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Evaluation of The Efficacy of Using A Single Lateral Border Monocorticalminiplate System For Treatment of Mandibular Angle Fracture.

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Abstract: *Treatment of mandibular angle fractures has no consensus with regards to fixation schemes and varies from center to center. Internal fixation with miniplates have several advantages, however controversy exits with regards to 1-plate vs 2-plate fixation. In this study we sought to assess the efficacy of a single miniplate placed along the lateral cortex for the treatment of mandibular angle fractures.*
Keywords: *mandibular angle fractures, lateral cortex miniplates*

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I. Introduction

Mandibular angle fractures account for 23-42% of all facial fractures and 30% of mandibular fractures.[1,3] The treatment of mandibular angle fracture is also plagued with the highest postsurgical complication rate of mandibular fractures.[5,6] Even traditional treatment have a high complication rate (17%)[5] in some patient population. The fixation methods that have been advocated for treatment of mandibular angle fractures have also no parity about them.[3,5]

II. Review Of Literature

Early proponents of mandibular angle fracture used large bone plates with compression, fastened with bicortical bone screws to provide rigidity. Luhr, Spiessel, and Schmoker had derived their inspiration from orthopaedic biomechanical studies. [4] In 1973, Michelet et al, reported of using small, easily bendable non-compression bone plates placed transorally attached with monocortical screws[7]. Champy et al. performed several investigations with a miniplate system to validate the technique. [8]He determined the ideal lines of osteosynthesis for fracture of mandibular angle, absoluteimmobilisation of bone fragments and primary bone union was deemed unnecessary. Internal fixation using a miniplate placed on the external oblique of ridge has advantages of shorter periods or no periods of MMF, early mandibular function, decrease hospital stay and faster healing. In addition, some invitro studies suggest using a second miniplate along the inferior border to create a second osteosynthesis line that helps stabilise the fixation protecting the fractures against rotation and torsion; however treatment related complications using 2 miniplates were reported to be high. Ellis and Walker showed that using a single miniplate is associated with lower complication rates. In the study by Danda et al(2010) infectionwas noted in 3.7% single miniplate and 7.4% for double miniplate patients.[1,3]
Edward Ellis I in his retrospective studies, with aim of comparing fixation techniques (1 vs 2 miniplates, external oblique ridge vs lateral border placement) found reduced risk of postoperative complications with use of 1 miniplate. [2]

III. Aims and objectives

The aim of our study was to see the efficacy of treatment of mandibular angle fractures using a single 4-hole with bar titanium miniplate (0.8mm thickness) with 2mm monocortical screws placed along the lateral border of the mandible.

IV. Material And Method

The present study was undertaken at the Department of Oral and Maxillofacial Surgery, Guru Nanak Institute of Dental Sciences and Research, Panihati, West Bengal(GNIDSR).

The cases were selected from the patients attending OPD of GNIDSR having fracture of the angle in mandible irrespective of caste, creed and sex determination and having age above 18 yrs. Diagnosis was done onthe basis of history, clinical and radiological examination. Proper consent from the patient was taken before inclusion of those cases in the present study. Medically compromised patient was excluded from the study.Ethical committee clearance was taken for the present study.

Patients were selected as per our inclusion and exclusion criterias. A total number of 8 mandibular angle fractures were finally selected for study evaluation.

All evaluation was done on clinical and radiological basis.

V. Results

Occlusion-

Occlusion was checked according to the patients' own evaluation on 2 and 3 months postoperatively. A significantly higher number of patients had normal occlusion at 2nd and 3rd postop months.

Ability to chew-

No significant difference was noted in the patients chewing ability by postop 90 days when compared preoperatively.

Evaluation of changes of width of fracture from preoperative to 3months postoperative period:-

A) Superior border:-

There was a statistically significant reduction of fracture width from pre-op to3months post op period.

B) Inferior border:-

The reduction of fracture width from preoperative period to 3 months postoperative period was statistically highly significant.

Evaluation of changes in length of fracture from preoperative to 3months postoperative period:-

There was statistically significant reduction inthe fracture length from pre op value to the 3 months post op value.

Evaluation of HFU at # side on CT Scanat stipulated time period:-

Bone density was measured in Hounsfield unit, & it was measured at the superior border, midpoint, inferior border of fracture line preoperatively and 3 month post operatively.

A)Superior border:-

there was a statistically highly significant rise of the Hounsfield unit from preoperative period to 3 month postoperative period at the superior border.

B)Mid point:-

the rise in the Hounsfield value from preop period to the 3rd post op month was statistically significant

C)Inferior border:-

there was a significant rise from pre op period to the 3rd month post op period in terms of Hounsfield value at the inferior most point of the fracture.

VI. Discussion

A considerable advantage has been seen with laterally placed miniplates using transbuccal instrumentation compared to transoral placement along the external oblique ridge with regards to postoperative complications. It could be due to the position of the external oblique ridge, which is covered with soft thin tissue. A plate inserted transorally will sitcloser to dentition, allowing an easier and shorter path of pathogens to transgress from the periondontal sulcus to fixation hardware.[4] In contrast plates fixed to the lateral aspect of the mandible using transbuccal trocar will be covered by greater bulkofsoft tissue, which might decrease the risk of dehiscence of incision and hardware exposure.[4]

Andres J.J. Gonjzalez et al in their study ―Evaluation of Trismus After Treatment of Mandibular Fractures[1] found a relationship was established between age, initial interincisal distance, and duration of trismus, no relationship was found with the number or location of fractures, or reduction method. It was also found that those cases in which Champy plates were used experienced a shorter duration of trismus compared with those using closed reduction with maxillomandibular fixation.

Lip paraesthesia:- No significant difference was observed statistically, in between groups. Leslie R et al 2004 reported that the 85% improvement of paraesthesia after open reduction and internal fixation postoperatively

Radiological evaluation:-By far radiological examination is the best method of evaluation of fracture healing. In the present studyCT scans were used to interpret the rate ofbony healing; 90 days postoperative radiographs were taken &compared with that of the preoperative phase to understandhealing. On evaluation of the same, at 3 month post op, it wasfound that there was a significant reduction in the width both atsuperior and

inferior borders, at the 90 days post op.This result gives an indication of the effectiveness of the reduction and fixation of the fracture fragments rather than the quality of bone healing.
Review of literature reveals that miniplateosteosynthesis is a reliable and effective treatment modality of mandibular fractures which are not comminuted, and has thus gained popularity amongst surgeons.[5]

Evaluation of HFU:-Probably measurement of HFU at stipulated sites gives the bestnon-invasive method of bone formation currently available.
When the changes in HFU from pre op to 3rd post op was evaluated it was seen that in the all the points, i.e. superior, middleand inferior, there was a significant rise in its value. When the mean range of HFU was seen in all the cases of the present study, it varied from 603 HU which falls in the range of medullary bone HFU to 906 HU, i.e. similar to the HFU of cortical bone.

VII. Conclusion

- 2 mm miniplate system following Champy's line of Osteosynthesis placed along the lateral aspect provides stability to the fractured mandible as was evident in the clinical assessment by the effectiveness of chewing
- Significant bone deposition was seen at the 90 days post op CT scan evaluation in all the cases.
- no major complications were noted postoperatively in our study

Techniques of internally stabilizing fractures of the mandible must provide adequate neutralisation of forces developed during functional loading. Controversy rages between the advocates of various proponents of fixation methodologies. Various studies favouring one technique over other are available. From our study perspective a larger sample size would be required to come to a definite conclusion regarding effectiveness of using a single minplate on the lateral cortex for ORIF of mandibular angle fractures.

Conflicts of interest : None
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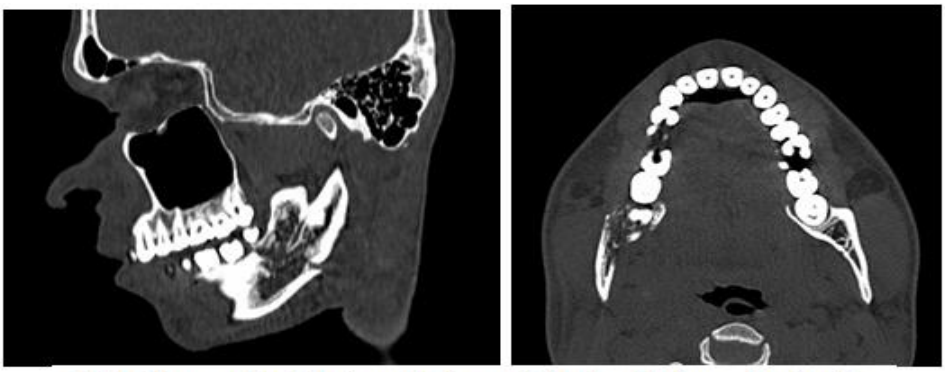

Fig1 : Preoperative CT- Scans in the sagittal and axial planes denoting the angle fracture

Fig2 : Exposure of the fracture line and plating done

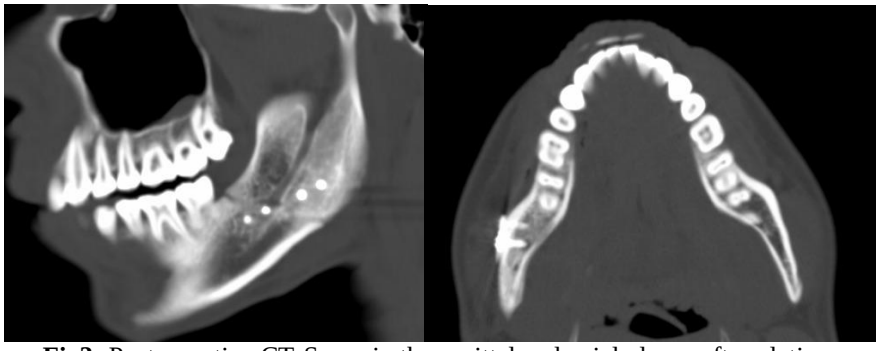

Fig3 : Postoperative CT-Scans in the sagittal and axial planes after plating

Fig4 : Pre- and post-operative occlusion

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