LAG SCREW FIXATION IN ANTERIOR MANDIBULAR FRACTURES

Rakesh Koshy Zachariah, Sherin Abdul Khamal, Varun B Raghavanpillai, Afzal Abdul Salim

INTRODUCTION

Fractures of the mandible constitute approximately two thirds of all maxillofacial fractures. Conventional management of these fractures include inter maxillary fixation alone or inter maxillary fixation along with intraosseous wiring which results in a semirigid fixation and healing by secondary intention. Rigid internal fixation that prevents inter fragmentary mobility during active function of the skeletal structures can be achieved by the process of lag screw osteosynthesis.1

Lag screw osteosynthesis is defined as the stable union of two bony fragments under pressure by using screws which are placed under tension. It works on the principle of inter fragmentary compression, of rigidly securing bone segments.6,3 Lag screw osteosynthesis is defined by Herbert Neiderdellmann as the stable technique of lag screw placement we used a single incision, thereby combining minimal access surgery with the benefits of open reduction and internal fixation of mandible will help in assessing this technique in a better way.

Materials and Method

Six patients who had reported to the Department of Oral and Maxillofacial Surgery with mandibular fractures were enrolled in the study after obtaining the written informed consent. In each case, a preoperative cast was used to record the demographical details of the patients and relevant history pertaining to the cause of injury. A thorough clinical examination was performed by a trained oral surgeon and panoramic radiographs were taken for all the cases. The clinical and radiographic features of the patients are given in Table 1.

All the six cases had mandibular fracture with the horizontal oblique line in the symphysis and parasymphyseal region. Two out of six cases had a concomitant condylar fracture. Open reduction and internal fixation with cortical screw was planned for all the six cases under local anaesthesia. Routine haematological investigations were done prior to the procedure and all the laboratory values were within normal limits for all the patients. Pre operatively the jaws were temporarily reduced by lower arch bar or eyelet wiring depending on the displacement of the fragment segment.

Table 1. Clinical and radiographic details of the patients

<table>
<thead>
<tr>
<th>Age/Gender</th>
<th>Clinical Findings</th>
<th>Radiographic Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>21/M</td>
<td>Mobility of fragments between 33 and 34 region; de-</td>
<td>Horizontal oblique fracture of left parasympysis with subcondylar fracture on the right side</td>
</tr>
<tr>
<td>28/M</td>
<td>Mobility of fractures between 33 and 34 region; de-</td>
<td>Horizontal oblique fracture in the symphysis between 31 and 41</td>
</tr>
<tr>
<td>28/M</td>
<td>Mobility of fragments between 33 and 34 region; de-</td>
<td>Horizontal oblique fracture of left parasympysis between 33 and 34</td>
</tr>
<tr>
<td>26/M</td>
<td>Swelling in the right lower jaw</td>
<td>Horizontal oblique fracture of right parasympysis between 43 and 44</td>
</tr>
<tr>
<td>30/M</td>
<td>Mobility of fragments between 31 and 41 region; de-</td>
<td>Horizontal oblique fracture of symphysis</td>
</tr>
<tr>
<td>24/M</td>
<td>Mobility in the left parasympysis between 31 and 32;</td>
<td>Horizontal oblique fracture of the left parasympysis with right subcondylar fracture</td>
</tr>
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</table>

All the six cases showed rigid fixation with good stability of the bone fragments after 4-6 months follow up. Radiographs revealed properly placed lag screws with minimal post operative complications. Conclusion: It is concluded that treatment of anterior mandibular fracture with lag screw fixation provides good stability with appropriate compression.

RESULTS

All six patients were males with an age range between 21 to 30 years. Occlusal derangement was present in all cases with extra oral swelling in one case. out of six cases one case was of symphysis and remaining five were of parasymphyseal. Two cases had associated subcondylar fractures. The patients were followed up for a period of six months. The arch bars were removed after six weeks in all the cases. Healing was satisfactory and the patients had a good occlusion post operatively. Post operative radiographs revealed proper reduction and fixation of all the other cases.

DISCUSSION

Based on specific principles reflecting on the philosophy of treatment there are different systems available for internal mandibular fixation.2 The 2mm miniplate system described by Chamy et al4 and the AO plate system (Arbeitsgemeinschaft fur Osteosynthesefragen) are common approaches to treatment. The AO plate and screw system is osteosynthesis using lag screws.1 The concept of lag screw osteosynthesis is described by Herbert Neiderdellman as the stable union of two bony fragments under pressure with the aid of screws, which are under tension.1 The lag screw technique was first introduced to Maxillofacial Surgery by Brons and Boening in 1970.1 Ellis and Ghali found that lag screw fixation of anterior mandibular fractures is a simple and successful means of stabilizing bone segments.1,4 Lag screw osteosynthesis works on the principle of inter fragmentary compression, where the screw glides freely through the cortex of the far fragment and engages the cortex of the far fragment with its threads. When tightened, the fragments are drawn together and compress their surfaces. Compression is facilitated by counterboring the external cortex of the head of the screw. Each of these procedures has conflicting results and has their own advantages and limitations. Most of these techniques require large incision placed in the anterior mandible and subperiosteal stripping of tissue to facilitate implant placement.2 This may lead to post operative complications like risk of haemorrhage due to wide incision, injury to mental nerve, post operative swelling, devascularisation of bone fragments, dysfunction of lower lip muscles and difficulty in eating.7 Current literature suggests the use of smaller endoskeletal incisions, which resulted in decreased patient morbidity but provided similar outcomes as compared to open approach.1 In this article we have used a single incision, thereby combining minimal access surgery with the benefits of open reduction and inter nal fixation in the treatment of undisplaced anterior mandibular fractures.

Forrest et al1 described a similar minimal access technique in 1999. In their technique, two incisions were placed equidistant from fracture line in the anterior line to facilitate the compression of bony fragments using towel clip.1 In our technique of lag screw placement we used a single incision, since this technique is indicated in undisplaced linear fracture where there are minimal chances of flaring of segments. Further, proper application of arch bar or interdental wiring as a tension band and resistance of inter cuspal relationship of teeth affords maximum advantage to this method. For our method we optimised the application of compression of bony segments. The advantages of lag screw osteosynthesis over other traditional methods are: limited surgical exposure, simple technique that can be performed under local anaesthesia, compression osteosynthesis is achieved which provides rigid fixation, less implant material is required, less expensive technique, minimal post operative complications, possibility of inspecting the occlusion at every step of the procedure, and treatment of bone is achieved early.4 The various complications of this technique reported in the literature are poor repositioning of bony fragments, malocclusion, peri mandibular abscess, oedema in the fracture line and sensory disturbances.1

In all our six cases, healing was uneventful without any hard or soft tissue infection. All the patients received standard regime of post operative antibiotics.

CONCLUSION

In conclusion, our study shows that lag screw fixation of anterior mandibular fracture is a practical and effective way of fixing fractures internally. This technique provides good stability and appropriate compression, leading to good bone healing without permanent neurosensory deficit or increased risk of malocclusion. The technique also reduces the chance of infection due to reduced surgical exposure. Selection of cases and careful instrumentation are the factors to be considered while employing this procedure. Further studies with larger sample size and comparison to traditional methods associated with internal fixation of mandible will help in assessing this technique in a better way.
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