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ASSESSMENT OF IMPACTED LOWER THIRD MOLAR CORONECTOMY THROUGH VESTIBULAR BONE WINDOW

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ABSTRACT

Objective: The aim of the present study was to assess impacted lower third molar coronectomy through vestibular bone window. **Materials and Methods**: Twenty patients were allocated into two groups. In group 1, the standard coronectomy technique was performed while in group 2, coronectomy through vestibular bone window was done. Preoperative evaluation included examination of the site of surgery for the presence of inflammation, ulceration, discoloration or infection and measurement of the crevicular depth, maximal mouth opening and cheek dimension. OPG and CBCT were used to give full details on tooth and its relation to IAN. **Results**: Out of 20 patients only one (5%) had IANI. The mean crevicular depth was significantly less in vestibular window group than regular coronectomy. The mean MMO was larger in vestibular window group than regular coronectomy, the difference was nonsignificant. The mean cheek dimension was less in vestibular window group than regular coronectomy, the difference was nonsignificant. The mean VAS value was higher in group 2 than group 1; however, the difference between the two groups was nonsignificant. **Conclusion**: Coronectomy is a safe technique that greatly reduces the risk of IANI. Coronectomy through vestibular bone window technique may reduce periodontal pocket formation distal to the lower second molar. Vestibular bone window technique has no effect on postoperative sequelae (trismus, swelling and pain).

KEYWORDS: Impacted lower third molar, Coronectomy, Vestibular bone window.

INTRODUCTION

The management of impacted teeth is a basic component of most oral and maxillofacial surgery practices. These teeth pose challenges in treatment and often have the risk of complications[1-3]. Complications of impacted lower third molar surgery included injury and nerve disorders, pain, infection and dry socket, along with other complications [4-7]. One of the more severe risks is inferior alveolar nerve injury (IANI) which may occur during removal of impacted mandibular third molar in close proximity to the mandibular canal. IANI during the third molar surgery entails a sensory deficit that may be temporary from 0.41% to 8.1% or permanent from 0.01% to 3.6%[8-10].

The prevention of these kinds of injuries is so important since current treatment modalities of neurosensory deficit management show only limited improvement in sensation while complete recovery is uncommon with all types of available treatments[11]. Orthodontic-assisted extraction of impacted third molars has been proposed and utilized by others.

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Unfortunately, this technique is time consuming and costly [12-14]. Pericoronal ostectomy was considered as an alternative approach to the extraction of horizontally or mesio-angular impacted mandibular third molars in proximity to the IAN [15].

Coronectomy has also been introduced in the literature as a way to reduce neurological complications. The procedure aims to remove only the crown of impacted lower third molar while leaving the root undisturbed, so it avoids direct or indirect damage to the IAN. Several studies [16-19] have demonstrated that coronectomy significantly decreased the risk of iatrogenic injury to the IAN and reduced complication rate. The disadvantages of this technique include deep periodontal pockets on the distal of the second molars, root migration with the possible need of a second procedure, dry sockets, local postoperative infections, postoperative pain and inadvertent root removal, or root walk-out during surgery which may increase the risk of IANI.

Preservation of periodontal health, regenerating bone and preventing or reducing the further need of periodontal surgery at the distal of the lower second molar, is an important advantage for the patients; a standard coronectomy procedure lacks this benefit. To overcome this shortage, a new technical approach was developed. It is called vestibular bone window approach, which facilitates impacted lower third molar extraction, minimizing the ostectomy, thus reducing secondary postoperative manifestations and avoiding possible periodontal defects on the distal side of the second mandibular molar [20]. This study was carried out to evaluate the vestibular bone window approach in coronectomy of the mandibular third molar in an assumption that it may avoid the risk of IANI and periodontal pocket formation at the distal of the second molar.

MATERIALS AND METHODS

Twenty patients were enrolled in the study (nineteen male and one female) with the ages ranged from 20 to 35 years. They were randomly allocated into two groups of 10 patients each, group 1 and group 2. In group 1, the standard coronectomy technique was performed while in group 2, coronectomy through vestibular bone window was done.

Inclusion criteria: Mesio-angular impacted lower third molars class I, position B. The impacted lower third molar should be in close proximity to inferior alveolar nerve. Healthy patients younger than 40 years of age, free of pericoronal or periodontal infection.

Exclusion criteria: Horizontally impacted tooth along the course of the IAN. Patients with history of radiotherapy or chemotherapy. Patients with numbness of the lower lip and chin or with past history of IANI. Presence of pathological tissue changes around the impacted lower third molar such as cyst or tumor.

Preoperative evaluation included examination of the site of surgery for the presence of inflammation, ulceration, discoloration or infection and measurement of the crevicular depth, maximal mouth opening and cheek dimension. OPG Fig. (1 a) and CBCT were used to give full details on tooth and its relation to IAN.

In both groups, coronectomy operation was undertaken under local anesthesia and mucoperiosteal flap was reflected Fig. (1 c). In group 1, a conservative buccal trough was created; tooth crown was sectioned and removed Fig. (1 d). In group 2, bone was removed to expose the distal and vestibular side of the impacted tooth; tooth crown was sectioned and then delivered through the buccal window Fig. (1 e).

Postoperative evaluations included measurement of the crevicular depth, maximal mouth opening, and cheek dimension. Measurements were taken one and four weeks after coronectomy. Pain intensity was evaluated after 2days, one week and four weeks.

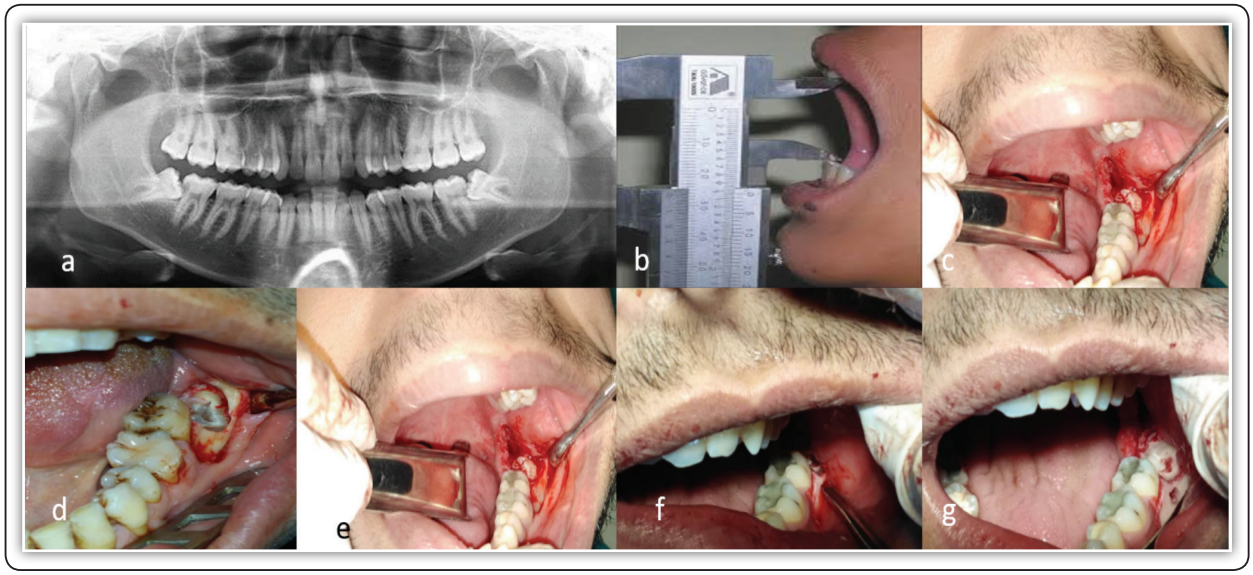

FIG (1) **a:** preoperative panoramic view showing the close proximity of IAN to MTMs, **b**: measurement of the maximal mouth opening using vernier scale **c:** mucoperiosteal flap reflection**, d:** the crown was separated and removed leaving the residual roots **e:** bone was removed to expose the crown of the tooth, **f:** a small root pick elevator was used through the buccal window to deliver the crown, and **g:** the tooth crown was removed through the created buccal window

RESULTS

Out of 20 patients only one (5%) had IANI. The mean crevicular depth was significantly less in vestibular window group than regular coronectomy.

The mean MMO was larger in vestibular window group than regular coronectomy, the difference was nonsignificant. The mean cheek dimension was less in vestibular window group than regular coronectomy, the difference was nonsignificant.

The mean VAS value was higher in group 2 than group 1; however, the difference between the two groups was nonsignificant. The following results are all shown in Table (1).

TABLE (1): Comparison between the two groups according to crevicular depth, Maximal mouth opening (M.M.O), cheek dimension, and VAS.

	Group I		Group II		U	p
	Mean	±SD	Mean	±SD		
crevicular depth						
Pre – operative	4.300	1.4211	3.100	1.0021	3.7878	.01*
1 week	4.350	1.4521	2.800	.8989	1.784	.01*
4 weeks	4.300	1.2311	2.65	.78551	3.798	.133
Maximal mouth opening (M.M.O)						
Pre – operative	43.6000	3.09839	44.8000	3.15524	.876	.393
1 week	35.2000	2.93636	36.1000	4.09471	.607	.579
4 weeks	41.9000	3.34830	43.5000	2.79881	1.177	.247
cheek dimension						
Pre – operative	286.5	12.364	281.5	19.3621	2.9874	.01*
1 week	287.5	13.955	283.5	14.3699	1.522	.199
4 weeks	287.3	22.361	282.2	19.352	3.129	.01*
VAS						
2 days	5.3000	2.49666	7.2000	1.3984	1.88	.063
1 week	3.4000	1.07497	4.5000	1.2693	1.872	.075
4 weeks	1.3000	.67495	1.9000	.73786	1.685	.123

U *: Mann Whitney test* *p: p value for comparison between the two groups*

DISCUSSION

In the present study, two groups were operated with coronectomy procedure using two different techniques. In one group, standard coronectomy was used while in the other group, coronectomy was performed through buccal window. It was assumed that removal of the tooth crown through buccal window may avoid possible periodontal defects on the distal side of the second mandibular molar. The study went into two directions; first was evaluation of coronectomy procedure in prevention of IANI and the second was evaluation of coronectomy procedure through buccal window in prevention of periodontal defects at the distal side of the second mandibular molar.

Mesio-angular impacted lower third molars class I, position B were selected due to its high incidence among population. One more reason is to reduce, as much as possible, the difficulty and to be sure that the variables are the same in the two groups to avoid bias. Patients younger than 40 years of age were chosen for the study because in this range of age, the healing process is much better than in older patients. Patients with history of radiotherapy or chemotherapy were excluded to avoid the development of osteoradionecrosis or osteonecrosis of the jaw, respectively, which may have an effect on the results. Patients with mandibular ipsilateral side cyst, tumor or numbness of the lower lip and chin were also excluded to avoid biased results [21,22].

Some measures were followed to avoid the risk of IANI. First of all; in both groups, the operations were performed under local anesthesia. IANI may occur when the surgery is performed under general rather than local anesthesia [23-25]. Second; a proper flap was designed. Patients of the present study were operated through three sided mucoperiosteal flap. A well designed flap for obtaining appropriate surgical access is the most important step in the removal of impacted mandibular third molars. The mucoperiosteal flap was elevated on the buccal surface of the mandible. Elevation of the lingual soft tissues, which was usually limited to a few millimeters, was performed carefully in order to prevent accidental slippage of the periosteal elevator. In this type of flap, to preserve the integrity of the LN, a distal releasing incision was made in the retromolar area from the disto-buccal crown edge of the second molar slightly oblique in the vestibular direction, without involving the lingual side of crestal mucosa [26].

The third was conservative bone removal during surgery. In the present study, bone was removed conservatively to avoid IANI and development of periodontal pockets distal to second molars. It was as conservative as possible on the distal and disto-lingual side so as to not involve the IAN and LN.

The fourth was the performed decapitation. Tooth sectioning was designed to allow disengagement of the element by decreasing its zone of retention and to avoid compression or stretching of the IAN [24].

After decapitation, in both groups, no endodontic treatment of the retained root was performed. Only socket wash with saline solution was sufficient. This is coincidental with several investigators [27]. The endodontic treatment of retained root could increase the risk of postoperative complication due to the prolongation of the surgical time. However, there is concern that the root that is left in place will eventually become a source of infection. This is coincidental with Goto et al [28] .But contrary to the concept of leaving the pulp tissue untouched, Kim et al [29] considered vital pulp therapy as an option for managing exposed pulp tissue to reduce the potential risk of pulpal inflammation or necrosis.

After wound debridement, the wound was closed with primary closure. This is in agreement with most authors who did primary closure of the wound [30, 31]. This was based on the hypothesis that a primary tension-free closure could help the blood clot stabilization improving the postoperative healing and primary closure could minimize the risk of alveolus contamination and post-operative

infection[32]. A systematic review based on randomized clinical trials did not report any indication about the type of sutures needed for coronectomy[33].

The postoperative failure rate of coronectomy was very low. Results showed only one patient out of twenty patients (5%) developed temporary parasthesia. This may be due to compression of the nerve or inadvertent mobilization of the remaining root caused by the inexperienced manipulation of the postgraduate trainee during surgery [34, 35]. The low failure rate of coronectomy could have been related to the standardized surgical protocol. The low incidence of failed coronectomy found in this study is in agreement with other studies[9,17,18]. Pogrel et al[16], Cilasun et al [19], Vignudelli et al [36,37] found no cases of neurologic lesions to the IAN after coronectomy in their studies.

Some techniques were introduced aiming to preserve the periodontal health, regenerate bone and preventing or reducing the further need of periodontal surgery at the distal of the lower second molar. Coronectomy of the lower third molar might have the ability to conserve or even lead to the regeneration of the periodontal tissues on the distal surface of the adjacent second molar [36, 37].

To avoid or reduce the potential periodontal defects at the distal of the second mandibular molar, coronectomy in conjunction with vestibular bone window technique was performed for ten patients (group 2) and compared to standard coronectomy (group 1). Results of the present study indicated that vestibular window has significant effect on the crevicular depth at the distal of the second mandibular molar following lower third molar coronectomy. This is attributed to the less traumatic ostectomy technique applied through creation of buccal window and avoiding bone removal at the distal of the second mandibular molar. Creating a bony bridge at the distobuccal of the lower second molar might prevent soft tissue collapse and help to avoid periodontal pockets on the distal of the second molar [20]. Similar result could be obtained when coronectomy was accompanied with the creation of periodontal "scaffolding," which is achieved through grafting [38].

Results of the present study indicated that vestibular window has nonsignificant effect on the postoperative MMO following lower third molar coronectomy. The mean MMO value was higher in group 2 than group 1; however, the difference between the two groups was nonsignificant. This may be due to the less amount of bone removal during the procedure in group 2 than group 1. The amount of bone removal and long duration of flap reflection, in group 1, causes more traumas to the tissue resulting in trismus. This is in agreement with Peñarrocha et al [20] who stated that vestibular window technique would reduce the amount of trismus.

Results of the present study indicated that vestibular window has significant effect on the postoperative swelling following lower third molar coronectomy. The amount of postoperative facial swelling was less in group 2 than group 1. This may be due to the more amount of bone removal and more duration of flap reflection during the procedure in group 1 than group 2. This is in agreement with Peñarrocha et al [20] who stated that vestibular window technique would reduce the amount of facial swelling.

Postoperative pain is somewhat inevitable; it is considered the most discomfort symptom after impacted lower third molar surgery. Studies have shown less postoperative discomfort following coronectomy than regular impacted lower third molar surgery [18, 39, 40]. In current study, the mean VAS value was higher in group 2 than group 1; however, the difference between the two groups was nonsignificant. The pain was most intense at the second postoperative day. In both groups, marked reduction of pain intensity was seen at the 7th postoperative day. Our finding agreed to the findings of other investigators [18, 39, 40].

CONCLUSION

Coronectomy is a safe technique that greatly reduces the risk of IANI. Coronectomy through vestibular bone window technique may reduce periodontal pocket formation distal to the lower second molar. Vestibular bone window technique has no effect on postoperative sequelae (trismus, swelling and pain).

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