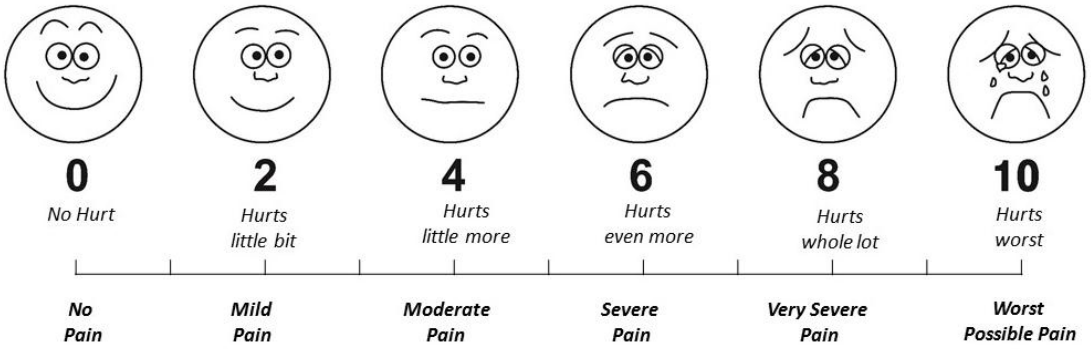

Figure 2 Use of the vibrator

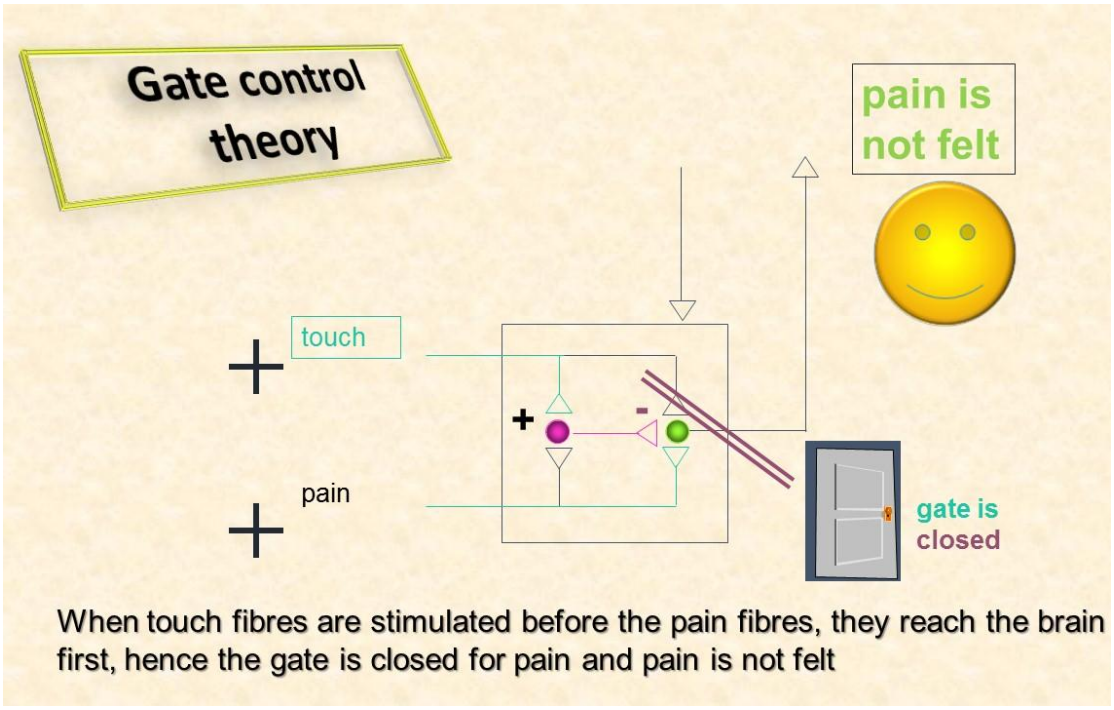

Figure 3 Gate control theory.

Results

Twenty patients with mean age of 29.7 years (range, 24-37 years) were included in the study. The mean pain score with the vibrator was 2.4 (range, 1-4) whereas the mean pain score was 4.6 (3-6) without the vibrator. Most of the patients having SO/ST nerve block without vibrator had a mean score of 4 followed by 5 (40%), whereas the majority of the patients (50%) having injections with the vibrator had a mean score of 2. There were 30% smokers. The average pain score in smokers vs. non-smokers was 6.2 vs. 4.3 on the side without vibrator and it was 3.8 vs. 2.0 on the side with the vibrator, respectively. None of the patients opted to undergo procedure without the vibrator for the next session.

Discussion

Pain is one of the factors which determines the future referral of the patients to the specific hair restorative surgeon. The patients have apprehension about the degree of the pain which is to be expected during the surgery. A surgeon who can perform a relative pain free procedure definitely has an edge over other surgeons. There are multiple factors which are associated with the degree of the pain. The needle gauge (length and diameter), volume to be injected, the anatomic area, the composition of anesthetic agent, temperature, pH etc., are all important factors.

There are two main types of fibres involved in the transmission of pain, i.e. myelinated Aδ fibres and type C fibres. The sensation of light touch is carried by Aß fibres. The gateway theory of pain was presented in 1965 by Melzack and Wall.[9] The theory postulated that there is an interaction between pain fibres and touch fibres input at the spinal cord level and a non-painful stimulus can block the transmission of a painful stimulus **(Figure 3)**. This gate control theory is the basis of various methods of pain relief, e.g., massaging the painful area, applying irritable substances, transcutaneous electrical nerve stimulation etc. Nowadays, there are various studies in which the vibration anesthesia has been incorporated in the clinical practice and has resulted in reduction of pain.[10-12] However, it is a new concept in hair restoration surgery and till date no study has been published to compare the effect of vibration anesthesia in patients undergoing hair restoration. Minimizing patient comfort is an important consideration especially for the aesthetic procedure.[13] A few studies have demonstrated clearly that vibration anesthesia is an effective means of minimizing injection pain.[14-16]

We used the Wong-Baker faces Pain Scale as it is much easier for the patients to describe the severity/degree of pain experienced.[17] The vibrator was placed near the injection site about 2-3 seconds before the needle was inserted. Based on gate-control theory, the activation of nerve fibres that conduct noxious stimuli, can be reduced. When vibration was applied as a counter stimulation to an anesthetic injection, it will reach the brain before the pain does. The brain can perceive only one stimuli at a time, therefore, the sensation that arrives the brain first is the one that will be felt.[6,18] Hence a counter vibration stimulus reduces the pain perception by brain.

As we know, the pain of local anesthetic injection has two components. The first component is the actual needle prick of the skin. This component can be blocked by vibration stimuli if applied according to the gate-control theory. The second component is the pain felt due to the injection of the drug and is dependent on various factors like composition, amount, temperature, pH, and speed of the injection. The pain of this component can also be reduced by

the vibration which actually massages the local area and helps in the dissolution of the fluid quickly into the tissues. The pain can further be reduced by using very fine needle (30G or fine) and slow injection speed.

Various other studies demonstrated that the use of vibration anesthesia resulted in significant pain reduction.[19,20] In the study by Fayers *et al.*[21], there was a significant difference (p=0.0003) in mean pain score for vibration-assisted side (3.3) as compared to the placebo (4.5) for local anesthesia in upper eyelid surgery which is higher than the score of 2.4 noted in our study. The pain score without vibration was 4.5 which is same (4.6) in the current study. However, there are no reported studies comparing the results of the use of vibration on SO/ST nerve blocks in the same patient. In the present study, we used a commercially available vibrator. The frequency of the vibration produced could not be measured. There is no study to date which compares the effects of different vibration frequencies on the pain n perceived by the patients. Although the use of SO/ST nerve block is very less common among hair restoration surgeons, however, another study concluded that the subcutaneous injections (ring block) was more painful with SO/ST nerve block as compared to the ring-block with SO/ST nerve block.[22] More multicenter studies may be required to establish the different geographical and racial influences.

Conclusion

The vibration anesthesia significantly reduces the pain experienced by the patients. It is a good adjunct in the hair restoration surgery.

References

1. Shilpapriya M, Jayanthi M, Reddy VN, Sakthivel R, Selvaraju G, Vijayakumar P. Effectiveness of new vibration delivery system on pain associated with injection of local anesthesia in children. *J Indian Soc Pedod Prev Dent.* 2015;**33**:173-6.
2. Yenisey M. Comparison of the pain levels of computer-controlled and conventional anaesthesia techniques in prosthodontic treatment. *J Appl Oral Sci*. 2009;**17**:414-20.
3. Ahmad M, Ahmad N. The efficacy of supra-orbital/supra-trochlear nerve block in hair transplant surgery: the use of local anaesthetic cream. *Hair Transpl Forum Int*. 2012;**22**:84-5.
4. Ahmad M, Mohmand MH. Nerve blocks or subcutaneous injections: Comparison of pain levels in patients undergoing hair transplant surgery. *Pak J Plast Surg*. 2015;**4**:19-22.
5. Barusco MN, Leavitt ML, Kirk R. The use of computerized anaesthesia injection system to minimize the pain during hair transplant surgery. *Hair Transpl Forum Int.* 2001;**11**:107-9.
6. Nanitsos E, Vartuli R, Forte A, Dennison PJ, Peck CC. The effect of vibration on pain during local anaesthesia injections. *Aust Dent J*. 2009;**54**(2):94-100.
7. Nusbaum BP. Techniques to reduce pain associated with hair transplantation: optimizing anesthesia and analgesia. *Am J Clin Dermatol*. 2004;**5**:9-15.
8. Seager DJ, Simmons C. Local anesthesia in hair transplantation. *Dermatol Surg*. 2002;**28**:320-8.
9. Melzack R, Wall PD. Pain mechanisms: a new theory. *Science*. 1965;**150**:971-9.
10. Mally P, Czyz CN, Chan NJ, Wulc AE. Vibration anesthesia for the reduction of pain with facial dermal filler injections. *Aesthetic Plast Surg*. 2014;**38**:413-8.
11. Ching D1, Finkelman M2, Loo CY3. Effect of the DentalVibe injection system on pain during local anesthesia injections in adolescent patients. *Pediatr Dent*. 2014;**36**:51-5.
12. Smith KC, Comite SL, Balasubramanian S, Carver A, Liu JF. Vibration anesthesia: a noninvasive method of reducing discomfort prior to dermatologic procedures. *Dermatol Online J*. 2004;**10**(2):1.
13. Sharma P, Czyz CN, Wulc AE. Investigating the efficacy of vibration anesthesia to reduce pain from cosmetic botulinum toxin injections. *Aesthet Surg J*. 2011;**31**:966-71.
14. Babamiri K, Nassab R. The evidence for reducing the pain of administration of local

anesthesia and cosmetic injectables. *J Cosmet Dermatol*. 2010;**9**:242-5.
15. DiFelice MG1, Vandewalle KS2, Maller SC3, Hancock RH4. Effects of a vibratory device on pain from anesthetic injections. *Compend Contin Educ Dent.* 2014;**35**:246-51.
16. Unger WP. Anaesthesia. In: Unger WP, ed. *Hair Transplantation*. New York: Marcel Dekker; 1995. P. 165-81.
17. http://www.wongbakerfaces.org accessed on 01-01-2016
18. Saijo M, Ito E, Ichinohe T, Kaneko Y. Lack of pain reduction by a vibrating local anesthetic attachment: a pilot study. *Anesth Prog.* 2005;**52**:62-4.
19. Wexler SJ, Wulc AE. Pain reduction using vibration in aesthetic injections and in eye and facial plastic surgery. In: Hartstein ME, Massry GG, Holds JB, eds. *Pearls and Pitfalls in Cosmetic Oculoplastic Surgery, 2nd edn*. London: Springer; 2015. p.43-5.
20. Chang SC. Virtual painless hair transplant anaesthesia. *Hair Transpl Forum Int*. 2009;**19**:124-7.
21. Fayers T, Morris DS, Dolman PJ. Vibration-assisted anesthesia in eyelid surgery. *Ophthalmology*. 2010;**117**:1453-7.
22. Ahmad M, Mohmand MH. Nerve blocks or subcutaneous injection: comparison of pain levels in patients undergoing hair transplant surgery. *Pak J Plast Surg*. 2015;**4**:19-22.