

RESEARCH ARTICLE

## Quality of life patients after treatment of mandibular fractures with ORIF in oral surgery departement of Dr. Sardjito general hospital

Edmond Apriza\*,\*\*✉, Rahardjo\*\*\*, Cahya Yustisia Hasan\*\*\*

\*RSUD Embung Fatimah Batam, Kepulauan Riau, Indonesia

\*\*Oral and Maxillofacial Surgery Specialty Program, Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia

\*\*\*Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia

\*Jl Letjend Suprpto No 1-9, Bukit Tempayan, Batu Aji, Batam, Kepulauan Riau; ✉ correspondence: [drg.edmondapriz@ugm.ac.id](mailto:drg.edmondapriz@ugm.ac.id)

Submitted: 21<sup>st</sup> November 2018; Revised: 11<sup>st</sup> March 2019; Accepted: 3<sup>rd</sup> October 2019

---

### ABSTRACT

Management of mandibular fracture using open reduction Internal fixation (ORIF) method is one of the ideal treatments for single and multiple mandibular fractures. The aim of this study was to determine the quality of life of patients after the treatment of mandibular fractures with ORIF using miniplate in single and multiple mandibular fractures. This research used case-control by recalling 43 research subjects in the oral surgery department Dr Sardjito general hospital between 2013 and 2017, that consisted of patients suffering from 23 single fractures and 20 multiple mandibular fractures. Each fracture would be examined clinically and subjectively. Clinical examination parameters were conducted using the mandibular mobility index (MMI) consisting of mouth opening assessment, left and right lateral mandibular excursion, and mandibular protrusive movement. Subjective parameters were performed based on general oral health asseesment index (GOHAI) questionnaire to assess physiological aspects, psychosocial aspects, and pain. The results of the chi-square test statistic study showed that the quality of life of a patient with a single mandibular fracture was better than that of multiple mandibular fractures based on MMI and GOHAI examinations. It was concluded that patients with a single mandibular fracture had a younger age, longer time adaptation and have a better quality of life.

**Keywords:** GOHAI; Mandibular Fracture; MMI; ORIF; quality of life

---

### INTRODUCTION

Mandibular fracture is the breakdown of mandibular bone continuity as a result of trauma and pathological abnormalities. This fracture can cause functional impairment and pain in the mandibular bone, thereby reducing the overall quality of life.<sup>1</sup> Symptoms of mandibular fracture were pain, swelling, tenderness, and malocclusion, as shown by radiographic examination. According to the research done by Rashid in London between June 2005 and May 2010, the incidence of mandibular fracture was higher in men (87%) than in women (13%) (male: female ratio 6.6: 1). The most common occurrence of mandibular fracture is in the mandibular angle (30%), followed by parasymphysis (27%), and condyles (27%), interpersonal violence in male patients (77%) and women (46%), traffic

collision resulting in condylar fracture (53%), and 4% due to pathological causes.<sup>2</sup>

Classification of mandibular fractures is based on the number of fragments and the presence of bone destruction, which is divided into five categories: incomplete fractures, single fractures, multiple fractures, comminuted fractures, and fractures with bone defects. Single fracture is a single mandibular fracture that is divided into two fragments, whereas multiple fractures are mandibular fractures that occur in several places and are divided into multiple fragments.<sup>3</sup> The primary goal of mandibular fracture treatment is to restore mandibular anatomy and function. Mandibular fracture treatment should be done immediately while considering the patient's general condition and trauma to other parts of the body. Open Reduction Internal Focal

Treatment (ORIF) for mandibular fracture is a surgical intervention to open and conduct a direct exploration of the mandibular fracture area, through a surgical incision of the skin or mucosa to obtain a direct view of the fractured bone fragment. This treatment is done by performing internal fixation on fracture fragments using intraosseous wiring, mini plate, and screw.<sup>4</sup> The advantages of this treatment are that it allows optimal treatment outcomes, takes short treatment time, does not require IMF (Intermaxillary Fixation), and does not hinder the patients daily activity. In general, ORIF treatment in post-fracture mandibular patients will create a perfect repositioning and fixation since it helps to mobilize the mandible immediately.<sup>5</sup>

Some factors to influence the success rate of treatment of mandibular fractures are the age of the patient, type of fracture, number of fracture regions, the likelihood of infection, and the amount of time for adaptation after treatment.<sup>6</sup> Evaluation treatment of mandibular fractures with ORIF can be done by clinical examination of mandibular function with the Mandibular Mobility Index (MMI), consisting of occlusion, the maximal ability to open the mouth, maximal ability of the mandible to the left and right lateral, maximal mandibular protrusive, and the quality of life questionnaire, one of which is the general oral health Assessment Index (GOHAI) questionnaire.<sup>7,8</sup> Atchison et al. 2006 revealed a continuous relationship between the results of clinical examinations and subjective examinations using the GOHAI questionnaire.<sup>9,10</sup>

Quality of life is the individual's perception of the position of the individual in life in the context of culture and value systems, indicated by the individual lives and its relationship with goals, expectations, standards set, and one's attention. Quality of life is also related to normality, including normal functions of the body or the ability to fulfill human needs. Quality of life includes three main aspects, physiological or functional, psychosocial, and pain.<sup>9</sup>

The results of the preliminary study revealed the need to conduct studies related to the description of the quality of life after the treatment of mandibular fractures with ORIF using a mini

plate. This study was conducted to see the healing progress after treatment of mandibular fracture to ensure that the healing process of ORIF patients was not solely focused on the physical condition, but also on the assessments of several aspects, including physiological, psychosocial, and pain aspects.<sup>10</sup> Based on these descriptions, using GOHAI questionnaires and clinical examinations, the authors wish to compare the quality of life in patients with single fracture and multiple fractures after treatment of mandibular fractures with ORIF using a mini plate at oral surgery department Dr. Sardjito general hospital, Yogyakarta.

## MATERIALS AND METHODS

This study investigated case-control subjects after the treatment of mandibular fractures with ORIF using miniplate from January 2013 to December 2017 in the oral surgery department Dr. Sardjito general hospital Yogyakarta. Ethical approval of the research (ethical clearance) was obtained from the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada.

Patients as the research subjects were selected according to inclusion criteria. Those who take part in the study were required to sign informed consent. The inclusion criteria were patients with mandibular fractures aged over 14 years, having single and multiple mandibular fractures, undergoing ORIF treatment use mini plates, and having post-treatment for mandibular fractures at least for six months. Exclusion criteria were patients with skeletal discrepancies and malocclusions before fracture, patients with TMJ conditions before fracture, patients experiencing maxillofacial trauma repeatedly after treatment of mandibular fractures, patients with pathological fractures, patients with psychiatric disorders, patients with incomplete medical record data, patients who were difficult to contact and who were unwilling to be the subject of research.

This study used MMI examination and the GOHAI questionnaire as the research instrument. The research procedure management of the ethical clearance (KE / FK / 0868 / EC / 2018), and the recall of the patients after having the mandibular

fracture treatment to assess their quality of life after treatment according to a predetermined time. Patients were required to fill out an informed consent as one of the research requirements. After signing the informed consent, the respondents were explained about the purpose of the study and the research procedures related to patient involvement. This explanation was followed by subjective examination and clinical examination of the research subject. After anamnesis, a clinical examination based on the MMI scale consisting of occlusion, maximal open mouth, maximal of the mandible to the left and right lateral, and maximal mandibular protrusion was conducted using a caliper on millimeter (mm). Then, the respondents were provided with GOHAI research questionnaire to reveal their current situation. The researcher accompanied the respondents as they filled out the questionnaire to anticipate questions. Afterward, the researcher examined the questionnaire that was filled out by the respondents to ensure the complete answering of the questions, and the data entered into the research form.

The data obtained from the respondents were tested for normality with the Kolmogorov-Smirnov test. After completion, the test continued with a test of the difference in the quality of life between single and multiple with the Chi-Square test. The relationship between age and operating time with quality of life scores were assessed with Pearson's correlation.

## RESULTS

The research was conducted on 43 subjects undergoing treatment of mandibular fracture with ORIF revealed the characteristics of the research subjects (Table 1) with an average age of 29 years old with a range of 18-54 years consisting of 27 male subjects and 16 female subjects. These subjects had a wide-ranging educational background: 2 people completed elementary school, 10 people completed junior high school, 28 people attended senior high school, and 3 people completed higher education. Twenty-three subjects received ORIF treatment for a single mandibular fracture, and 20

subjects were provided with the ORIF treatment for multiple mandibular fractures.

Data on the location of single mandibular fractures were corpus for 3 people, symphysis for 6 people, angle for 5 people, parasymphysis for 4 people, and processus condyles for 5 people. The location of multiple mandibular fractures was on the parasymphysis and proc. condyles for 5 people, corpus and processus condyles for 2 people, symphysis and processus condyles for 3 people, parasymphysis and corpus, and bilateral processus condyles for 2 people, bilateral parasymphysis for 3 people, bilateral corpus for 1 person, parasymphysis and angle for 2 people.

The results of the study on clinical evaluation measurements using MMI (Table 2) showed the proportion of subjects with normal occlusion, mouth opening, right and left lateral, and protrusive mandible on the normal category, which occurred more frequently in single mandibular fractures than in multiple mandibular fractures. Measurements were based on the score of 0 for the normal category, the score of 1 for the medium category, and the score of 5 for the severe category. Each examination was summed to obtain an assessment of MMI's total score with a category of 0 as normal, 1-4 as moderate, and 5-20 as severe.

Based on Chi-Square test data analysis on the MMI category (Table 3), 20 subjects with single mandibular fractures were in a good category (87.0%), and six subjects with multiple mandibular fractures were in a good category (30%). There was a significant difference in MMI subjects between single and multiple fractures, as indicated by the p Chi-Square value of = 0.000 ( $p < 0.05$ ).

Analysis of the 12 questions in the GOHAI questionnaire (Table 4) revealed that subjects with single mandibular fractures of  $n = 23$  people who answered that they had no problems with teeth, gums and jaws both physiologically, painfully and psychosocially towards others. Analysis of the 12 questions in the GOHAI questionnaire revealed subjects with multiple mandibular fractures of  $n = 20$  people (Table 5), half of whom answered that they had no problems with their teeth, gums, and jaws both physiologically, painfully and psychosocially

towards others. The remaining half had problems with teeth, gums, and jaw more frequently.

Based on the GOHAI questionnaire, the average quality of life of subjects with single mandibular fracture was lower than those with multiple mandibular fractures with an average score of 23.04 for the former and 32.75 for the later (Table 6). Each aspect of quality of life regarding

pain, physiology, and psychosocial in subjects with a single mandibular fracture was lower than in subjects with multiple mandibular fractures.

GOHAI's total value score of  $\leq 50$  indicates a good quality of life, 51-56 indicates a fair living quality, and 57-60 demonstrates the poor quality of life. Based on the GOHAI questionnaire, it was found that 23 subjects (100%) with single

**Table 1.** Research subjects characteristics

		Mean $\pm$ standard deviation	n=43
Age		28.92 $\pm$ 8.83	
Sex	Man		27
	Woman		16
Education	Elementary		2
	Junior high		10
	Senior high		28
	University		3
Fracture types	Single		23
	Multiple		20
Surgery time		3.61 $\pm$ 1.46	

**Table 2.** Clinical examination evaluation of mandibular mobility index (MMI) for mandibular fracture treatment using ORIF

		Single fracture n=23	Multiple fractures n=20
Occlusion	Normal	22	17
	abnormal	1	3
Mouth opening	Normal	23	12
	Fair	0	8
	Poor	0	0
Lateral right excursion	Normal	23	15
	Fair	0	4
	Poor	0	1
Lateral left excursion	Normal	22	10
	Fair	1	9
	Poor	0	1
Maxilla and mandibula protrusions	Normal	20	9
	Fair	3	6
	Poor	0	5

**Table 3.** Chi-Square test comparing mandibular mobility index (MMI) categories between single and multiple mandible fractures

Fracture type	MMI category						p
	Good		Fair		Poor		
	n	%	n	%	n	%	
Single	20	87.0%	3	13.0%	0	0.0%	0.000
Multiple	6	30.0%	9	45.0%	5	25.0%	

**Table 4.** Distribution of frequency percentage answers of the quality of life of subjects with single mandible fractures (n= 23)

Questions	Never		Seldom		Sometimes		Often		Always	
1. Are there any dietary restrictions because of problems with your teeth or jaw?	17	73.9%	5	21.7%	1	4.3%	0	0.0%	0	0.0%
2. Do you have trouble biting or chewing any kind of hard foods, such as meat or apples?	18	78.3%	5	21.7%	0	0.0%	0	0.0%	0	0.0%
3. Is it comfortable to swallow?	0	0.0%	0	0.0%	1	4.3%	7	30.4%	15	65.2%
4. Do you have speech problems because of your teeth or wires?	13	56.5%	10	43.5%	0	0.0%	0	0.0%	0	0.0%
5. Can you eat any type of foods without uncomfortable feeling?	0	0.0%	0	0.0%	0	0.0%	8	34.5%	15	65.2%
6. Do you limit your contacts with people because of the condition of your teeth or jaw?	16	69.6%	7	30.4%	0	0.0%	0	0.0%	0	0.0%
7. Are you displeased or unhappy with the looks of your teeth and gums, or jaws?	14	60.9%	8	34.8%	1	4.3%	0	0.0%	0	0.0%
8. Do you use medication to relieve pain or discomfort around your mouth?	10	43.5%	13	56.5%	0	0.0%	0	0.0%	0	0.0%
9. Are you worried or concerned about the problems with your teeth, gums, or jaws?	16	69.6%	5	21.7%	2	8.7%	0	0.0%	0	0.0%
10. Do you feel nervous or self-conscious because of problems with your teeth, gums, or jaws?	15	65.2%	8	34.8%	0	0.0%	0	0.0%	0	0.0%
11. Do you feel uncomfortable eating in public because of problems with your teeth?	16	69.6%	6	26.1%	1	4.3%	0	0.0%	0	0.0%
12. Are your teeth or gums sensitive to hot, cold, or sugary foods?	15	65.2%	6	26.1%	2	8.7%	0	0.0%	0	0.0%

1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, and 5 = Always

**Table 5.** Distribution of frequency percentage answers of the quality of life of subjects with multiple mandible fractures (n= 20)

Questions	Never		Seldom		Sometimes		Often		Always	
1. Are there any dietary restrictions because of problems with your teeth or jaw?	7	35.0%	3	15.0%	5	25.0%	5	25.0%	0	0.0%
2. Do you have trouble biting or chewing any kind of hard foods, such as meat or apples?	3	15.0%	10	50.0%	2	10.0%	4	20.0%	1	5.0%
3. Is it comfortable to swallow?	1	5.0%	0	0.0%	12	60.0%	3	15.0%	4	20.0%
4. Do you have speech problems because of your teeth or wires?	7	35.0%	6	30.0%	2	10.0%	4	20.0%	1	5.0%
5. Can you eat any type of foods without uncomfortable feeling?	0	0.0%	0	0.0%	6	30.0%	6	30.0%	8	40.0%
6. Do you limit your contacts with people because of the condition of your teeth or jaw?	7	35.0%	8	40.0%	0	0.0%	2	10.0%	3	15.0%
7. Are you displeased or unhappy with the looks of your teeth and gums, or jaws?	3	15.0%	9	45.0%	1	5.0%	4	20.0%	3	15.0%

Questions	Never	Seldom	Sometimes	Often	Always
8. Do you use medication to relieve pain or discomfort around your mouth?	6 30.0%	5 25.0%	4 20.0%	1 5.0%	4 20.0%
9. Are you worried or concerned about the problems with your teeth, gums, or jaws?	6 30.0%	7 35.0%	0 0.0%	6 30.0%	1 5.0%
10. Do you feel nervous or self-conscious because of problems with your teeth, gums, or jaws?	4 20.0%	6 30.0%	3 15.0%	4 20.0%	3 15.0%
11. Do you feel uncomfortable eating in public because of teeth problems?	6 30.0%	6 30.0%	3 15.0%	3 15.0%	2 10.0%
12. Are your teeth or gums sensitive to hot, cold, or sugary foods?	6 30.0%	5 25.0%	2 10.0%	4 20.0%	3 15.0%

1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, and 5 = Always

**Table 6.** Single and multiple mandible fracture subject's quality of life- based on GOHAI

	Single (n=23)		Multiple (n=20)	
	Mean± SD	Median (min-max)	Mean	Median (min-max)
GOHAI score	23.04 ± 3.21	22.0 (19.0-31.0)	32.75 ± 12.0	29.0 (19.0-54.0)
Pain	3.00 ± 0.80	3.0 (2.0-5.0)	5.25 ± 2.83	5.0 (2.0-10.0)
Physiological aspect	13.22 ± 1.20	13.0 (11.0-16.0)	4.75 ± 3.29	14.0 (9.0-21.0)
Psychosocial aspect	6.83 ± 1.99	6.0 (5.0-13.0)	12.75 ± 6.49	10.0 (5.0-24.0)

**Table 7.** Chi-Square test comparing quality of life categories based on GOHAI between respondents with single and multiple mandible fractures

Fracture Type	GOHAI categories						p
	Good		Fair		Poor		
	n	%	n	%	n	%	
Single	23	100%	0	0.0%	0	0.0%	0.011
Multiple	15	75.0%	5	25.0%	0	0.0%	

**Table 8.** Chi-Square test correlation between clinical examination of MMI and quality of life-based on GOHAI questionnaire

MMI	GOHAI categories						p
	Good		Fair		Poor		
	n	%	n	%	n	%	
Good	26	100%	0	0.0%	0	0.0%	0.011
Fair	10	83.3%	2	16.7%	0	0.0%	
Poor	2	40%	3	60%	0	0.0%	

mandibular fractures and 15 subjects (75%) with multiple mandibular fractures had a good quality of life (Table 7). The analysis using the chi-square test showed significant differences in the quality of life of between subjects with single and multiple mandible fractures as indicated by the p-value = 0.000 ( $p < 0.05$ ). The correlation between surgery time and clinical examination obtained a

coefficient of  $r = -0.329$  with  $p = 0.031$  ( $p < 0.05$ ). Negative coefficient denoting that the longer the surgery time the patient has undergone, the lower the MMI score indicates the improvement in clinical conditions.

The correlation between surgery time and the quality of life of the subjects according to GOHAI resulted in coefficients of  $r = -0.595$  with  $p = 0.000$

( $p < 0.05$ ). Negative coefficients indicate that the longer the time after surgery, the lower the subject quality of life score based on GOHAI, which shows improved quality of life of patients. Correlation between age and clinical examination obtained the coefficient value of  $r = 0.460$  with  $p = 0.002$  ( $p < 0.05$ ). The positive coefficient showed that the older the patient, the higher the MMI score, which indicated a poor clinical condition. The correlation between age and quality of life of patients according to GOHAI obtained coefficients of  $r = 0.433$  with  $p = 0.004$  ( $p < 0.05$ ). Positive coefficients showed that the older the subject, the higher the quality of life score based on GOHAI, which showed the poor quality of life of the subject.

The correlation between the clinical examination of MMI and quality of life revealed that all subjects with good clinical examination results had a good quality of life. The research subjects with moderate clinical examination results had a good quality of life (83.3%). Most subjects with poor clinical examination results had a fair quality of life (60.0%) (Table 8). This shows a significant match between MMI clinical examination and quality of life-based on the GOHAI questionnaire  $p = 0.001$  ( $p < 0.05$ ).

## DISCUSSION

A mandibular fracture can cause functional impairment and pain in the mandibular bone, reducing the overall quality of life. Single fracture divided into two fragments, whereas multiple fractures are mandibular fractures that occur in several places and divided into multiple fragments.<sup>1</sup> The primary goal of mandibular fracture treatment is to restore mandibular anatomy, and function.<sup>1</sup> ORIF mandibular fracture is a surgical intervention to open and conduct a direct exploration of the mandibular fracture area through a surgical incision of the skin or mucosa in order to obtain a direct view of the fractured bone fragment.<sup>4</sup> Quality of life is related to normality, including the ability to function normally and to meet daily needs. Quality of life includes three main aspects, physiological or functional, psychosocial, and pain aspects.<sup>9,10</sup>

Quality of life after treatment of mandibular fracture was conducted with ORIF using miniplate at oral surgery department Dr Sardjito general hospital Yogyakarta on January 2013-December 2017 by involving 43 people as the research subjects. The average age of the research subjects was 29 years, with an age range of 18-54 years. Based on their level of education, 28 people attended high school, ten people completed junior high school, 3 people attended higher education, and 2 people completed elementary school. The age group of 18-40 years is classified as a productive age, which requires high mobility and dynamic activities, which are attributed as the factors to cause traffic accidents.<sup>11,12</sup>

These 43 people consisted of 27 males (62.8%) and 16 females (37.2%). The higher incidence of mandibular fractures that occurred in males was attributed to the fact that most male subjects underwent more numerous outdoor activities such as driving vehicles or doing sports than that of female.<sup>12</sup> Research subjects who experienced single mandibular fractures were 23 people (53.5%) and those experiencing multiple mandibular fractures as many as 20 people (46.5%) with an average post-surgery of 3.6 years.<sup>9</sup>

The single mandibular fracture was mainly dominated by fracture of the single symphysis, while multiple mandibular fractures was mainly located on condyle fracture and a parasymphysis fracture. The most frequently fractured locations were symphysis (48%), and body (42.2%), whereas in the case of multiple fractures, the fracture of parasymphysis with subcondylar fracture, bilateral parasymphysis fracture, fracture of parasymphysis with angular fracture, fracture of parasymphysis with corpus fracture, and fracture of parasymphysis with ramus fracture was the most fracture combinations to occur.<sup>4</sup> Treatment of mandibular fractures with ORIF was considered successful in the absence of infection, inflammation, fistula, malunion, malocclusion, pain, osteomyelitis and osteoarthritis.<sup>13,14</sup>

MMI assessment of subjects with a single mandibular fracture showed a better result than that of multiple mandibular fractures subjects based on the ability of each subject to open his/her mouth,

hold lateral left and right excursion, and show mandibular protrusion. One factor that influenced the success rate of mandibular fracture treatment was the number of fracture regions experienced by the research subjects.<sup>15</sup>

Analysis of the frequency distribution of single mandibular fractures and mandibular multiple fractures patient's answer using the GOHAI questionnaire indicated that the answers were dominated with the answer 'no.' Omeje's (2014) study of the frequency analysis of the answers to each GOHAI questionnaire question showed that the quality of life of the subjects under study was largely influenced by the ability to chew, swallow, and feel pain.<sup>9</sup> The quality of life of research subjects with a single mandibular fracture was better than that of multiple mandibular fractures, as seen from the physiological aspects, psychosocial aspects, and pain. Large trauma causes severe injury to multiple mandibular fractures and involves multiple fracture alignment locations leading to a longer recovery process.<sup>9</sup> Lee et al. (2008) revealed that the quality of life of patients undergoing orthognathic surgery treatment had improved significantly in terms of emotional status and well-being 6 months post-treatment, as marked by the improvements in facial aesthetics, function, and social abilities.<sup>16</sup>

The process of adaptation after surgery affect the clinical examination of MMI and quality of life-based on GOHAI. The longer the postoperative period of the research subjects, the lower the MMI score, which indicates the better clinical condition of the research subject. Meanwhile, the lower quality of life score based on GOHAI indicates the improved quality of life of the patients. Research by Yamamoto et al. (2004) explained that 6 months after treatment, there was a significant difference in the quality of life between condyle fracture alone and condyle fracture accompanied by another mandibular fracture. At that stage, clinically and radiographically, the bone had been declared to heal.<sup>17</sup> Atchison (2006) who evaluated patients with pan-facial fractures showed a correlation between GOHAI quality of life assessment and clinical objectives consisting of the patient's ability to open their mouth wide, mental health, and pain.<sup>10</sup>

MMI clinical examination showed that the older the patient, the higher the MMI score, and thus pinpointing the worse clinical condition.<sup>7</sup>

Correlation between age and quality of life of patients based on GOHAI showed that the older the patient's age, the higher the quality of life score based on GOHAI, that the quality of life getting worse. Young research subjects have many active growth factors and thereby making faster recovery process than that of the old age. This lower improvement of quality of life is attributed to the decreasing growth factors, including bone morphogenetic proteins (BMPs), transforming growth factor-beta (TGF- $\beta$ ), insulin-like growth factors I and II (IGF-I and IGF-II), platelet-derived growth factor (PDGF) and basic and acidic fibroblast growth factor (bFGF and aFGF). Nikolaou et al. who studied subjects aged 65 years and over with fracture healing demonstrated that these elderly took longer healing process than patients aged 18-40 due to the presence of signs of osteoporosis in radiographic.<sup>13,14</sup>

However, the drawback of this study is that it cannot observe and evaluate the clinical function patterns of mouth opening movement of patients who only had condyles fractures or accompanied by other mandibular fractures post-fracture treatment, not to mention the absence of time limits in assessing the best relationship between time required for physiological adaptation in influencing the quality of life of subjects.

## CONCLUSION

In conclusion, quality of life of single study subjects mandibular fractures with ORIF treatment is better than those with multiple mandibular fractures. The longer time of adaptation after treatment of mandibular fracture with ORIF, the better the quality of life. Quality of life of patients at a young age is better than that at old age.

## REFERENCES

1. Zaleckas L, Drobnys P, Rimkuvienė J. Incidence and etiology of mandibular fractures treated in Vilnius University hospital Žalgiris clinic, Lithuania: a review of 1 508 cases. *Acta Medica Lituanica*. 2013; 20(1): 53-60.



2. Rashid A, Eyeson J, Haider D, Gijn DV, Fan K. Incidence and patterns of mandibular fractures during a 5-year period in a London teaching hospital. *Br J Oral Maxillofac Surg.* 2013; 51(8): 794-798.  
doi: 10.1016/j.bjoms.2013.04.007
3. Spiessl B. Internal fixation of the mandible a manual of AO/ASIF principles. New York London Paris Tokyo: Springer-Verlag Berlin Heidelberg; 1990. 151-157.  
doi: 10.1007/978-3-642-71034-6
4. Mwaniki DL, Guthua SW. Occurrence and characteristics of mandibular fractures in Nairobi, Kenya. *British Journal of Oral and Maxillofacial Surgery.* 1990; 28(3): 200-202.  
doi: 10.1016/0266-4356(90)90089-4
5. Ehrenfeld M, Manson PN, Prein J. Principles of internal fixation of the craniomaxillofacial skeleton trauma and orthognathic surgery. Switzerland, Clavadelstrasse 8, CH-7270 Davos Platz: AO Foundation; 2012.
6. Balaji SM. Textbook of oral and maxillofacial surgery, Chapter 4. Fractures of the mandibles. New Delhi: Elsevier; 2013. 887-892.
7. Ajanović M, Lončarević AS, Kazazić LD, Bejtović B, Strujić S, Smajkić N. The prevalence of symptoms and signs of temporomandibular dysfunctions in patients with the posttraumatic stress disorder. *Acta Stomatol Croatia.* 2009; 43(3): 202-214.
8. Rana M, Gellrich NC, VonSee C, Weiskopf C, Gerressen M, Ghassemi A, Modabber A. 3d evaluation of postoperative swelling in treatment of bilateral mandibular fractures using 2 different cooling therapy methods: a randomized observer blind prospective study. *J Craniomaxillofac Surg.* 2013; 41(1): 17-23.  
doi: 10.1016/j.jcms.2012.04.002
9. Omeje KU, Adebola AR, Efunkoya AA, Osunded OD, Bamgbose BO, Akhiwua BI, Amole IO. Prospective study of the quality of life after treatment of mandibular fractures. *Br J Oral Maxillofac Surg.* 2015; 53(4): 342-346.  
doi: 10.1016/j.bjoms.2015.01.009
10. Atchison KA, Shetty V, Belin TR, Dermartirosian C, Leathers R, Black E, Wang J. Using patient self-report data to evaluate orofacial surgical outcomes. *Community Dent Oral Epidemiol.* 2006; 34(2): 93-102.  
doi: 10.1111/j.1600-0528.2006.00260.x
11. Elgehani RA, Orafi MI. Incidence of mandibular fractures in eastern part of Libya. *Med Oral Patol Oral Cir Bucal.* 2009; 14(10): 529-532.  
doi: 10.4317/medoral.14.e529
12. Sari CA. Prevalensi fraktur mandibula yang dirawat di RSUD dr. Saiful Anwar Malang Tahun 2005-2010 [skripsi]. Universitas Jember; 2011.
13. Lu C, Miclau T, Hu D, Hansen E, Tsui K, Puttlitz C, Marcucio RS. Cellular basis for age-related changes in fracture repair. *J Orthop Res.* 2005; 23(6): 1300-1307.  
doi: 10.1016/j.orthres.2005.04.003.1100230610
14. Foulke BA, Kendal AR, Murray DW, Pandit H. Fracture healing in the elderly: a review. *Maturitas.* 2016; 92: 49-55.  
doi: 10.1016/j.maturitas.2016.07.014
15. Kilinc A, Ertaş U, Yalçın E, Saruhan, N. Retrospective Analysis Of Mandibular Fractures Cases In Center Of The Eastern Anatolia Region Of Turkey. *Cumhuriyet Dental Journal.* 2017; 20(1): 40-44.  
doi: 10.7126/cumudj.306117
16. Lee S, McGrath C, Samman N. Impact of orthognathic surgery on quality of life. *J Oral Maxillofac Surg.* 2008; 66(6): 1194-1199.  
doi: 10.1016/j.joms.2008.01.006
17. Yamamoto K, Murakami K, Sugiura T, Fujimoto M, Ohgi K, Kirita T. Factors affecting mandibular function after conservative treatment of condylar fractures. *Asian Journal of Oral Maxillofacial Surgery.* 2004; 16(3): 160-165.  
doi: 10.1016/S0915-6992(04)80026-8