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Original Article

Dentistry Section

Coronectomy versus Extraction of Third Molar with Inferior Alveolar Nerve Proximity: A Cross-sectional Study

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ABSTRACT

Introduction: A tooth that failed to erupt in its expected time of eruption is called impacted tooth. Mandibular impacted teeth are common than any other tooth. Management of impacted teeth depends upon depth, angulations and type of impaction. Certain factors may increase the complications of tooth extraction. One of them is Inferior Alveolar Nerve (IAN) approximation with third molar roots. Coronectomy is surgical procedure through which crown of tooth can be removed at cementoenamel junction level and leaving the root part is a new procedure to avoid nerve injury.

Aim: To compare outcome of extraction of lower third molar and coronectomy in management of impacted third molar with close proximity to inferior alveolar nerve.

Materials and Methods: This cross-sectional study was conducted at Oral and Maxillofacial Surgery Department at Liaquat University of Medical and Health Science Jamshoro/Hyderabad, Pakistan. Ethical approval was sought from the ethical review committee of university. The written informed consent was taken from the patients. Total 36 patients were included in this study, divided into two groups using random number table. Patients with mandibular impacted third molar, with inferior alveolar nerve approximation diagnosed clinically and radiographically were included in this study. Group A was treated with surgical extraction and group B with Coronectomy. The data was analysed by Statistical Package for the Social Sciences (SPSS) statistical software version 20.0. The Chi-square test and Independent t-test was applied to check the statistical difference in outcomes of both treatment procedures.

Results: Total 36 patients were included in two groups and the mean age of patients were 25±2 years with male to female ratio as 1.1:1. Preoperatively, all patients were having normal mouth opening and no neurosensory deficit. Postoperatively neurosensory deficit seen in both groups at follow-up visits but, at six weeks follow-up, all patients were recovered from IAN deficit in coronectomy group with statistically significant p-value <0.001.

Conclusion: With this small sample size, it cannot be concluded which technique is better than other. With this single centre study, it was observed that coronectomy appears to be simple, easier and better procedure and more effective technique for minimising the risk to inferior alveolar nerve injury, limited mouth opening and dry socket that corresponds to impacted molar extraction.

Keywords: Inferior alveolar nerve injury, Orthopantomogram, Two point discrimination

INTRODUCTION

A tooth that failed to erupt in its expected time of eruption is called impacted tooth. Any tooth of the arch can be impacted but most commonly impacted teeth are mandibular 3rd molars followed by maxillary and then canines. Management of impacted teeth depends upon type of impaction according to angulations, depth of impacted tooth, and ramus relation. Other important factor which may interfere surgical management is inferior alveolar nerve approximation. Entire surgical removal of the tooth is the conventional method for most wisdom teeth management [1-3].

Extraction of lower third molar may be associated with postoperative complications like pain at surgical site, limited mouth opening, dry socket and inferior alveolar nerve damage/lingual nerve damage. Frequency of permanent damage to inferior alveolar nerve accounts to 2-4% after surgical extraction [4]. The severity of nerve injuries depends upon types of injury and ranges from neurapraxia, axonotmesis to neurotmesis, that may be expressed clinically as paraesthesia, hypoesthesia or dysesthesia to total numbness of the lower lip, teeth, gingiva and skin over the chin which considerably affects the quality of life of the patient [5,6].

This magnitude of never damage can be decreased if it is addressed before surgery. The relation of roots of third molar and inferior alveolar nerve must be documented while planning for surgical extraction. This can be seen on conventional periapical X-ray, Orthopantomogram (OPG) or on cone beam CT scan [7-9]. Radiographic signs may indicate closeness of nerve with roots; are interruption of the white line of the mandibular canal wall, darkening around the root(s), diversion of the mandibular canal, narrowing of the mandibular canal, narrowing of the root(s), and deflection of the roots [10].

The incidence of nerve injuries is as high as 19% [11]. If there is close proximity between the IAN and the roots, several methods have been planned to reduce inferior alveolar nerve injury like orthodontic extrusion, pericoronal ostectomy, surgical removal of third molar, coronectomy, modified coronectomy and grafting [5]. Recently, coronectomy has been investigated as an alternate to conventional surgical removal of third molars, particularly for those with an increased risk of injury to the inferior alveolar nerve [12]. It involves removal of the mandibular third molar crown, leaving the roots in the alveolar bone, in order to decrease the danger of trauma to inferior alveolar nerve [13]. Few studies have been published in literature to provide better treatment modalities to manage impacted mandibular third molar with nerve approximation [1,5,14,15]. Many of these studies tried coronectomy along with extirpation of vital pulp in order to avoid pulpal pain. The present study involved coronectomy without removal of pulp. The hypothesis was coronectomy can be performed without endodontic treatment and also without any pulpal complication. The aim of this study was to evaluate the outcome of coronectomy without extirpation of pulp and without complete removal for mandibular third molar teeth root apices which are near to inferior alveolar nerve.

MATERIALS AND METHODS

This cross-sectional study was conducted in Department of Oral and Maxillofacial Surgery, Liaquat University of Medical and Health Science Jamshoro/Hyderabad, Pakistan from March 2019-February 2020 after approval of Ethical Review Committee No.LUMHS/REC/733. A written informed consent was obtained from every patient for participation in this study and all surgical procedure was explained with their outcomes and complications.

Sample size calculation: Sample size was calculated using Epitool online sample size calculator. Total 36 patients were included in this study. Two groups of 18 in each were divided by using random number table.

Group A was planned for surgical extraction of tooth and group B was for coronectomy. Detailed history was obtained. The clinical examination was done and radiographic investigation like OPG was recommended to all patients.

Inclusion criteria: Mandibular impacted 3rd molar partial or full bony impaction with recurrent pericoronitis in close proximity to inferior alveolar nerve were selected for this study, age ranges from 18 to 40 years with no gender specification and healthy individual with American Society of Anaesthesiologist classification (ASA), class 1.

Exclusion criteria: Carious third molar tooth with associated periapical infection or tooth with grade two mobility. All surgical procedures were performed by consultant having atleast five years' experience in the field of oral and maxillofacial surgery.

Surgical Procedure

In group A, intraoral preparation was done with povidone-iodine solution. Anaesthesia was secured with 2% lignocaine hydrochloride with 1:2,00,000 adrenaline through classical inferior alveolar nerve block plus infiltration of mucosa of retromolar trigone. A standard ward's incision or ward's incision with distal extension was placed, the mucoperiosteal flap was reflected and the bone was exposed. Bone removal was done by guttering technique with a round bur (SME Dent) on the buccal and distal aspects of the tooth. Sectioning of tooth was performed according to the need to facilitate the tooth removal. Tooth was delivered from the socket by an elevator. Sharp bony edges was smoothen with bone files and the surgical site was thoroughly debrided and irrigated with 0.9% normal saline, closure of flap was done by using 3-0 polyglactin (Vicryl Rapid, Ethicon).

In group B, after following septic measures and local anaesthesia like in group A, bone was removed up to the cementoenemal junction by slow speed hand piece (SME Dent). Decoronation of tooth was done at 1-2 mm below the CEJ to ensure crown removal without mobilising the roots. Finally, finishing of the root surface were done with a round bur to decrease height of root 2-3 mm below the level of the surrounding alveolar bone. The surgical site was cleaned thoroughly and irrigated with 0.9% normal saline. The closure of flap was done by using 3-0 polyglactin (Vicryl Rapid, Ethicon). Postoperative instructions were given to every patient in both groups. Amoxicillin 500 mg, Metronidazole 400 mg and Paracetamol 500 mg three times a day for three days were also given in both groups [5,6]. The patients of both groups were recalled for follow-up on 1st, 3rd, and 6th week. In every postoperative follow-up, IAN deficit, dry socket and limited mouth opening were assessed.

IAN deficit was recorded with standardised neurosensory test which included a Two Point Discrimination (TPD)- in this neurosensory test, the probes of calliper device (Kawasaki, Japan) were drawn across the surface of skin or mucosa at constant pressure at the distance of 5 mm and then patients were asked to raise their left hand if two points were sensed. Positive was considered if patient identified and negative, if patient did not recognise the sensation at offending area. The minimum separation that was consistently reported as two points was termed as two-point discrimination threshold [16]. Mouth opening was recorded by the Vernier calliper (Kawasaki, Japan).

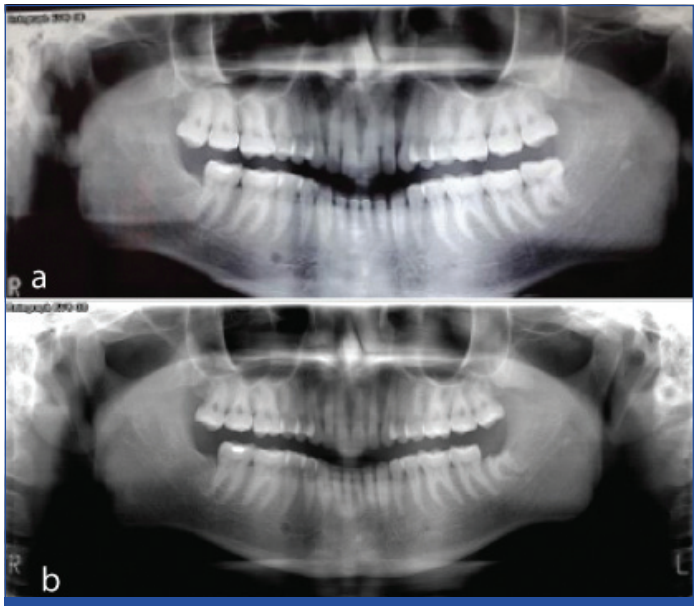
STATISTICAL ANALYSIS

The data was analysed by Statistical Package for the Social Sciences (SPSS) statistical software version 20.0. Categorical variables are presented in frequency and percentages. Continuous variables are presented in mean and standard deviation. Chi-square test was applied for categorical variables. The p-value <0.05 was considered as significant.

RESULTS

[Table/Fig-1a,b] shows preoperative OPG depicting impacted teeth with close apices with IAN. Total 36 patients were reported in this study, the mean age of patients were 24.5 years. Out of 36, 47% were females and 53% were males [Table/Fig-2].

Mean mouth opening in both groups was 38.5 mm and no inferior alveolar nerve impairment was seen preoperatively [Table/Fig-3].



[Table/Fig-1]: (a) Preoperative and (b) Postoperative orthopantomogram.

Groups	Age (years)		Gender	
	Mean	SD	Male n (%)	Female n (%)
Group A	25 years	2.3	10 (27.77%)	8 (22.22%)
Group B	25 years	3	9 (25%)	9 (25%)

[Table/Fig-2]: Descriptive statistics of age and gender according to treatment groups.

Groups	Mouth opening		INF TPD	
	Mean	SD	Positive	Negative
Group A	38 mm	3.15	18	0
Group B	38.9 mm	3.95	18	0
p-value (t-test)	0.489		p<0.001**	

[Table/Fig-3]: Preoperative assessment of mouth opening and inferior alveolar nerve Two Point Discrimination (TPD) with treatment groups.
p<0.001**, statistically highly significant

The variable analysed in postoperative visits were mouth opening, dry socket, and status of IAN. Mouth opening was reduced markedly in group A in 1st postoperative visit at 1st week from 39 mm to 28 mm and improvement seen in follow-up visit. While in group B mouth opening was also reduced from 39 to 31 mm, significant difference was observed in 1st week (p<value 0.01) [Table/Fig-4].

On the other hand, IAN damage was more in group A than group B (39% were positive in group A). Till last follow-up visit (6th week) no IAN deficit was seen in group B (p<0.002) [Table/Fig-5]. Dry socket

Groups	1st Week		3rd Week		6th Week	
	Mean	SD	Mean	SD	Mean	SD
Group A	28 mm	3.6	34.7 mm	3.6	37.6 mm	3.182
Group B	31 mm	2.9	35.5 mm	3.2	39 mm	2.47
p-value (t-test)	0.012*		0.503		0.153	

[Table/Fig-4]: Postoperative assessment of mouth opening with treatment groups at 1st, 3rd and 6th week.
p<0.001** statistically highly significant

Groups	Group A		Group B		p-value Chi-square
	Positive	Negative	Positive	Negative	
1st week	14 (39%)	4 (11%)	16 (44%)	2 (6%)	0.386
3rd week	15 (42%)	3 (8%)	16 (44%)	2 (6%)	0.641
6th week	16 (44%)	2 (6%)	18 (50%)	0	0.002**

[Table/Fig-5]: Postoperative assessment of Inferior Alveolar Nerve (Two Point Discrimination) with treatment groups at 1st, 3rd and 6th week using Chi-square test.
p <0.001** statistically highly significant

a complication of surgical extraction was only seen in 16% patients in group A and no such complication was observed in group B, (p<0.004) [Table/Fig-6].

Groups	1st Week		3rd Week	
	Yes	No	Yes	No
Group A	4 (16%)	14 (34%)	0	0
Group B	0	18 (50%)	0	0
p-value	0.004**		0	

[Table/Fig-6]: Postoperative outcome of dry socket in treatment groups at 1st and 3rd week using Chi-square test.
p<0.001** statistically highly significant

DISCUSSION

This study was conducted in oral and maxillofacial surgery, with special emphasis on postoperative complication related to third molar surgery. In this study male to female ratio was 1:1, the findings of this study are similar to studies conducted by Aslam F, Dolanmaz D et al., and Hatano Y et al., [1,4,14]. Preoperative all patients were in normal state of inferior alveolar nerve on two-point discrimination test. Bhat P and Cariappa KM conducted study on 400 patients, all have showed normal neurosensory normal values [17].

Inferior alveolar nerve assessment damage seen in 11% in group A while 6% in group B in 1st week of follow-up. The nerve damage in further follow-up visits suggested no case for nerve damage in group B. These results are comparable with two studies done by Dolanmaz D et al., and Pogrel MA et al., (2004) who reported inferior alveolar nerve injury that ranged from 2.2% and 4.8% [4,8]. According to Hatano Y et al., only 1% coronectomy group patients were with a transient inferior alveolar nerve injury and six patients of the control group (5%) were with inferior alveolar nerve injury [14]. Leung YY and Cheung LK found postoperative inferior alveolar nerve injury in coronectomy group was 0.6% and 5.10 % in control group [15].

In current study, the preoperative mouth opening assessment was 38±2 mm in both groups, our results are similar to Singh K et al., study. On postoperative follow-up, the mouth opening was greater in coronectomy and the result was statistically significant with p-value of 0.012, 0.503 and 0.153. Singh K et al., in their study measured intergroup comparison of the mouth opening on 1st and 7th postoperative day and were statistically analysed using independent sample t-test and p-values were found to be 0.212 and 0.284 at postoperative interval of 1st day and on the 7th day, respectively [18].

In the study by Cilasun U et al., two cases of transient inferior alveolar nerve injury (2.8%) were observed in the control group (87 teeth) while no patients of the study group (88 teeth) developed inferior alveolar nerve injury [19]. Renton T et al., reported that inferior alveolar nerve damage occurred in 19% patients underwent complete removal of the impacted third molar and no patient who underwent successful coronectomy. In same study, 8% patients experienced irritation of the inferior alveolar nerve after failed coronectomy [20].

The result was statistically not significant thereby, implicating that there was no difference in the intensity of mouth opening in both groups either pre or postoperative periods [18]. Another study was conducted by Hatano Y et al., on postoperative 7th day, mouth opening assessment was greater in coronectomy group which was 41.2 mm [14]. On the postoperative 1st week, the dry socket was found in 16% patients who undergone surgical extraction while this complication was not seen in coronectomy. The result was statistically significant with p-value of 0.004, comparable with the study of Hatano Y et al., where they observed that dry socket within the control group was 8.5% and in coronectomy group, it was 2% [14]. Leung YY and Cheung LK found no case of dry socket in the coronectomy group, whereas 2.8% in 178 of cases in the control group developed dry socket in the 1st postoperative week [15]. Cilasun U et al., reported one case of dry socket infection within the 1.1% control group and no cases within the coronectomy group [19] in comparison with the study done by Renton T et al., wherein authors found a similar incidence of dry socket infection in the 9.6% control group, 12% coronectomy group and 11.1% failed coronectomy group [20]. With this small scientific work, it was observed that coronectomy appears to be simple, easier and better procedure and more effective technique for minimising the risk to inferior alveolar nerve injury, limited mouth opening and dry socket that corresponds to impacted molar extraction.

Limitation(s)

Small sample size and type of impaction was the major limitation in our study. This research can be planned with larger scale with more number of patients and comparison between each groups according to type of impaction may give more accurate result.

CONCLUSION(S)

Coronectomy is a better option with less complications as compared to surgical extraction in selected cases where inferior alveolar nerve is in close proximity with roots of mandibular third molar.

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