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Research Article

Relation between the Location of the Mandibular Fracture and the Incidence of Post ORIF Malocclusion in H. Adam Malik Central General Hospital Medan, Indonesia

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Abstract:
Introduction: Mandible fracture is the second most common fracture of the face. Open Reduction and Internal Fixation (ORIF) has gained popularity with improvement in plating materials and regined of surgical technique. The most common complication documented in post-ORIF patients with mandible fracture was malocclusion and the most frequent locations are at angles and subcondylar. The purpose of this study was to determine the relationship between the location of mandible fracture and the incidence of post-ORIF malocclusion at H. Adam Malik General Hospital Medan.
The purpose of this study was to determine the relationship between the location of mandibular fracture and the incidence of post-ORIF malocclusion at RSUP H. Adam Malik Medan.
Methods: This study is an analytical study with cross sectional design. Subject of this study amounted to 57 people. Data were collected through medical record at Adam Malik Medan General Hospital during period of August 2016 until March 2017. Data were analyzed by using Chi-Square test.
Results: From the 57 cases of this mandibular fracture showed that male gender 55 people (96%), fracture location on parasymphisis 35 people (61%), the most often etiology is due to traffic accident 53 people (92%), meanwhile, there were not found the post-ORIF incidence of malocclusion in 52 people (79%). Based on the Chi-Square test, *p*=0.63 showed that there is no relationship between the location of the mandibular fracture and the incidence of post-ORIF malocclusion.
Conclusion: The study shows that there is no relationship between the location of the mandibular fracture and the incidence of post-ORIF malocclusion.

Keywords: mandibular fracture, malocclusion, ORIF

INTRODUCTION

Mandibular fracture is a loss of mandibular bone continuity which can be fatal if not handled properly. The major etiological factors of mandibular fracture vary such as malignancy in the mandible, accidents due To work and exercise, but the motor vehicle accident is the most common cause. The location of mandibular fracture includes the symphysis, parasymphisis, condyle, ramus, angle, alveolar, and corpus. The most frequent location is symphysis (26.7%) (Dwi, 2013).

The incidence of malocclusion is the most common postoperative complication of mandibular fractures. Malocclusion presents as a discrepancy between the dental and jaw (maxillofacial), especially in its diagnostic and management. The management of malocclusion uses fixation technique such as the use of head bandages, intermaxillary fixation, and Open Reduction and Internal Fixation (ORIF) has gained popularity with improvement in plating materials and regined of surgical technique.

The common post ORIF complications include infection, impaired wound healing, malocclusion, discomfort feeling of Temporo Mandibular Joint (TMJ), or nerve injury. Then, malocclusion is being evaluated in six months postoperatively. The location of the mandibular fracture is one of the prognostic factors of post ORIF mandibular malocclusion. In the study of Shanker et al showed that the location of mandibular fracture has a correlation with post ORIF malocclusion. The most common location of post ORIF malocclusion is at angle and subcondilar.

METHODS

This research is an analytical study with cross sectional design. Samples were collected through medical record data with inclusion criteria of patients with mandibular fracture who performed ORIF during August 2016 until March 2017. Patients with incomplete medical record data were excluded. Sample selection is done by consecutive sampling. The minimum number of samples calculated by the formula:

$$n = \left\{\frac{Z\alpha+Z\beta}{0{,}5\ln\left[\frac{1+r}{1-r}\right]}\right\}^2 + 3 = \left\{\frac{1.96+0.842}{0{,}5\ln\left[\frac{1+0.001}{1-0.001}\right]}\right\}^2 + 3$$

Information:

n = sample size

Zα = standard deviation α (level error type 1) = 5%, so Zα = 1.96

Zβ = standard deviation β (level error type II) = 20%, so Zβ = 0.842

r = 0.001 (based on previous research results (Shankar, 2012)

Based on the above formula, the minimum sample size of this study is 27 people.

The collected data will be presented descriptively in the frequency distribution table. The datas between the location of mandibular fracture and the incidence of post ORIF malocclusion results were then analyzed bivarietely with Chi-Square test.

RESULTS

Sample Characteristics

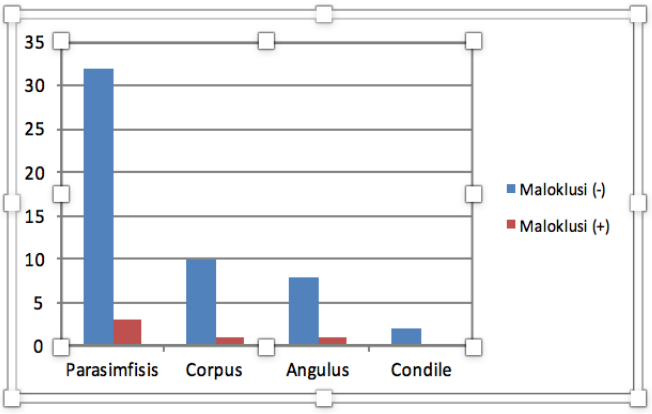
A total of 57 patients consisting of 55 (96%) boys were participated in the study. All of them who undergone ORIF, 52 (79%) patients were not performed malocclusion. The mean ± SD of patient's age was 26,14±12,25 years. Parasymphysis was the most frequent location in mandibular fracture in 35 (61%) patients, and the most etiology was caused by motor vehicle accidents in 53 (92%) patients.

Table 1. Characteristics of Research Sample

Characteristic	N	%
Age (Mean ± SD)	26,14 ± 12,25	
Geder		
Male	55	96
Female	2	4
Location of Mandible Fracture		
Parasymphisis	35	61
Corpus	11	19
Angulus	9	16
Condile	2	4
Etiology		
Motor vehicle accident	53	92
Other trauma	4	8
Incidence of Malocclusion		
Malocclusion (+)	5	21
Malocclusion (-)	52	79

Based on the bivariate analysis with Chi-Square Test showed the p value = 0.63 (p<0.05) that showed there is no realtion between the location of mandibular fracture and the incidence of post ORIF malocclusion.

Figure 1. Diagram of the location of the mandibular fracture and the occurrence of malocclusion



From the diagram above, the ORIF post malocclusion was encountered in 3 of 35 (8%) of parasympathetic fractures, 1 of 11 (9%) patients at the fracture of the corpus, and 1 in 9 (11%) in the angular fracture, and no malocclusion of the fracture condile.

DISCUSSION

Based on the research results can be seen that the average age of the study subjects was 26.14 ± 12.25. The age group of 18-40 years (adults) is a productive age group with high mobility (Falatehan, 2008). The mandibular corpus is the most common site of fracture because the corpus is the first part of the impact and causes it to be susceptible to fracture (Ajmal, 2007).

Mandibular fractures mostly occurred in men 55 subjects (96%). This is consistent with other studies that mandibular fractures are common in men with a percentage of 80.1% with a 4: 1 ratio, as men are more likely to engage in outdoor activities such as driving, sports or fighting (Ajmal, 2007).

Mandibular fractures may occur due to traffic accidents, industrial accidents or occupational accidents, domestic accidents, drunkenness and fights or physical violence. According to a survey in the District of Columbia Hospital, of the 540 cases of fractures, 69% of cases occurred due to physical violence (fights), 27% due to traffic accidents, 12% from occupational accidents, 2% due to sporting accidents and 4% . (Smeltzer & Bare 1996). In Sheturaja's study in India mentioned that based on the etiology of traffic accidents is often the case (51%). Mandibular fractures in this study mostly occurred due to traffic accidents 53 subjects (92%).

The location of parasymphisis fracture is most common in 35 samples (61%) because of the prominent parasymphisis symphysis position causing frequent fractures. This is similar to the research Sheturaja says that parasymphisis is the most common location of mandibular fractures of 44%, and most

rarely in dento-alveolar (2%). The thickness of the mandible in the symphysis and parasymphisis areas ensures that the fractures in the symphysis and parasymphisis regions are merely smooth fractures. But a prominent position in this area causes this area to often experience fracture.

This is different from the research conducted in hospitals dr. Saiful Anwar Malang (2011) showed that condylus occupies the first position of mandibular fracture case (35.6% or 128 of 689 cases) caused by condylus is one of the weakest places of the mandible besides the position of the condyle which is bound by several ligaments, whereas in this study the condylous region is kept the fourth position with the percentage (7.1%). The cause of the difference in the results of this study is probably caused by a total of 101 samples from 206 samples of this study having no description of the location of the fracture in the mandible so that the results obtained for the grouping of the anatomical location of the occurrence of the mandibular fracture become limited. (Bhagol A, 2013). In this study based on the incidence of postoperative malocclusion, showed that 79% of patients did not experience malocclusion.

From the result of bivariate analysis with Chi-Square test, there was no correlation between the location of mandibular fracture and postoperative ORIF malignition (p = 0.63). Complications that occur post-fracture of the mandible is caused by several things: the mandible is the only bone in the face of the most moving area than other facial bones. Therefore, fractures of the mandible generally result in a greater degree of instability. Because the muscles are attached to the mandible, the movement of the mandible can occur even after ORIF. (Li Z, 2006).

In accordance with Lee's research reported that the most significant factors causing malunion and malocclusion in mandibular fractures are instability, infection, inadequate blood circulation, and metabolic changes. The normal bone union process occurs within 4-8 weeks, depending on the age of the patient. Malocclusion occurs when bone integration is not appropriate at the time. Malocclusion occurs due to movement of bone segments and non-compliance of post-ORIF patients such as chewing unsound foods. (Lee, 2014). In Lee's study mentioned malunion after mandibular reduction led to malocclusion, and repeat surgery showed satisfactory results. Proper preoperative examination and appropriate surgical procedures followed by appropriate postoperative management are needed to prevent post-ORIF complications of the mandible (Lee, 2014).

CONCLUSION

Of the 57 subjects who experienced mandibular fractures and performed ORIF surgery. Bivariate statistic test showed that there was no correlation between the location of mandibular fracture and malocclusion p = 0.63 (p <0.05).

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