

Management of Post traumatic deformity of mandible: Report of two cases with review of literature

¹Prof.(Dr.)Rajarshi Banerjee, Head of the Department, Dept. of Oral and Maxillofacial Surgery, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

²Dr. Ritoban Saha Bhowmick, Registrar Surgeon, Dept. of Oral and Maxillofacial Surgery, AMRI Hospital, Dhakuria, Kolkata

³Dr. Sudipto Sahu, Assistant Professor, Dept. of Oral and Maxillofacial Surgery, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

Corresponding Author: Dr. Ritoban Saha Bhowmick, Registrar Surgeon, Dept. of Oral and Maxillofacial Surgery, AMRI Hospital, Dhakuria, Kolkata

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Abstract

Mandibular fractures are the most common trauma cases that we often come across in our day to day practice of Oral and Maxillofacial surgery. Various factors can lead to deformities and make those cases more challenging. In our literature, we will enlighten the different reasons, possible complication and management of different types of post-traumatic cases.

Keywords: Post traumatic deformity, Mandibular fracture, Management protocol.

Introduction

Mandibular fractures are one of the most common maxillofacial injuries in our daily basis practice. The management has been religiously regarded as one of the cornerstones of oral and maxillofacial surgery. Despite of

much technological advancement, to consistently return patients to their pre-traumatic state remains one of the main challenging issues. As a result, an unavoidable number of patients develop unsatisfactory results. Diagnostic errors, poor surgical technique, healing disorders, or complications may lead to the establishment of posttraumatic mandibular deformities.

The most common causes of post-traumatic maxilla mandibular deformities include malunion, malposition, and nonunion of fractures because of an inadequate postoperative interocclusal relationship or bony reduction and fixation. The standard goals of secondary reconstruction of the anatomic regions of the mandible in case of post-traumatic deformity are aimed at

reconstituting its three-dimensional shape while achieving excellent orofacial rehabilitation.¹

Different factors can influence the post-traumatic scenario and may cause requirement of reconstruction like patient factors, injury factors, treatment factors and post treatment factors. Failure to attain adequate occlusion is related to tight MMF that creates buccal tipping, loose MMF that produces an open bite, or inadequately reduced fractures. In addition, poorly adapted plates may displace the occlusion because of their tendency to draw the fracture to the plate.²⁻⁴

The challenge in treating delayed cases lies in the fact that after a 3-week period, bone healing enters into the “gray stage,” during which the edges of bone fragments are undergoing resorption and remodeling, which can make achieving ideal bone reduction very difficult and can lead to mal-union, non-union, or even a bone defect.¹

Non-surgical therapy may result in malocclusion, loss of mandibular vertical ramus height, and loss of balanced occlusion.³ Development of ankylosis, significant proximal segment degeneration with functional impairment or pain, Malunion with unacceptable function or pain were the worst consequences of untreated Condyle fracture.²

Symphyseal fracture that appears well reduced at the level of the buccal cortex but the lingual cortex was not visualized or properly reduced. Poor reduction usually is associated with insufficient anatomic references such as inadequate dentition, multiple mandible fractures.⁴

Fracture stability is paramount to institute the necessary fixation.⁵ According to De Souza and colleagues, early motion after fixation is the main contributor to non-union.⁶

Goals of therapy in late secondary treatment of Mandibular fractures:⁷ (fig.1)

Case report 1

A 42-year-old white male received a blow to the chin and fractured his both side mandibular condylar neck and left side parasymphysis. The fractured condylar neck was severely displaced on medial side on both sides and he was treated with IMF. Intermaxillary fixation was maintained for 1 week, followed by 1 month of training elastics, and after 6 weeks the patient had a progressive centric relation centric occlusion [CR-CO] shift with open bite and limited opening of mouth, and was unable to bite into centric occlusion. Both side mandibular EVRO was done to superiorly reposition the condylar stump into it's fossa.

The proximal segment was stabilized using 2 Titanium L plates and 2 Titanium four hole mini plate with bar and 16 screws. The patient was released from IMF following surgery and functioned with training elastics for 2 weeks and a soft diet for 6 weeks. At 6 months follow-up, the deviation on opening had resolved. (fig 2A-2J)

Case report 2

A 31-year-old male received a blow to the left side body of mandible and fractured his right side angle of the mandible. The fractured distal segment was severely displaced on medial side and he was treated with IMF. Intermaxillary fixation was maintained for 4 weeks, after that the patient had limited opening of mouth, and was unable to bite into centric occlusion. Re-fracture of the Mal-united fracture was done on right side.

The fracture segments were stabilized using 1 Titanium mini plate of 6 hole with bar and 1 Titanium Miniplate of 4 hole With bar and 10 screws. The patient was released from IMF following surgery and a soft diet for 6 weeks. Six months later the patient developed a 1-2 mm CR-CO shift with slight left deviation on opening. (fig.3A-3F)

Discussion

Mandibular nonunion can be best approached by an extraoral approach. Ample and direct visualization of the fracture site allows for better debridement of the area of any fibrous tissue, necrotic bone, or failed implants. Ideally, bone debridement requires the presence of bleeding bone. Once adequate occlusion and IMF are achieved, the fracture is reduced and a properly anchored reconstruction-type plate with screws is placed away from the fracture (3–4 screws at each side of the fracture). Recommendations of placing the screws no closer than 7 to 10 mm have been described in the literature, with the rationale that, although the bone may appear normal, there is less mineral content several millimeters from the fracture.⁸ In younger patients or in well vascularized areas, union generally occurs if the bone gap is small. If inadequate bone contact exists, autogenous bone grafting needs to be performed to reestablish the continuity of the mandible.²

General algorithm for the management of infected mandible fracture after open reduction and internal fixation advocated by Alpert. (Figure.4)

Functional disturbances resulting from malunion and remodeling of the condylar stump are due to three dimensional adaptations to CR-CO discrepancies. The condylar stump may be repositioned using the BSSO when horizontal movement is the primary goal. Extraoral vertical ramus osteotomy may be used to achieve more vertical correction.³

In case of the parasymphyseal and body regions, the fracture line acts as the ideal position for osteotomy. Additionally, with regard to malocclusion secondary to a healed unilateral condylar fracture and shortening of the ramus-condyle unit, surgeons recommend bilateral mandibular osteotomies (vertical ramus or sagittal split

osteotomies) to correct the asymmetry caused by a malunited condylar fracture.¹

Some authors justified the application of Orthognathic surgery in post-traumatic mandibular deformity. Correction of the lower jaw will not lead to alterations in the inclination of the upper anterior teeth, so pre-surgical or postsurgical orthodontics will therefore seldom be necessary. If correction is performed in the affected lower jaw, the resulting situation will be identical to the original skeletal relation. Reconstruction of the affected jaw will be more acceptable to patients.

In time, because of neuromuscular adaptation, a post-traumatic situation might be considered as a Dentofacial deformity. Autorotation of the mandible after dorsal impaction of the maxilla might result in less relapse when there is a considerable anterior open bite, rather than closure of an open bite by ramus osteotomies and counterclockwise rotation of the distal fragment of the mandible. No technical difficulties will be encountered in surgery of the maxilla with respect to the earlier condylar fracture. On the contrary, managing the proximal fragment in ramus osteotomies after a condylar fracture can be difficult, especially if the condylar process was grossly dislocated at the time of the initial treatment. A higher prevalence of TMJ problems is reported to occur after mandibular ramus surgery than after Le Fort I osteotomies used to close an anterior open bite.

Summary

The ultimate goal is to restore function and occlusion, in a pain-free manner, as close to the pre injury architecture as possible. Treatments can be simple or complicated depending on the severity of the problem

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References

1. Bagheri SC, Bell B, Khan HA. Current therapy in oral and maxillofacial surgery. Elsevier Health Sciences; 2011 Sep 19.
2. Davis B. Late reconstruction of condylar neck and head fractures. Oral and Maxillofacial Surgery Clinics. 2013 Nov 1;25(4):661-81.
3. Rubens BC, Stoelinga PJ, Weaver TJ, Blijdorp PA. Management of malunited mandibular condylar fractures. International journal of oral and maxillofacial surgery. 1990 Feb 1;19(1):22-5.
4. Vega LG. Reoperative mandibular trauma: management of posttraumatic mandibular deformities. Oral and Maxillofacial Surgery Clinics. 2011 Feb 1;23(1):47-61.
5. Ellis 3rd E. Complications of rigid internal fixation for mandibular fractures. The Journal of cranio-maxillofacial trauma. 1996; 2(2):32.
6. De Souza M, Oeltjen JC, Panthaki ZJ, Thaller SR. Posttraumatic mandibular deformities. Journal of Craniofacial Surgery. 2007 Jul 1;18(4):912-6.
7. Maron G, Kuhmichel A, Schreiber G. Secondary treatment of malocclusion/malunion secondary to condylar fractures. Atlas of the oral and maxillofacial surgery clinics of North America. 2017 Mar 1;25(1):47-54.
8. Mehra P, Van Heukelom E, Cottrell DA. Rigid internal fixation of infected mandibular fractures. Journal of Oral and Maxillofacial Surgery. 2009 May 1;67(5):1046-51.
9. Becking AG, Zijdeveld SA, Tuinzing DB. The surgical management of post-traumatic malocclusion. Clinics in plastic surgery. 2007 Jul 1;34(3):e37-43.

Legend Figures and Tables

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|--|
| 1. Obtain stable occlusion. |
| 2. Restore interincisal opening. |
| 3. Establish a full range of mandibular excursive movements. |
| 4. Minimize deviation of the mandible. |
| 5. Produce a Pain free masticatory complex at rest and during function. |
| 6. Avoid internal derangement of the Temporomandibular joint on the injured or contralateral side. |
| 7. Avoid long term complication of growth disturbance. |

Table 1: Objectives of therapy in late secondary treatment for Mandibular fractures.



Figure. 1A: Post traumatic deformity causing skeletal Class II relation.



Figure 1B: Both side mandibular condylar neck fracture and left side parasymphysis fracture in OPG



Figure 1 C



Figure 1D

Figure 1C & Figure 1D: Planning of Extra oral Incision marked on both sides.



Figure 1 E



Figure 1 F

Figure 1E & Figure 1F: Both side mandibular EVRO was done.

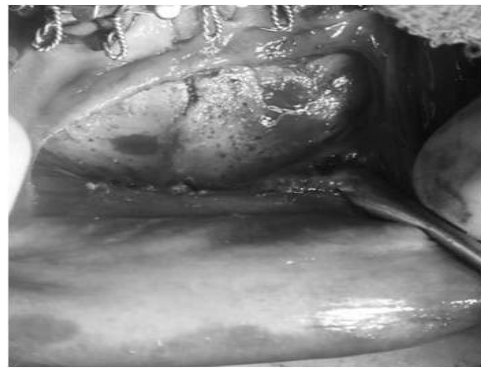


Figure 1G: Left side parasymphysis fracture exposed.



Figure 1H: Semi rigid fixation done by Miniplate by following line of Osteosynthesis.



Figure 1I: Post-operative 6 month follow up (Lateral Cephalograph).

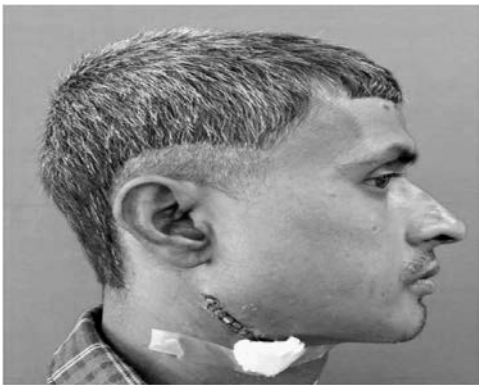


Figure 1J: Post-operative 6th months follow up shows improvement of skeletal deformities. (After implant removal)



Figure 2A: Right side Mal-united Angle fracture.



Figure 2B: Reduced Inter-incisal distance.



Figure 2C: Extraoral Incision Marked for exposure.



Figure 2D: Re-reduction and Rigid fixation of angle fracture done.

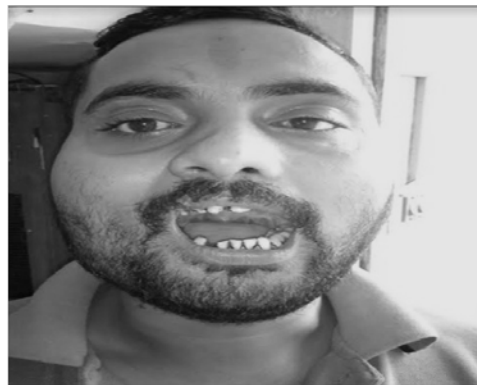


Figure 2E



Figure 2F

Figure 2E & Figure 2F: Post-operative results.

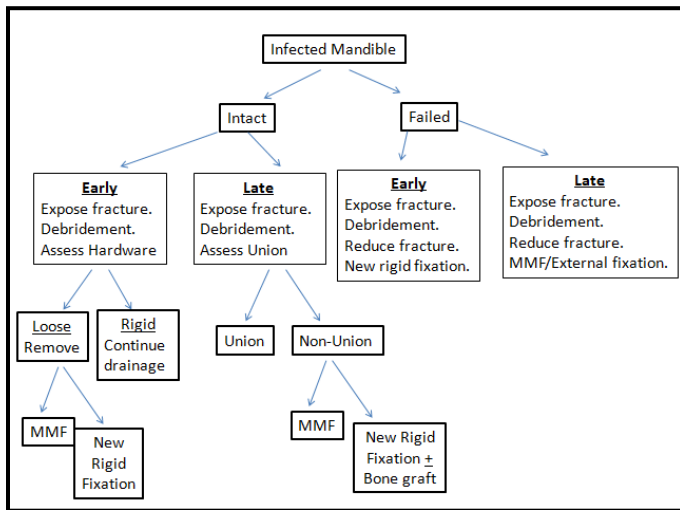


Figure 3: Algorithm for the management of none united or Mal united mandible fracture.