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RELATIONSHIP BETWEEN MANDIBULAR AMPLITUDE AND KINESIOPHOBIA IN PATIENTS WITH MAXILLOFACIAL FRACTURE: CASE REPORT

RELAÇÃO ENTRE AMPLITUDE MANDIBULAR E CINESIOFOBIA EM PACIENTES COM FRATURA BUCOMAXILOFACIAL: RELATO DE CASO

RELACIÓN ENTRE LA AMPLITUD MANDIBULAR Y LA KINESIOPHOBIA EN PACIENTES CON FRACTURA MAXILOFACIAL: REPORTE DE CASO

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ABSTRACT

Objective: To investigate the relationship between mandibular range of motion (ROM) and kinesiophobia in patients with maxillofacial fractures.

Methodology: Descriptive, observational study in the form of a case series report, conducted at the Núcleo de Atenção Médica Integrada from September to October 2022, approved by ethics committee protocol 5.641.381. The assessment included a form with sociodemographic data, fracture characteristics, and main complaints, followed by a physical examination in which pain was quantified using the VAS, sensitivity using microfilaments, and mandibular ROM—measured in mouth opening, protrusion, and right and left lateral deviation using a caliper. Kinesiophobia was assessed using the Tampa Scale for Kinesiophobia for TMD, and functional limitation using the Mandibular Function Impairment Questionnaire.

Results: Only one patient presented a mandibular fracture, while the others underwent orthognathic surgery. In the assessment, Case 1 showed: mouth opening 11 mm, RLD 1 mm, LLD 3 mm, protrusion 0 mm; Case 2: mouth opening 4 mm, RLD 0 mm, LLD 1 mm, protrusion 0 mm; Case 3: mouth opening 18 mm, RLD 4 mm, LLD 5 mm, protrusion 2 mm. All patients reported moderate pain, with the most frequent complaints being movement limitation, hypoesthesia, and edema. Cases 1 and 2 showed severe kinesiophobia, and Case 3 presented moderate kinesiophobia.

Conclusion: Patients with reduced mandibular movements exhibit increased kinesiophobia, along with edema and pain.

Keywords: Face. Fracture Healing. Mandibular Fractures. Kinesiophobia. Range oif Motion.

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RESUMO

Objetivo: Relacionar ADM mandibular e cinesiofobia em pacientes com fratura bucomaxilofacial.

Metodologia: Estudo descritivo, observacional do tipo relato de caso em série, no Núcleo de Atenção Médica Integrada, de setembro a outubro de 2022, parecer ético 5.641.381. Avaliação contou com ficha contendo dados sociodemográficos, características da fratura e principais queixas, seguida da avaliação física, onde a dor foi quantificada segundo a EVA, sensibilidade pelos microfilamentos e ADM mandibular nos movimentos de abertura, protrusão, desvio lateral esquerdo e direito utilizando o paquímetro. A cinesiofobia foi avaliada pela Escala Tampa de Cinesiofobia para DTM e limitação funcional pelo Mandibular Function Impairment Questionnaire.

Resultados: Apenas um dos pacientes apresentou fratura mandibular, enquanto os outros realizaram uma cirurgia ortognática. Na avaliação, o Caso 1 apresentou abertura: 11mm, DLD: 1mm, DLE: 3mm, protrusão: 0mm; Caso 2 abertura: 4mm, DLD: 0mm, DLE: 1mm, protrusão: 0mm; Caso 3, abertura: 18mm, DLD: 4mm, DLE: 5mm, protrusão: 2mm. A dor apresentou-se moderada em todos e as queixas mais frequentes foram limitação de movimento, hipoestesia e edema. Os casos 1 e 2 apresentaram grau grave de cinesiofobia e o caso 3 moderado.

Conclusão: Pacientes com redução dos movimentos mandibulares apresentam aumento da cinesiofobia, presença de edema e dor.

Palavras-chave: Face. Cicatrização de Fraturas. Fraturas de Mandíbula. Cinesiofobia. Amplitude de Movimento.

RESUMEN

Objetivo: Relacionar la amplitud de movimiento mandibular (ADM) y la kinesiofobia en pacientes con fractura bucomaxilofacial.

Metodología: Estudio descriptivo y observacional, tipo serie de casos, realizado en el Núcleo de Atención Médica Integrada, entre septiembre y octubre de 2022, con aprobación ética n.º 5.641.381. La evaluación incluyó un formulario con datos sociodemográficos, características de la fractura y principales quejas, seguido de la evaluación física, en la cual el dolor se cuantificó mediante la EVA, la sensibilidad con microfilamentos y la ADM mandibular en los movimientos de apertura, protrusión y desviación lateral derecha e izquierda, utilizando un calibrador. La kinesiofobia se evaluó mediante la Escala de Tampa de Kinesiofobia para DTM y la limitación funcional a través del Mandibular Function Impairment Questionnaire.

Resultados: Solo uno de los pacientes presentó fractura mandibular, mientras que los demás fueron sometidos a cirugía ortognática. En la evaluación, el Caso 1 presentó: apertura 11 mm, DLD 1 mm, DLI 3 mm, protrusión 0 mm; Caso 2: apertura 4 mm, DLD 0 mm, DLI 1 mm, protrusión 0 mm; Caso 3: apertura 18 mm, DLD 4 mm, DLI 5 mm, protrusión 2 mm. El dolor fue moderado en todos los casos, y las quejas más frecuentes fueron limitación del movimiento, hipoestesia y edema. Los Casos 1 y 2 presentaron un grado severo de kinesiofobia y el Caso 3 un grado moderado.

Conclusión: Los pacientes con reducción de los movimientos mandibulares presentan mayor kinesiofobia, además de edema y dolor.

Palabras clave: Cara. Consolidación de Fracturas. Fracturas de Mandíbula. Cinesiofobia. Amplitud de Movimiento.

1 INTRODUCTION

Maxillofacial fractures are a significant public health problem due to their high frequency in trauma centers, being one of the leading causes of morbidity and mortality worldwide. Studies indicate that young adult males, aged between 21 and 30 years, have the highest incidence of maxillofacial trauma, with traffic accidents and physical assaults being the most evident causal factors. According to the same study, the most affected area is the mandible due to its prominence, followed by the nasal bones (1,2).

Fractures of the middle facial region are commonly classified according to René Le Fort, who observed recurring fracture patterns and categorized them into Le Fort I, II, and III (3). Mandibular fractures are classified according to their location and can occur in the symphysis, horizontal ramus, angle, ramus, condyle, and coronoid process. One of the main consequences of these fractures can be malocclusion, leading to functional changes (4). This factor is classified according to Angle, who divides occlusions into three classes: Class I, normal occlusion; Class II, the lower molar is distal to the upper first molar; and Class III, the lower molar is mesial to the upper first molar (5).

Orthognathic surgery is a therapeutic option for correcting these malocclusion patterns, allowing the restoration of the patient's functionality (6,7). The craniofacial skeleton plays key roles such as speech, chewing, vision, smell, and breathing. The masticatory muscles are directly related to factors such as mandibular range of motion, dental occlusion, and bite force. Any alteration in these structures can lead to functional changes in the patient, as the skeletal muscles of the face can modify their morphology to meet specific demands (6,7,8).

Additionally, temporomandibular joint (TMJ) dysfunctions, osteoarthritis, tumor resections, and facial trauma also directly influence mandibular movement, load, and muscle activity modification, making the analysis of range of motion clinically relevant for the success of rehabilitation (9,10). Another important aspect is kinesiophobia, or the fear of movement, which is defined as an excessive, irrational, and debilitating fear of performing a movement in which the patient feels vulnerable to injury or relapse.

Developed from direct experience, such as trauma, or through observations and instructions, kinesiophobia can be linked to functional disability and quality of life, as it has the potential to alter how a person moves to avoid pain, which can affect their performance in actions related to pain control and identification (11). In a study conducted in 2020 by Brown et al., it was observed that kinesiophobia negatively impacts the patient’s performance in

achieving active range of motion. The same study demonstrated that for the patient to achieve good results, both physiotherapeutic and psychological interventions are necessary (12,13).

The observation of the increasing number of facial trauma cases and the importance of understanding the care of these patients motivated this study. This research is relevant as it will help us better understand the functional implications of facial trauma and the importance of quantifying kinesiophobia for better therapeutic outcomes. The aim of this study is to relate mandibular range of motion and kinesiophobia in patients who have suffered maxillofacial fractures, by quantifying mandibular range of motion and its impacts on patients' functionality.

2 METHODOLOGY

A descriptive, observational study in the form of a case series report was conducted at the *Núcleo de Atenção Médica Integrada* (NAMI) between September and October 2022. The research project was approved by the Ethics Committee of the University of Fortaleza and by *Plataforma Brasil*, resulting in ethical approval number 5.641.381. Participants aged between 18 and 60 years, of both sexes, who underwent surgery for the correction of maxillofacial fractures were included. Exclusion criteria were patients with more than 15 days postoperatively, those who presented any central or peripheral neurological disorder, or those who had used analgesic medication within 24 hours prior to the assessment.

Data collection from the participants occurred immediately after reading and signing the Informed Consent Form. Subsequently, the assessment was initiated, consisting of a form containing sociodemographic data, physical evaluation, application of the kinesiophobia scale, and the mandibular functionality questionnaire, with an average duration of 45 minutes. Initially, the participants completed a form developed by the researchers, which included socio demographic data, fracture characteristics, and the main complaints. Subsequently, the physical evaluation was performed, with pain quantified using the Visual Analog Scale (VAS), sensitivity assessed using monofilaments, and analysis of mandibular range of motion using a caliper, considering the movements of active mouth opening, protrusion, and right and left lateral deviations.

After that, the participants were administered the Tampa Scale for Kinesiophobia for Temporomandibular Disorders (TSK/TMD), an adapted version of the Tampa Scale for Kinesiophobia (TSK), a questionnaire developed to assess kinesiophobia in patients with musculoskeletal pain. In the TSK/TMD, some terms were adapted, providing specificity to the questionnaire. It consists of 18 items with four response options, with scores ranging from 1

to 4. To obtain the final score, the item scores are summed, resulting in a total score ranging from 18 to 72, in which higher scores indicate a greater degree of kinesiophobia (12).

Additionally, the Mandibular Function Impairment Questionnaire (MFIQ) was applied, which assesses mandibular functional limitation, classifying it as mild, moderate, or severe. The questionnaire consists of 17 questions with five response options, scored from 0 to 4. The result is obtained through an equation that generates a coefficient, which is compared with predefined intervals to determine the degree of the patient's functional limitation—where lower results indicate less functional limitation, and higher results indicate more severe limitation.

3 CASE SERIES OF CLINICAL REPORTS

Case 1

A 28-year-old female patient, a street vendor, sought physiotherapeutic care after suffering an accident in which she slipped and fell from a height of 10 meters while attempting to take a photograph from the top of a waterfall. During the fall, the patient sustained multiple injuries, including an open tibial fracture, acromioclavicular joint dislocation, and a comminuted fracture in the mandibular symphysis region with avulsion of tooth 31. Three days after undergoing surgery for correction of the mandibular fracture, the patient began the assessments.

During the physical evaluation, the patient presented active mouth opening of 11 mm, right lateral deviation (RLD) of 1 mm, left lateral deviation (LLD) of 3 mm, and 0 mm of protrusion (Table 1), with moderate pain (VAS score of 5). The main complaints reported were hypoesthesia and the presence of edema. The TSK/TMD score was 52, indicating severe kinesiophobia, and the MFIQ indicated a severe degree of functional impairment.

Case 2

A 32-year-old female patient, a security guard, with a history of bruxism, sought physiotherapeutic care after temporomandibular joint locking that led to reduced mandibular range of motion, and for preoperative management prior to orthognathic surgery aimed at functional improvement; the patient was classified as Class II. During surgery, maxillary, mandibular, and mentonian osteotomies were performed. In addition to orthognathic surgery, bichectomy and cervicofacial liposuction were also performed.

After the surgical interventions, the patient began the assessments. During the physical evaluation, the patient presented active mouth opening of 4 mm, RLD of 0 mm, LLD

of 1 mm, and 0 mm of protrusion (Table 1), with moderate pain (VAS score of 4). The main complaints reported were hypoesthesia and limitation of movement. The TSK/TMD score was 51, indicating severe kinesiophobia, and the MFIQ indicated a severe degree of functional impairment.

Case 3

A 23-year-old male patient, a student, sought physiotherapeutic care after undergoing orthognathic surgery due to respiratory and aesthetic complaints; the patient was classified as Class II. During surgery, maxillary and mandibular osteotomies and a mentonian osteotomy were performed. In addition to orthognathic surgery, bichectomy and cervicofacial liposuction were also performed.

During the physical evaluation, the patient presented active mouth opening of 18 mm, RLD of 4 mm, LLD of 5 mm, and 2 mm of protrusion (Table 1), with moderate pain (VAS score of 6). The main complaints reported were pain, limitation of movement, edema, and paresthesia. The TSK/TMD score was 44, indicating moderate kinesiophobia, and the MFIQ indicated a severe degree of functional impairment.

Table 1

Mandibular Range of Motion

Cases	Active Mouth Opening (mm)	RLD (mm)	LLD (mm)	Protrusion (mm)
Case 1	11	1	3	0
Case 2	4	0	1	0
Case 3	18	4	5	2

Source: Research data. Note: mm= millimeters.

4 DISCUSSION

This study demonstrated that the main motivation for undergoing fracture correction surgery was functional and aesthetic improvement. During the physical assessment, all patients presented limitations in range of motion, reporting moderate pain, edema, and altered sensitivity. Regarding kinesiophobia, participants presented moderate to severe levels, possibly indicating a relationship between limited range of motion and fear of mandibular movements. Concerning the motivations for undergoing orthognathic surgery,

functional and aesthetic-functional complaints were reported, corroborating the study by Ambrizzi et al., which indicated that the primary motivation for undergoing orthognathic surgery is aesthetic concerns, followed by aesthetic-functional complaints and, lastly, purely functional complaints, including difficulties in mastication, breathing, pain, and speech alterations.

Factors such as bite force and muscle activity tend to improve after surgery; however, all malocclusion groups tend to present some degree of temporomandibular joint (TMJ) hypomobility in the postoperative period (16). The reduction in mandibular range of motion may result from the type of fixation used during the surgical procedure, combined with postoperative edema and pain, which is consistent with the findings of this study (17). Although all patients presented moderate VAS scores, the patient in Case 3 reported a VAS score of 6, the highest value observed, reporting edema as a complaint while presenting the greatest range of motion among the described cases. Conversely, the patient in Case 2 reported a VAS score of 4, the lowest among the cases, did not report edema, and presented extremely reduced range of motion.

However, pain is a complex and subjective process, which may impact the accuracy of the findings (18). Regarding the consequences of maxillofacial fracture correction surgeries, studies indicate that sensory alteration is a common complication in these patients, which is consistent with the findings of this research, as all patients reported some type of sensory alteration. These injuries generally affect the area of the inferior alveolar nerve, including the chin, lower lip, and gingival mucosa, leading to slow recovery of up to one year and potentially resulting in complete and permanent paresthesia (19). As presented in the case reports, both patients who underwent orthognathic surgery were classified as Class II and underwent the same procedures. However, the observed ranges of motion were markedly divergent, particularly in active mouth opening, in which Case 2 presented 4 mm and Case 3 presented 18 mm.

This result may be explained by the patients' clinical history, different motivations for surgery, and different degrees of kinesiophobia—being severe in Case 2 and moderate in Case 3, according to the TSK/TMD scale. In this context, it is known that a previous injury, as observed in Cases 1 and 2, may significantly impact the patient's psychological state. Patients may perceive pain as non-threatening and perform their activities normally, or they may catastrophize pain, developing kinesiophobia and movement hypervigilance, which tends to increase rehabilitation time (21,22).

Mandibular fractures are more likely to reduce mandibular range of motion, with fractures in the posterior region having a greater impact than anterior fractures (23). According to the same study, and considering Case 1, in which the fracture occurred in the mandibular symphysis region, the patient tends to present a more functional range of motion in the postoperative period and not maintain a malocclusion pattern during this time. With regard to mandibular functionality, the severity observed may be justified by the postoperative phase in which the patients were, characterized by significant edema and pain.

Another important aspect is masticatory function, which tends to be altered after maxillofacial fracture correction surgeries, varying according to the phase and type of postoperative treatment (24,25). Finally, some limitations of this study should be acknowledged. The first is the small number of participants, which limits the generalizability of the results. In addition, the absence of data such as a history of psychological treatment and variables related to psychosocial aspects may have influenced questionnaire scores. These findings suggest the need for a biopsychosocial approach for the appropriate rehabilitation of these patients.

5 CONCLUSION

Postoperative patients with maxillofacial trauma who present reduced mandibular range of motion tend to exhibit higher levels of kinesiophobia, in addition to the presence of edema and moderate pain. These findings reinforce the importance of an integrated assessment of functional and psychosocial aspects during the rehabilitation process.

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