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A COMPARATIVE STUDY ON OPEN AND CLOSED TREATMENT OF EDENTULOUS MANDIBULAR FRACTURES.

Maxillofacial Surgery

Dr. Pravish. V* Assistant Professor, Department of Oral & Maxillofacial Surgery, Sree Anjaneya Institute of Dental Science, Calicut, Kerala, India. *Corresponding Author

Dr. Syed Khaja Hussain. A Assistant Professor, Department of Oral & Maxillofacial Surgery, Government Dental College, Thrissur, Kerala, India

Dr. Soumitran. C S Professor & Head, Department of Oral & Maxillofacial Surgery, Government Dental College, Kozhikode, Kerala, India.

Dr. Johnson. A G Consultant, Oral & Maxillofacial Surgeon, Kozhikode, Kerala, India.

ABSTRACT

Background And Objectives: The loss of bone mass and decreased vascularity decreases the strength of mandible and makes it vulnerable to fracture. Elderly persons with atrophic mandible have less osteogenic capability and reduced blood flow, and may have a complex medical history, so that management of a fracture of the mandible may require special considerations. An ideal treatment for these mostly geriatric patients is absolutely essential. In this context this particular study is being undertaken to compare with the two available treatment modalities open and closed reduction and to do an analysis to find out which one will be a suitable technique for treatment.

Method: This study involved 30 patients with edentulous mandibular fractures in which 15 patients for open reduction and 15 patients for closed reduction were selected. All the patients selected for the study were followed up postoperatively for a minimum period of 6 months. Postoperative assessment for pain, swelling, mobility of fracture segment, signs of Infections and radiographic assessment of fracture ends were done on the first, third and sixth month respectively.

Result: Postoperative assessment for pain, swelling, mobility of fracture segment, signs of Infections and radiographic assessment of fracture ends were done on the first, third and sixth month showed no significant differences.

The results and observations from the study suggest us that there was no significant difference between both methods on fracture healing.

KEYWORDS

Edentulous mandibular fracture, open reduction, closed reduction

INTRODUCTION

Edentulism is the major problem in the developing countries and is widely spread in the current population. Edentulism affects approximately 158 million people globally as of 2010 (2.3% of the population). It is more common in women at 2.7% compared to the male rate of 1.9%. Although the prevalence is declining and incidence of tooth loss is decreasing in the developed nations[1,2] it still remains to be a major problem among geriatric patients in our part of the country.

Maxillofacial trauma in elderly patients represents a significant social concern. Studies have shown the incidence of maxillofacial trauma in the elderly population has been increasing over the past 30 years. A common injury in patients who present with maxillofacial trauma is fracture of the mandible. The aetiology, demographics, and management of elderly patients with mandibular fractures differ from younger cohorts. Falls are the primary reason for mandibular fracture in the elderly with 30% of individuals over 65 years of age falling each year. This increases to more than 40% in persons 80 years and older.

AIM

The aim was to evaluate fracture healing following conservative management of edentulous mandibular fracture with closed reduction with circummandibular wiring on gunning splint or pre-existing dentures vs open reduction with fixation using titanium miniplates.

MATERIALS & METHODS

The study was conducted on patients reported to the Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Kozhikode over a period of 18 months from February 2013 to August 2014.

This study involved 30 patients with edentulous mandibular fractures in which 15 patients for Open reduction and 15 patients for closed reduction were randomly selected and the patients were treated by the same surgeon. All the patients selected for the study were followed up postoperatively for a minimum period of 6 months. Postoperative assessment for pain, swelling, Mobility of fracture segment, Signs of Infections and radiographic assessment of fracture ends were done on the first, third and sixth month respectively. All the data was recorded in a pre-designed and structured proforma. The study was conducted after ethical clearance.

Inclusion Criteria:

- Completely edentulous patients within age group of 50 – 80 with fracture in mandibular body, symphyseal or parasymphyseal region with a remaining mandibular height at least 15 mm

Exclusion Criteria:

- Patient who has not consented to participate in the study
- Patient who are not fit to undergo treatment under General anaesthesia
- Patients with long standing systemic illness like Diabetes, Renal dysfunction, Arthritis, blood disorders, compromised immunity, long term steroid therapy, osteoporosis or any other bony disorders.
- Patients with Pathological fractures.

Based on the type of treatment the patients are divided into two groups. Preoperative radiographs OPG and occlusal view of mandible is taken for proper fracture line assessment in both groups.

Group 1 will comprise of patients to be treated with open method

Group 2 will comprise patients to be treated with closed method.

In group 1 the fracture is treated with open reduction and rigid fixation is given by titanium mini plates. In group 2 treatment is by closed reduction and stabilization with Gunning splints/ Pre-existing dentures with peralveolar and Circummandibular wiring done for 4weeks.

Statistical Analysis

Chi square test was used for the analysis and comparison of two method. The values were represented in frequencies and percentages. The statistical analysis was done using SPSS version 15.0.

RESULTS

In our study we had included a total of 30 edentulous patients of which there were 17 males and 13 females. The aetiology for fractures were self-fall (50 %), Road traffic accident (33.33%) and others which included industrial accidents and assault. A total of 21 patients in this study were denture wearers. The site of fracture being parasymphysis in 7 patients (23.3 %) and body fracture in 22 patients (73.3 %), while only one patient had symphyseal fracture. And 76.7 % of cases had bilateral representation of fracture.

Clinical assessment of fracture healing with pain as a parameter was

done. Total of 16 patients had objective complaint of pain at site of fracture. At the end of first month 10 patients who underwent open reduction had experienced pain and 6 from closed reduction. This data had a chi- square value of 2.14 and p- value of 0.14. Third month post –op showed significant reduction in no. of patient with pain. The number being four, two in each group. The chi- square was 0.0 and p-value was 1.0. There was remarkable decrease in pain perception after 6 months, since only 1 patient from closed treatment group had experienced pain. The statistics being chi- square value of 1.03 and p-value of 0.309. This concluded that there was no statistical difference in healing of fracture when the pain parameter was assessed.

A comparison on mobility of fracture segment showed that only 1 patient from open method had mobility at the end of 1st month and 2 from closed method. There was no statistically significant difference between both groups. The chi- square value was 0.37 and p- value 0.54. At the end of 3rd month only one patient from closed group had mobility of fractured segment. The same patient had mobility of fracture segment on 6th month. The statistics were chi- square value 1.03 and p- value 0.31. There was no statistically significant difference between two groups based on mobility. However, one patient from closed group had developed mobility with signs of non-union. This would have been due to decrease in period of immobilization, early functional mobilization, age and decreased vascularity of the fracture site.

At the end of 1st month one patient from open method developed a discharge from fracture site along with pain, swelling and mobility. But it was controlled with help of antibiotics. The chi – square at end of 1st month was 1. 03 and p- value 0.31. On subsequent follow ups at the end of 3rd and 6th month there were no reported case with infection.

On comparing swelling at fracture site on both groups, there were significant swelling in patients who received open reduction that is 6 patients from group 1 and 1 patient from group 2 had swelling. The chi-square was 4.65 and p-value was 0.03 which showed statistically significant presence of swelling in group treated with open reduction. This was mainly a residual swelling from the operative site. This swelling reduced in subsequent follow ups at 3rd and 6th month post – op with only one patient from closed treatment having swelling. The chi square value in 1.03 and p-value 0.31 which was not statistically significant to establish any difference.

Radiographic assessment was graded based on fracture union staging. Both groups showed similar radiographic features of healing. There was no difference in fracture healing between both groups which could be established statistically. At the end of 1st month none of the cases attained complete fracture union, while 26 cases showed a bridging of fracture site which was uncertain for fracture union. Only 4 cases showed no initiation of callus formation. The statistics showed no significant difference with a chi- square value of 1.15 and p- value 0.28.

Radiographic analysis at end of 3rd month showed homogenous radiopacity at fracture site in 8 cases suggestive of fracture union, whereas 1 patient from closed group had not achieved initiation of callus formation. There was no statistically significant change at end of 3rd month. The chi- square value was 1.04 and p- value 0.59.

The fracture healing of 96.7 % of cases were completed by 6th month post-op. The radiograph showed homogenous radiodensity in 29 cases showing definite healing of fractures. However, one patient from closed group showed bridging of fracture line on radiographs, suggestive of fibrous union. There was no statistically significant difference between both groups on basis of radiographic interpretation.

DISCUSSION

The treatment options for geriatric patients depends on various factors including age related physiological changes, associated co-morbidities, psychological acceptance to treatment method.

With age the bone becomes greatly reduced in size, for with the loss of the teeth the alveolar process is absorbed, and, consequently, the chief part of the bone is below the oblique line. The mandibular canal, with the mental foramen opening from it, is close to the alveolar border. The ramus is oblique in direction, the angle measures about 140°, and the neck of the condyle is more or less bent backward.

Koshy et al[3] describes that this structural difference in edentulous mandible requires a special consideration for its treatment. First, these individuals tend to have other systemic comorbidities that need to be managed, as well as a poorer baseline nutritional status as described by Ellis et al[4]. Second, obtaining preinjury occlusion can be difficult, as the lack of dentition prevents individuals from noticing subtle changes in their teeth and prevents physicians from identifying wear facets. There is also an inverse relationship between mandibular bone height and the rate of fibrous union/non-union and infection after mandibular fracture[5].

Management of mandible fractures has been mentioned as early as 1700 B.C. in the Edwin Smith Papyrus and later by Hippocrates in 460 B.C., "Displaced but incomplete fractures of the mandible where continuity of the bone is preserved should be reduced by pressing the lingual surface with the fingers...". Open reduction for fractures was described as early as 1869[6]. Since the late 19th century, modern techniques including IMF have been described with titanium based rigid internal fixation becoming common place since the 1970s. Michelet et al[7]. developed the concept of miniplate osteosynthesis in the late 1960s.

Clinical Controversies in treatment of edentulous fracture

Treatment of edentulous fracture required a special attention owing to the change in concept of fracture reduction and also physiological change in mandibular structure. During the past 50 years various methods of treating edentulous mandible fractures have been proposed. These methods have been extolled, modified, or dismissed. The basic principles of fracture management, whether in dentulous or edentulous patients, are reduction and immobilization for restoration of form and function. However, customary methods of fracture immobilization, such as maxillomandibular fixation, are often not a viable alternative in the edentulous patient because of the lack of teeth and the alveolar atrophy. Moreover, systemic factors in these patients, such as osteoporosis, renal failure, diabetes, and malnutrition, also contribute to a high percentage of malunion and non-union of these fractures.

Many Clinical Studies including the Bradley 1975[8] and A.D. McGregor et al (1988)[9] done to study the blood supply of edentulous mandible had concluded that the blood supply is mainly from the periosteum. The Chalmers J. Lyons Academy Study (1976), suggested that Closed reduction should be tried first as open reduction tends to limit vascular supply to the edentulous fracture. They had observed 20 % of cases which were treated conservatively ended up with non-union.

Surgical techniques to repair mandibular fractures have improved considerably in the 25 years since the original Chalmers J. Lyons Academy study. There is ample evidence to support the utility of open reduction and rigid fixation for edentulous mandible fractures taken as a group independent of mandibular body height. The second Chalmers J. Lyons (1993) investigation concluded that using an extraoral open reduction with bone plate fixation may lead to improved results.

The results and observations from the study suggest us that there was no significant difference between both methods on fracture healing. However, we require more sample size and a long-term evaluation of patients to establish a statistically significant relation.

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