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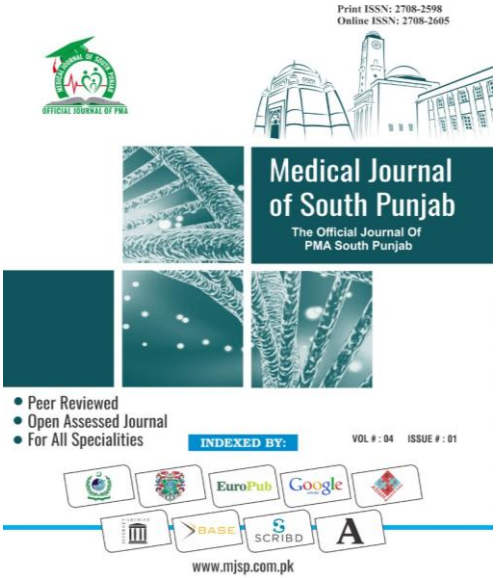

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Original Article

Pain perception between local infiltration and inferior alveolar nerve block (IANB) injection techniques in patients undergoing orthodontic lower premolar extractions

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ABSTRACT

Objective: *to compare the effectiveness of local anesthesia delivered via IANB and local infiltration techniq ifically for lower premolar teeth extraction in the context of orthodontic treatment.*

Methods: *Randomized clinical trial was conducted at the Department of Oral and Maxillofacial Surgery, Niazi Medical & Dental College, Sargodha, Pakistan, spanning six months from January 2023 to June 2023. The study included patients aged 12 to 25, of any gender, referred for extraction of lower premolars due to any orthodontic issue and therapeutic reason. Two groups of patients were made; in group 1 patients received local anesthesia through infiltration and in group 2 it was given through IANB.*

Results: *Mean pain score in the time of extracting the teeth by using Wong-Baker faces pain rating scale and mean pain score in the time of extracting the teeth using visual analogue scale (VAS) for Group A and Group B was 2.32±0.62 and 2.38±0.58 and 1.55±0.55 and 1.53±0.54, respectively.*

Conclusion: *Infiltration technique is simpler, offering shorter and sufficient anesthesia compared to IANB. It's easier and more comfortable for patients, avoiding collateral innervations and nerve harm. Injection of local infiltration is comparatively less painful and as effective as nerve block for lower premolar orthodontic extractions, making it a routine choice.*

Keywords: *Infiltration, Inferior alveolar nerve block, Mandibular premolar, Pain perception. Therapeutic extraction,*

1. INTRODUCTION

Temporary loss of sensation is named as local anesthesia is a in a specific area of the body, achieved by inhibiting the conduction of action potentials in peripheral nerves without altering consciousness levels[1]. However, achieving profound anesthesia can be challenging for dentists, particularly in patients undergoing tooth extraction with pulpitis[2]. The goal is to ensure that dental extractions are comfortable and painless for the patient, despite the complexities involved in targeting the affected proprioceptive fibers[3].

Usually in dental practice, especially for pediatric patients, involves applying topical anesthetics prior to injection to ensure a painless procedure, fostering a more positive mentality towards proposed treatments[4]. In orthodontic treatment, where extraction of premolars for therapeutic purpose is common among young patients under 25, proper injection techniques such as infiltration and IANB are crucial to manage lower pain thresholds and ensure patient cooperation during extraction[5], although IANB, frequently used for mandibular posterior teeth, carries risks of complications like trismus, facial nerve palsy, and prolonged anesthesia duration due to its technique sensitivity[6].

Infiltration anesthesia is a challenge for new trainees and has high failure rates due to landmark identification difficulties[7]. It can lead to complications like facial nerve palsy, hematoma formation and limited mouth opening[8]. Traditionally mandibular infiltration is avoided for extraction of posterior mandibular teeth due to limited efficiency caused by the thick buccal cortical plate[9]. Clinicians are exploring infiltration anesthesia as a suitable alternative to the traditional IANB method[10]. IANB's duration and discomfort often outlast dental procedures, especially extractions, but previous literature mainly compared molars extracted for reasons like periodontitis or pulpitis[11].

The rationale for conducting a study to understanding the comparative efficacy of local infiltration and IANB techniques in managing pain during orthodontic procedures is clinically significant.

2. METHODOLOGY

The study included 80 patients aged 12 to 25, of any gender, who were planned for therapeutic extraction of lower premolars for orthodontic reasons. Patients with pre-existing systemic illnesses or planned for teeth extraction but not premolars were excluded from the study.

Each group consisting of 40 participants. Group 1 underwent the local infiltration technique using lignocaine 2% 2ml lignocaine with 1:80,000 adrenaline (Xylocaine), while Group 2 received the IANB injection technique with the same anesthetic solution. Randomization was performed online using details of group numbers and patient ID. Blinding was achieved by having a secondary surgeon administer either the nerve block or infiltration, with the primary surgeon performing the tooth extraction procedure. The effectiveness of anesthesia was confirmed both subjectively and objectively before proceeding with the extraction of lower premolars using lower premolar forceps. Postoperative medications and instructions were advised.

The assessment of pain perception during injection and tooth extraction utilized both the WBFP Rating Scale scores and VAS scores. SPSS version 27 was used for data analysis.

3. RESULTS

Overall, 80 patients were included in this study. Group A, 40 (50.0%)

and Group B 40 (50.0%). The mean age of Group A and Group B was 26.88±4.43 years and 27.25±5.21 years, respectively. (p=0.747). Male strength is greater than female in both the groups, (p=0.152). (Table. I).

The mean pain score in the time of given local anesthesia using Wong-Baker faces pain rating scale for Group A was lower than the Group B, 1.75±0.63 and 3.90±0.95, respectively (p<0.001). The mean pain score in the time of given local anesthesia using visual analogue scale for Group A was lower than the Group B, 1.95±0.45 and, 3.90±1.03 respectively (p<0.001). Whereas, the mean pain score in the time extracting the teeth by using Wong-Baker faces pain rating scale for Group A and Group B was 2.32±0.62 and 2.38±0.58 respectively (p=0.711). The mean pain score in the time of extracting the teeth using visual analogue scale for Group A and Group B was 1.55±0.55 and 1.53±0.54, respectively, (p=0.840). (Table. II).

Table. I
Demographic variables of both the study groups

Variable	Group A 40 (50.0%)	Group B 40 (50.0%)	p-value
Age (years)	26.88±4.43	27.25±5.21	0.747
Gender			
Male	30 (75.0)	24 (60.0)	0.152
Female	10 (25.0)	16 (40.0)	
Mean±S.D, N (%)			

Table. II
Comparison of pain perception during local anesthesia using the WBFP rating scale and VAS of both the study groups

Pain scale	Group A 40 (50.0%)	Group B 40 (50.0%)	p-value
Wong-Baker Faces Pain Rating Scale			
Mean±S.D	1.75±0.63	3.90±0.95	<0.001
Visual analogue scale			
Mean±S.D	1.95±0.45	3.90±1.03	<0.001
Wong-Baker Faces Pain Rating Scale			
Mean±S.D	2.32±0.62	2.38±0.58	0.711
Visual analogue scale			
Mean±S.D	1.55±0.55	1.53±0.54	0.840

4. DISCUSSION

Local anesthesia is important in dental surgery, especially in cases of tooth extraction where pain is inevitable; while pain during injection can be reduced with topical anesthetic agents and specific techniques such as nerve blocks and infiltration, yet inferior alveolar nerve block (IANB) remains the gold standard for mandibular posterior teeth extraction despite its technique sensitivity and potential complications[12].

In this study we used Wong baker's scale and VAS scoring for assessment of pain and effectiveness of block. The review by Tomlinson et al[13] concludes that the WBFP Rating Scale possesses the necessary psychometric qualities to effectively assess pain levels and is considered a rapid and straightforward tool for evaluating pain during therapeutic extraction of lower premolars when combined with VAS scores. In a study Aditya et al[14] reported that nerve block and local infiltration both are less painful and equally effective as nerve block for extractions, suggesting that it can be routinely employed for orthodontic procedures or lower premolar extractions.

The study findings indicated that the facial pain scale score was notably lower during injection for the infiltration group compared to the IANB group, with no significant difference observed during tooth extraction in either group. These results align with a study conducted by Bahrololoomi et al[15], which also reported similar pain scores using the facial pain scale for both infiltration and IANB. Additionally, when assessed using VAS scores, individuals experienced significantly more pain during IANB compared to infiltration, while no significant disparity was noted between the two techniques during tooth extraction.

Studies conducted by El-Kholey et al[16] and Yalmaz et al[17] found that the infiltration

technique resulted in similar pain scores compared to the IANB, with less pain reported during the infiltration technique. Additionally, they observed that during extractions, sometimes local anesthesia in addition was administered in few patients of infiltration group, in IANB group some patients needed additional anesthesia.

Madeira et al[18] reported that between 87.3% to 96.2% of examined specimens displayed accessory foramina within the human mandible, indicating a prevalent anatomical variation. Pogrel et al[19] described the trajectory of the mental nerve branches, highlighting their entry into the lateral surface of the mandible, elucidating the pathway through which sensory innervation is facilitated in this region.

According to Rajendran et al[20] study, the success rate of inferior alveolar nerve block (IANB) was 22%, while that of intraosseous nerve block (INF) was significantly higher at 78%, indicating a superior anesthetic effect for INF ($P < 0.05$). Claffey et al[21] found that the success rate of inferior alveolar nerve blocks (IANB) was only 24%, with a recorded failure rate ranging between 44% and 81% when IANB was employed.

Limitations: The study have a short follow-up period, limiting the ability to assess long-term outcomes such as post-operative pain or complications.

5. CONCLUSION

Infiltration technique is simpler, offering shorter and sufficient anesthesia compared to IANB. It's easier and more comfortable for patients, avoiding collateral innervations and nerve harm. Injection of local infiltration is comparatively less painful and as effective as nerve block for lower premolar orthodontic extractions, making it a routine choice.

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