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Original Research Article

COMPARISON OF PERIOSTEAL ELEVATOR WITH AND WITHOUT DEXAMETHASONE INJECTION FOR THE PREVENTION OF LINGUAL NERVE INJURY IN AN OPEN EXTRACTION OF MANDIBULAR THIRD MOLARS

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ABSTRACT

Background: *Lingual nerve injury (LNI) is a recognized complication during mandibular third molar surgery, often resulting from excessive traction or manipulation of the lingual flap. The use of periosteal elevators for lingual retraction is a common practice, while corticosteroids such as dexamethasone have been suggested to minimize postoperative inflammation and nerve injury.* ***Objective:*** *To assess the incidence of lingual nerve injury by comparing two surgical approaches—lingual retraction using a periosteal elevator alone versus retraction with a periosteal elevator preceded by preoperative steroid therapy.* ***Study Design:*** *Randomized controlled trial.* ***Setting:*** *Department of Oral and Maxillofacial Surgery, at Sardar Begum Dental College and Hospital, Peshawar, Pakistan.* ***Duration of Study:*** *From 23 February 2025 to 23 May 2025.* ***Methods:*** *A total of 88 patients requiring mandibular third molar extraction were randomly allocated into two groups (n=44 each). Group A underwent lingual flap retraction using only a periosteal elevator. At the same time, Group B received a single intramuscular dose of dexamethasone (4 mg) one hour preoperatively, followed by lingual retraction using a periosteal elevator. Postoperative lingual nerve sensory function was evaluated on the 7th postoperative day using standardized neurosensory tests. Data were analyzed using SPSS version 23, and the chi-square test was used to assess intergroup differences; $p < 0.05$ was considered significant.* ***Results:*** *The mean age of patients was 35.14 ± 11.08 years in Group A and 41.20 ± 11.89 years in Group B. The incidence of lingual nerve injury was 6.8% in Group A and 2.3% in Group B. The difference between the two groups was not statistically significant ($p > 0.05$).* ***Conclusion:*** *Preoperative administration of dexamethasone before lingual retraction slightly reduced the incidence of lingual nerve injury following mandibular third molar extraction; however, the difference was not statistically significant. Further studies with larger sample sizes and long-term follow-up are warranted to confirm these findings.*

Keywords: Lingual Nerve Injury, Dexamethasone, Periosteal Elevator, Third Molar Extraction, Neurosensory Testing, Randomized Controlled Trial

INTRODUCTION

Mandibular third molars symbolise the most commonly extracted teeth, which include 18% of the total dental extractions (1, 2). Third molars generally develop between 8 and 15 years of age and usually erupt between 17 and 22 years of age (3, 4). The delayed eruption of mandibular third molars usually leads to impaction, with research studies indicating that 17-69% of such molars exhibit different levels of impaction. The removal of third molars can be difficult due to anatomical proximity to the inferior alveolar nerve, which is the third branch of the fifth cranial nerve (5, 6).

The mandibular nerve constitutes the most prominent as well as the largest division of the 5th cranial nerve, also known as the trigeminal nerve. The innervation includes the skin of the lower face as well as the lip, muscles involved in mastication, the gingivae, and the anterior two-thirds of the tongue. The system provides both motor and sensory functions. The inferior alveolar nerve symbolises the most substantial branch of the mandibular nerve. The lower cheek, tongue, teeth, and gingivae receive sensory input from this structure. The IAN is an essential component of extraction for lower third molars, given the proximity of both structures (7-10). Consequently, there is a greater likelihood of injury to the IAN, possibly leading to immediate or long-term alterations in sensation within its distribution area. The probability of a temporary altered sensation ranges from 1-5%, whereas the likelihood of long-term dysaesthesia has been projected at 0.9% (11).

The surgical extraction process involves a critical step, such as elevating the mucoperiosteal flap. This is generally accomplished with a periosteal elevator. Improper or overly aggressive use of these tools may result in direct trauma to the lingual nerve or lead to traction-induced injuries; nevertheless, the possible contribution of supplementary pharmacologic interventions, especially anti-inflammatory agents, should be considered. Dexamethasone is a synthetic glucocorticoid known for its significant anti-inflammatory and immunosuppressive effects. It is commonly utilised in preoperative settings within oral and maxillofacial surgery to mitigate postoperative complications (12, 14).

The use of a periosteal elevator has been studied extensively as a means of preventing this complication. Still, little research has been conducted on the effectiveness of combining a periosteal elevator with steroid therapy. This synopsis aims to fill this gap in the literature by examining the available research on both. By comparing the effectiveness of these two approaches, we can better understand how to minimize the risk of lingual nerve injury and improve patient outcomes in this procedure.

METHODOLOGY

This randomized controlled trial was conducted in the Department of Oral and Maxillofacial Surgery at Sardar Begum Dental College and Hospital, Peshawar, from 23 February 2025 to 23 May 2025, after getting the ethical clearance from our institute. A non-probability convenience sampling technique was used, and the sample comprised 88 patients, randomly divided into two groups: Group A (periosteal elevator alone) and Group B (periosteal elevator with dexamethasone). The sample size was calculated based on an expected frequency of lingual nerve injury of 6.6% (15), a 5% margin of error, and a 95% confidence level. Eligible patients were those aged 18 to

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60 years undergoing surgical removal of impacted mandibular third molars, which were classified as mesioangular, vertical, distoangular, or horizontal according to Winter's classification. Patients who were mentally or physically disabled, those with neurological diseases, traumatic brain injury, multiple sclerosis, mandibular fractures, or bisphosphonate therapy, and those already on steroid medication. Each patient gave their consent.

In Group A, the periosteal elevator was used to retract the lingual flap alone. In contrast, in Group B, the periosteal elevator was combined with a 4mg dose of dexamethasone, which was given one hour before the surgical procedure.

The surgical extraction was performed under local anesthesia by a qualified OMFS consultant and a CPSP trainee following a standardized procedure. The Terence Ward's incision was made to reflect the buccal flap, and a gutter was created in the disto-buccal bone to expose the tooth. Bone removal was achieved using a motor-driven surgical bur with continuous irrigation with normal saline. Depending on the path of removal, odontectomy or odontotomy procedures were performed. In the second group, the same surgical technique was used, preceded by the steroid injection.

Postoperatively, sensory disturbances were assessed on the seventh day, and any complaints of altered sensation in the tongue or floor of the mouth were recorded. A variety of neurosensory tests, including two-point discrimination, thermal sensation, pinprick testing, and directional brush stroke, were employed to assess nerve injury. Patients reporting sensory disturbance were advised to follow up monthly with additional assessments until six months after surgery if paresthesia persisted.

SPSS 26 was used for analysis. Age, operative time, and duration of numbness were assessed using mean and standard deviation. Lingual nerve injury was stratified by age, gender, operative time, and paresthesia duration. Chi-square tests were used with a significance level set at $p < 0.05$.

RESULTS

We had 88 patients who presented for open extraction of mandibular third molars, divided equally into two groups. We used a periosteal elevator in group A and a periosteal elevator with dexamethasone for group B.

The mean age in group A was 35.14±11.080 years with an operative time of 30.55±5.837 minutes. The mean duration of numbness was 49.55±6.92 days. For Group B, the mean age was 41.20±11.888 years with an operative time of 31.23±5.826 minutes. The mean duration of numbness was 48.11±6.40 days. There were 20 (45.5%) males and 24 (54.5%) females in group A, and there were 23 (52.3%) males and 21 (47.7%) females in group B (Figure 1).

Regarding lingual nerve injury, in group A, 3 (6.8%) patients experienced injury, while 41 (93.2%) did not; in group B, 1 (2.3%) patient experienced injury, while 43 (97.7%) did not. The difference was not statistically notable (P = 0.30) (Table 1). Stratification of lingual nerve injury by age, gender, duration of numbness, and operative time is shown in Table No. 2.

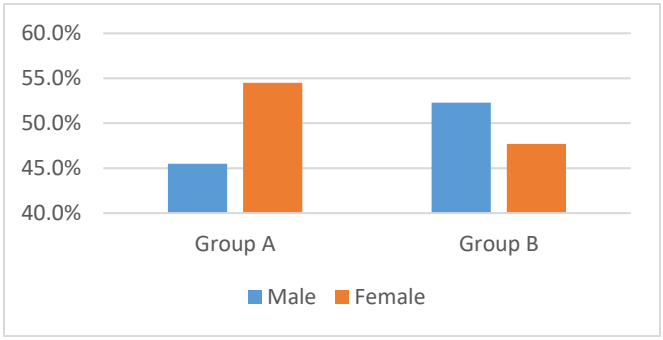

Figure 1: Gender distribution

Table 1: Comparison of lingual nerve injury between both groups

Lingual nerve injury	Groups				P value
	Group A (Periosteal elevator)		Group B (Periosteal elevator with Dexa)		
	n	%	n	%	
Yes	3	6.8%	1	2.3%	0.30
No	41	93.2%	43	97.7%	

Table 2: Stratification of comparison of lingual nerve injury between both groups with different parameters

Parameters				Groups				P value
				Group A (Periosteal elevator)		Group B (Periosteal elevator with Dexa)		
				n	%	n	%	
Gender	Male	Lingual nerve injury	Yes	2	10.0%	1	4.3%	0.46
			No	18	90.0%	22	95.7%	
	Female	Lingual nerve injury	Yes	1	4.2%	0	0.0%	0.34
			No	23	95.8%	21	100.0%	
Age groups (Years)	18 to 35	Lingual nerve injury	Yes	2	9.1%	0	0.0%	0.23
			No	20	90.9%	15	100.0%	
	36 to 50	Lingual nerve injury	Yes	1	5.0%	1	5.3%	0.97
			No	19	95.0%	18	94.7%	
	51 to 60	Lingual nerve injury	Yes	0	0.0%	0	0.0%	N/A
			No	2	100.0%	10	100.0%	
Duration of numbness (Days)	35 to 45	Lingual nerve injury	Yes	0	0.0%	0	0.0%	N/A
			No	12	100.0%	11	100.0%	
	> 45	Lingual nerve injury	Yes	3	9.4%	1	3.0%	0.28
			No	29	90.6%	32	97.0%	
Operative time (Mins)	20 to 35	Lingual nerve injury	Yes	2	5.9%	1	3.3%	0.63
			No	32	94.1%	29	96.7%	
	> 35		Yes	1	10.0%	0	0.0%	0.22

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		Lingual nerve injury	No	9	90.0%	14	100.0%	

DISCUSSION

The current study evaluated the efficacy of dexamethasone in reducing lingual nerve paresthesia by comparing two groups: one group used a periosteal elevator alone (Group A), while the other combined a periosteal elevator with dexamethasone (Group B). We observed that Group A had a slightly higher incidence of LNI. Still, the difference was not statistically significant: 6.8% of patients in Group A and 2.3% in Group B experienced injury (P = 0.30). These findings align with the study by Mushtaq et al, which investigated the effect of intramuscular dexamethasone on neuropraxia following third molar surgery and found no substantial difference in the incidence of paresthesia between the dexamethasone and control groups. Their results showed an overall 15% incidence of lingual nerve paresthesia and 6.5% for the inferior alveolar nerve, with no statistical significance (P > 0.05) (16). Similarly, Bhuvana et al. conducted a randomized controlled trial. They demonstrated that dexamethasone did not significantly alter lingual nerve paresthesia recovery, as both the test and control groups showed comparable recovery rates over 3 months (17). These studies collectively suggest that, despite its anti-inflammatory properties, dexamethasone may not have a pronounced effect on preventing or reducing nerve injury during third molar surgeries.

Another critical aspect of our study is the surgical technique; we used the lingual flap technique. Pogrel and Goldman explored the use of lingual flap retraction during third molar removal and reported a transient lingual paresthesia rate of 1.6% with no cases of permanent nerve damage. Their study emphasized that lingual retraction could improve surgical access and potentially reduce inadvertent nerve damage caused by instrumentation or bone fragments (18). In contrast, Pichler et al. conducted a systematic review and found that lingual flap retraction was associated with a higher incidence of temporary nerve injury than buccal approaches without retraction (19). These contrasting findings highlight the complexity of surgical techniques and their variable outcomes in nerve injury rates.

In the present study, the mean duration of numbness was slightly shorter in Group B compared to Group A, though this difference was not statistically significant. This observation is consistent with the findings of Von et al, who reported that dexamethasone failed to reduce neuropraxia despite its known anti-inflammatory effects (20). The lack of significant improvement in nerve recovery time in our study raises concerns about the mechanisms by which dexamethasone might influence nerve healing. While the drug is effective in reducing postoperative edema and pain, its direct impact on nerve regeneration appears limited (12).

Dexamethasone may reduce postoperative swelling and discomfort; its role in preventing or mitigating lingual nerve injury remains uncertain. The surgical technique, including the use of lingual retractors, may have a more direct impact on nerve safety, though the risk of temporary paresthesia cannot be eliminated. Future research could explore higher doses of dexamethasone or alternative pharmacological agents targeting lingual nerve injury.

CONCLUSION

In conclusion, the periosteal elevator with dexamethasone group demonstrated a slightly lower incidence of lingual nerve injury after mandibular third molar extraction than the periosteal elevator alone group, but the difference was not statistically significant. We deduce that both techniques are equally effective.

DECLARATIONS

Data Availability Statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned. (IRB)
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

ANUM GUL (Postgraduate Resident)
Data Collection, Data Analysis, Manuscript writing, Review of manuscript, and final approval of manuscript.
Manuscript drafting.
JAWAD AHMAD KUNDI (Professor)
Supervision, Critical input, Study Design, and final approval of manuscript.
ARIF AHMAD (ENT Registrar)
Critical guidance

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