

Outcomes of Crevicular Incision on Periodontal Health When Used in Open Reduction and Internal Fixation in Case of Mandibular Fractures

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Abstract

The crevicular incision is a very simple incision. It has many applications in various surgeries like flap surgery, apicoectomy, transalveolar extraction, bone biopsy and orthognathic surgery. In the management of fracture mandible, a routine vestibular incision is used. There are many complications associated with the vestibular incision like infection, wound dehiscence, mental nerve injury. These postoperative complications are rare with the crevicular incision. Like in other oral surgeries it can also be used as one of the approach to access fracture in the mandible. It not only provides wide surgical exposure but simultaneously it gives more visibility to both upper and lower limits of the fracture line. Since this incision crosses the sulcus of gingiva it can affect the health of gingival tissues. With this question, we planned this study to find out the outcome of the crevicular incision on periodontal health if used in open reduction & internal fixation. This study was done on patients with isolated mandibular fractures of symphysis and body region. Comparison of crevicular incision (study group) with a vestibular incision (control group) was done on the basis of certain periodontal indices (Gingival index, Pocket probing depth, Clinical Attachment level) which was recorded preoperatively and postoperatively after 6 weeks, and 12weeks. The results of the current study revealed that well performed ORIF for fracture mandible by using crevicular incision does not lead to periodontal problems. It showed almost similar long-term outcomes compared to the vestibular incision in ORIF.

Keywords: Crevicular incision, Open reduction and internal fixation, Periodontal health.

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INTRODUCTION

The maxillofacial injuries are very common due to its prominent site [1, 2]. The number of road traffic accidents are also increasing the number of maxillofacial injuries [3]. The rate of mandibular fractures is more common among other facial bones [4, 5]. Different causes of mandibular fractures are road accidents, assaults, fall from a height, sports injury and many more [6]. Mandible not only give a form to the face but it also helps in speech, mastication and swallowing. Therefore the principles of management of mandibular bone fracture are to reestablish the form and function. There are many methods available for the management of mandibular bone fracture [7, 8]. The most preferred method is ORIF. It has many advantages than other modalities. In the medically compromised patients with airway problems or seizure disorder, intermaxillary fixation can be avoided by ORIF. The

other advantages of ORIF are increased comfort, improved diet, easy to maintain oral hygiene. Minimal joint problems due to immobilization and fast recovery [9, 10].

The two approaches for ORIF are extraoral and intraoral. Fractures of the anterior region of mandible could be treated by intraoral approach while comminuted fractures and fracture of the posterior area of the mandible can be treated by extraoral approach [11]. In the intraoral approach routine vestibular incision is commonly used to expose the surgical site. The vestibular incision is an easy incision but there are many complications related to this incision such as infection, wound dehiscence, mental nerve injury, scarring and obliteration of vestibular depth. These complications are minimal in case of the crevicular incision. The crevicular incision is a very simple type of

incision and commonly used in periodontal cases. It is implications also in case of apicoectomy, impaction and so on. If the crevicular incision is used in case of fracture mandible to expose fracture site for ORIF it will give wider exposure with excellent healing and minimal complications. However, there is one problem with the sulcular incision that in giving this incision it also causes damage to the gingival tissues and periodontal ligaments. Therefore with the aim to find out the effect of this incision on periodontal health in ORIF, we framed this study.

MATERIALS & METHODS

A prospective study was done in the Department of Oral & Maxillofacial Surgery, Dr. Z. A. Dental College, Aligarh Muslim University. The study included 45 patients (36 male and 9 female) with the age group of 20-45 years. Patients were selected with an isolated mandibular fracture of symphysis/parasymphysis or body region without any periodontal diseases, gingival tear and adverse oral habit. There were certain exclusion criteria that include cases with pan facial fractures, comminuted and displaced fractures of the mandible, patients with signs of mental nerve injury due to trauma, poor dental hygiene and gross infection at the site of injury and medically compromised patients. Ethical approval was obtained from the institutional ethical committee and informed consent was properly signed by all patients by explaining the procedures.

Patients were divided into three groups. In each group, 15 patients of fracture mandible were randomly taken.

In group I, a crevicular incision was given while in group II crevicular incision with a vertical release was used. These two groups were considered as study groups. Group III was considered as a control group in which a routine vestibular incision was given to perform ORIF.

The comparison of crevicular intraoral incisions with or without a vertical release to a vestibular incision is done on the basis of certain clinical periodontal parameters-(a) Gingival Index, (b) Probing pocket depth and (c) Clinical attachment level.

In order to avoid the bias, the same investigator did all recording. The periodontal parameters were recorded for all mandibular teeth excluding the third molars. The recording was done preoperatively, and postoperatively after 6 weeks, and 12weeks.

Gingival Index [12]

In each tooth, surrounding tissues were divided into 4 gingival scoring units. A UNC-15 [13]. a periodontal probe was used to assess the tissues. Each gingival units were assessed according to the following criteria:

- Normal gingiva.
- Mild inflammation, no bleeding on probing, slight oedema and a slight change in colour.
- Moderate inflammation, bleeding on probing, oedema and redness.
- Severe inflammation, tendency to bleed spontaneously, marked oedema and redness.

The scores of each tooth were calculated by adding the scores of each unit and dividing by 4. The value obtained on adding the scores of all teeth and dividing it by the number of teeth scored gives the gingival index score per person.

Gingival scores

- 0.1-1.0 Mild gingivitis
- 1.1-2.0 Moderate gingivitis
- 2.1-3.0 Severe gingivitis

Probing depth [14]

Probing depth is the distance from the base of the pocket to the gingival margin. This was also measured by UNC-15 [13] probe from the gingival margin to the depth of the pocket. The value less than the midpoint of the two divisions was rounded off to lower value and the value more than the midpoint was rounded off to the upper value.

Clinical attachment level [14] (CAL)

CAL was measured by using a UNC-15 periodontal probe with the cemento-enamel junction.

Determining the level of the attachment [15]

When the gingival margin is positioned on the crown, the level of attachment is calculated by subtracting the distance from the gingival margin to the cemento-enamel junction from the depth of the pocket. If both are at the same level loss of attachment is zero. When the gingival margin and cemento-enamel junction coincides loss of attachment is equal to pocket depth. When the gingival margin is apical to the cemento-enamel junction loss of attachment will be more than the pocket depth and hence the distance from the gingival margin to the cemento-enamel junction should be added to the pocket depth.

All the patients were operated under general anaesthesia within two days of trauma, A single surgeon did all the cases. Preoperative intravenous antibiotics were started. The surgical site was disinfected with 7.5 % povidone-iodine solution. The inferior alveolar nerve block with local infiltration was given with 2% Lidocaine and 1:80000adrenaline

Fractures were reduced manually to achieve anatomic position and temporary intermaxillary fixation was done with eyelet wiring.

In group 1, a crevicular incision with No 12 blade surgical knife was given through the base of the

sulcular depth of gingiva in order to detach connective tissue through the bone. The interdental gingiva was separated through the orban knife. In group 2, a crevicular incision with a vertical release was given. While in group-3, a routine vestibular incision was used with No. 15 blade. After giving incisions the periosteal elevator was inserted and the flap was separated from the bone and surgical site was exposed.

Reduction

Fracture site was identified and curetted with the help of curette to remove any bone fragments, trapped muscle, granulation tissue and blood clots. The fracture site was flushed with 5% povidone-iodine with normal saline in 1:1 concentration. The fragments were reduced manually in the correct anatomical position. Occlusion was checked and temporary intermaxillary fixation was done, in such a way so as to achieve the maximum apposition of the fracture fragments.

Irrigation and Closure

After plate fixation, surgical site was copiously irrigated with 5% povidone iodine and then by normal saline in 1:1 concentration. After hemostasis, suturing was done with 3-0 catgut & 3-0 silk in layers in case of the vestibular incision and 3-0 silk in case of the crevicular incision with or without releasing incision. Pressure pack was applied and all patients were prescribed antibiotics and analgesics for 7 days. The patient was advised to maintain oral hygiene and to perform oral rinses with Chlorhexidine mouth wash. The patient was also advised soft diet for the first week.

Follow up

All the patients were evaluated at 6 weeks and 12 weeks. The data were collected in SPSS version 20 and it was analysed using paired and unpaired t-test.

OBSERVATIONS AND RESULTS

Different parameters of the study were a gingival index, pocket probing depth and attachment loss. Their observational values have been presented in the following tables.

Table-1: Gingival Index Mean and SD

Groups	Baseline(preoperative) Mean±SD	6-weeks Mean±SD	12-weeks Mean±SD
I	0.71±0.15	0.78±0.16	0.73±0.16
II	0.71±0.19	0.76±0.18	0.75±0.18
III	0.65±0.21	0.67±0.23	0.65±0.21

Table-2: Inter-Group comparison of Gingival Index using T-test

Groups	6 – Weeks	12 – Weeks
Group I Vs Group II	t =0.67 NS	t =0.8 NS
Group IVs Group III	t =2.9 p <0.05	t =1.2 NS
Group II Vs Group III	t =2 p <0.05	t =1.7 NS

Table-3: Comparison of Gingival Index within groups using paired T-test

Time of comparison	Group – I	Group – II	Group – III
Baseline Vs 6 weeks	t=3.732 p=0.002	t=2.942 p=0.001	t=2.827 p=0.013
Baseline Vs 12 weeks	t=1.277 NS	t=1.829 NS	t=0.272 NS
6weeks Vs 12weeks	t=2.923 p=0.011	t=4.146 p=0.001	t=3.627 p=0.003

On comparison mean of the difference of gingival index between the groups 1 and II a non-significant difference ($p>0.05$) was observed at 6 weeks and 12 weeks respectively. Between the groups 1 and III a significant difference ($p<0.05$) observed at 6 weeks and a non-significant difference observed at 12 weeks (Table-2).

On comparison mean of gingival index Table-3 within the groups there were a significant difference in GI in group 1, II and III at baseline to 6 weeks and 6 weeks to 12 weeks and there was no significant difference within the group I, II and III at baseline to 12 weeks.

Table-4: Probing Depth Mean and SD

Groups	Baseline(preoperative) Mean±SD	6 – weeks Mean±SD	12-weeks Mean±SD
I	1.98±0.26	1.98±0.62	2.02±0.24
II	1.93±0.38	2.08±0.33	1.97±0.30
III	2.03±0.38	2.11±0.35	2.00±0.32

Table-5: Intergroup comparison of Probing depth (PD) using T-test

Groups	6 – Weeks	12- weeks
Group I Vs Group II	t =1.0 NS	t =0.05 NS
Group I Vs Group III	t =0.53 NS	t =0.22 NS
Group II Vs Group III	t =1.0 NS	t =0.2 NS

Table-6: Comparison of Probing depth (PD) within groups using paired T-test

Time of comparison	Group – I	Group – II	Group – III
Baseline Vs 6 weeks	t=0.009 NS	t=4.043 p=0.001	t=1.408 NS
Baseline Vs 12 weeks	t=1.845 NS	t=0.818 NS	t=0.365 NS
6 weeks Vs 12 weeks	t=0.276 p=NS	t=4.392 p=0.001	t=1.711 NS

On comparison mean of the difference of probing depth between the groups 1 and II, I and III, and II & III, a non-significant difference ($p>0.05$) were observed at 6 weeks and 12 weeks respectively. Between the groups, I and III a non-significant difference ($p>0.05$) were observed at 6 weeks and 12 weeks (Table-5).

On comparison of the mean of probing depth within groups, there was a significant difference in PD in group II at baseline to 6 weeks and 6 weeks to 12 weeks and there was no significant difference in PD in groups I and III (Table-6).

Table-7: Clinical attachment level (CAL) Mean and SD

Groups	Base Baseline(preoperative) I Mean±SD	6 – weeks Mean±SD	12 – weeks Mean±SD
I	2.06±0.27	2.05±0.66	2.09±0.24
II	1.99±0.44	2.14±0.38	2.03±0.34
III	2.05±0.38	2.13±0.36	2.03±0.33

Table-8: Intergroup comparison of clinical attachment level using T-test

Groups	6 - Weeks	12- Weeks
Group I Vs Group II	t =1.1 NS	t =0 NS
Group I Vs Group III	t =0.53 NS	t =0.24 NS
Group II Vs Group III	t =0.95 NS	t =0.2 NS

Table-9: Comparison of Clinical attachment level within groups using paired T-test

Comparison between...	Group – I	Group – II	Group – III
Baseline VS 6 weeks	t=0.009 NS	t=4.043 p=0.001	t=1.388 NS
Baseline Vs 12 weeks	t=1.740 NS	t=0.818 NS	t=0.325 NS
6 weeks Vs 12 weeks	t=0.276 NS	t=4.392 p=0.001	t=1.627 NS

On comparison mean of the difference of clinical attachment level between the groups I and II, I and III and II & III a non-significant ($p>0.05$) was observed both at 6 weeks and 12 weeks (Table-8).

On comparison of the mean of CAL within groups, there was a significant difference in CAL in group II at baseline to 6 weeks and 6 weeks to 12 weeks and there was no significant difference in CAL within groups I and III (Table-9).

DISCUSSION

Fracture mandible is more common as compared to the fracture of other facial bones [16, 17]. This is due to its prominent position in the facial skeleton. Incidence is also rising due to the increase in the number of road traffic accidents [6]. Management of fracture mandible is done not only to maintain its form but also to achieve its important functions of mastication, speaking and swallowing. There are various modalities for the treatment of mandible fracture. It includes both closed and open treatment.

Open reduction and internal fixation can be done through both intraoral and extraoral approach. Extraoral approach gives wider exposure and allows more visibility and lighting [18]. but it causes facial scar with more chances of nerve injury. While the intraoral approach is a more preferred approach as it allows simultaneous visualization of occlusion intraoperatively with no facial scar. Chances of nerve injury are also minimal. The intraoral approach can be taken under local anaesthesia [9].

In ORIF for fracture mandible, vestibular incision is commonly employed for surgical Exposure [19, 20]. There are various types of intraoral incisions other than vestibular incision like crevicular, marginal and paramarginal. The crevicular incision is a synonym of the sulcular incision. It has more implications in periodontal surgeries and named as "second incision". The crevicular incision is very simple in nature [21] and even an inexperienced surgeon can use it easily. It runs along the gingival crevice and is scalloped in shape. This incision is also important in terms of esthetics. It is especially indicated where protection of gingival is important, in the case of the shallow vestibule and tense mentalis posture [22, 23]

Other common uses of the crevicular incision are transalveolar extraction, periapical surgery, surgical procedures on palate [24].

The crevicular incision can also be used to expose fracture mandible for ORIF. It provides more wider exposure, allowing both upper and lower limits of fracture line visible. The chances of bleeding, nerve injury and scar are also minimal. But the possible problem that appears with the crevicular incision is the damage that it causes to the periodontal tissues. We

framed this study to evaluate the outcome of the crevicular incision on periodontal tissues.

In this study we compared the crevicular incision and its modifications with a vestibular incision with respect to their effect on periodontal health in terms of periodontal indices—gingival index, probing depth, clinical attachment level.

We used a gingival index to evaluate the effect of the crevicular incision on periodontal health if this is used to place the fixation devices in symphyseal and body fractures of the mandible. On comparing the gingival index between the groups it can be seen that the change in the gingival index was significant between the groups I and III, & II and III in follow up period of 6 weeks Table-2.

On comparison mean of the gingival index, Table-3 within the groups there were a significant difference in GI in group I, II and III at baseline to 6 weeks and 6 weeks to 12 weeks and there was an insignificant difference within groups I, II and III at baseline to 12 weeks. The results of the current study revealed that well-performed ORIF for fracture mandible by using either incision does not lead to periodontal problems. All incision types showed almost similar long-term outcomes in ORIF for fracture mandible.

When we compared the probing depth and attachment level at various intervals between the groups, no significant difference was found. This signifies that attachment level and probing depth did not change in all the study groups, and it may be of good clinical value. Crevicular incision leads to the slight recession which was insignificant in our study. Due to delayed initial regeneration of the connective tissue attachment, the findings of probing depth and clinical attachment level were perfect postoperatively after 3 months.

CONCLUSIONS

Our study revealed that well-performed ORIF for fracture mandible by using either incision does not lead to periodontal problems. All incision types showed almost similar long-term outcomes in ORIF for fracture mandible. The crevicular incision has the advantage of good adaptation and approximation of incision line. No food lodgement occurs and thus chances of infection are reduced. The choice of the incision design depends on the needs of the case and preference of the surgeon and does not seem to have a long-lasting effect on the health of tissues.

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