



TME ANKİLOZUNUN MASSETER VE TEMPORAL KASLARIN ELEKTROMYOGRAFİK AKTİVİTELERİ İLE YÜZ VE ALT ÇENE BÜYÜMESİNE ETKİLERİ: BİR VAKA RAPORU

EFFECTS OF TMJ ANKYLOSIS ON ELECTROMYOGRAPHIC ACTIVITY OF MASSETER AND TEMPORAL MUSCLES AND FACIAL AND MANDIBULAR GROWTH: A CASE REPORT

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ABSTRACT

Purpose: The purpose of this study is to report electromyographic, clinical and radiological features of an adult female patient having bilateral complete TMJ ankylosis that occurred her childhood.

Material and Methods: A 42-year old female patient was diagnosed with bilateral complete TMJ ankylosis. According to anamnestic data, TMJ was injured by a trauma when she was 5 years old.

Results: Clinical and radiological examinations showed that the patient had hypoplastic mandible and convex profile, facial asymmetry, 0 mm of mouth opening, poor oral hygiene, complete absence of all anterior and right posterior teeth, and a huge bone block in both TMJ area and ankylosis of both TMJs. In addition to these findings, electromyographic activities of masticatory muscles affected from TMJ ankylosis.

Conclusion: The findings of the present case report showed that bilateral TMJ ankylosis has potential negative effects on facial and mandibular growth and motor outputs (EMG values) of masticatory muscles.

Key Words: Trauma, TMJ ankylosis, Electromyography, Facial growth

ÖZET

Amaç: Bu çalışmanın amacı, çocukluk döneminde gelişen bilateral komple TME ankilozlu bir erişkin bayan hastanın elektromyografik, klinik ve radyolojik özelliklerinin rapor edilmesidir.

Gereç ve Yöntem: 42 yaşındaki bayan bir hasta çift taraflı TME ankilozu tanısı koyulmuştur. Anamnestic verilere göre, hasta 5 yaşında iken bir travma geçirmiş ve bu travmada TME zarar görmüştür.

Bulgular: Klinik ve radyolojik incelemeler hastada hipoplazik mandibula ve konveks profil, yüz asimetrisi, ağız açamama, düşük ağız hijyeni, ön ve sağ posterior dişlerin tümünün yokluğu ve TME bölgesinin bir kalın kemik kitle ve buna bağlı bilateralde komple ankilozun varlığını göstermiştir. Bu bulgulara ek olarak, hastanın çiğneme kaslarındaki elektromyografik aktivitenin ankilozdan etkilenmiştir.

Sonuç: Bu vaka raporunun sonuçları bilateral TME ankilozunun alt çene ve yüz büyümesi ile çiğneme kaslarının motor güçlerini etkilediğini göstermektedir.

Anahtar Kelimeler: Travma, TME ankilozu, Elektromyografi, Yüz büyümesi

INTRODUCTION

Temporomandibular joint (TMJ) ankylosis is an extremely disabling condition that causes problems in oral hygiene, mastication, digestion, speech, facial and mandibular growth and psychology of the patient.

Ankylosis of TMJ can be classified according to the location of problem (intra or extra-articular); type of the tissue involved (osseous, fibrous and fibro-osseous) and the extension of fusion (complete or incomplete).¹⁻⁴

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The main causes of TMJ ankylosis are the trauma and local-systemic infections.^{3,5-9} In addition, systemic diseases or neoplasms are associated with ankylosis.^{2,5,9} It is hypothesized that trauma which most important factor causes TMJ ankylosis, often results in intra-articular hematoma, along with scarring and formation of excessive bone, and leads to hypomobility and ankylosis.^{9,10} However, Oztan et al⁶ found no signs of ankylosis when they created intra-articular hematoma in guinea pigs.

TMJ ankylosis precludes or extensively restrains the range of mandibular motion. The severity of TMJ ankylosis is determined by the amount of interincisal opening. Less than 5 mm of interincisal opening indicates a complete ankylosis.^{5,11} When it occurs before facial growth is completed, it causes micrognathie, especially if the TMJ is affected bilaterally.

It was suggested by some authors that clinical electromyographic studies are an important aid in diagnosis and the treatment of craniomandibular disorders.¹² According to best of our knowledge, clinical and radiological features of TMJ ankylosis were investigated in literature.^{2,3,10,13,14} No study performed to assess electromyographic outputs of masticatory muscles in patients having TMJ ankylosis.

Because of advised surgical treatment was rejected by the patient, the aim of this study was only to present diagnostic clinical, radiographic and electromyographic findings of a female patient having bilateral complete TMJ ankylosis.

CASE REPORT

A 42-year old female patient was diagnosed with bilateral complete TMJ ankylosis. According to anamnestic data, TMJ was injured by a trauma when she was 5 years old.

Clinical Findings (Figure 1,2 and 3):

1. Hypoplastic mandible and convex profile,
2. Facial asymmetry,
3. 0 mm of mouth opening,
4. Poor oral hygiene,
5. Complete absence of all anterior and right posterior teeth.

Panoramic Film Findings:

Panoramic radiograph was taken for confirmation of clinical diagnosis and for outlining of

osseous mass. A huge bone block in both TMJ area and ankylosis of both TMJs were seen in Orthopantomograph (Figure 4). All teeth were lost except the left posterior teeth. In addition, abnormally enlarged antegonial notching was present in both sides.



Figure 1. Extra-oral photographs of the case from front.



Figure 2. Extra-oral photographs of the case from profile.



Figure 3. Intra-oral photograph of the case.



Figure 4. Panoramic film of the case.

Electromyographic Findings:

All electromyographic records were taken and analyzed by using MP 100 Data Acquisition and Analysis System (Biopac System, Inc, 42 Aero Camino, Galeta, CA 93117, USA). Data were stored in a computer as RAW EMG. All stored records were full-wave rectified and integrated (Figure 5 and 6). Electromyographic values at maximal bite and postural position of masseter (MM) and anterior (AT) and median (MT) temporal muscles are shown in Table 1.

According to Table 1, electromyographic values of all muscles at rest position are nearly the same. MM showed less electromyographic activity than both AT and MT at clenching. In addition, EMG values of right side are greater than those left side in all muscles at clenching.

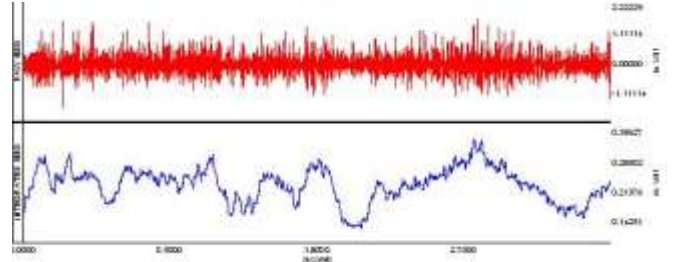


Figure 5. Electromyography of left median temporal muscle at clenching.

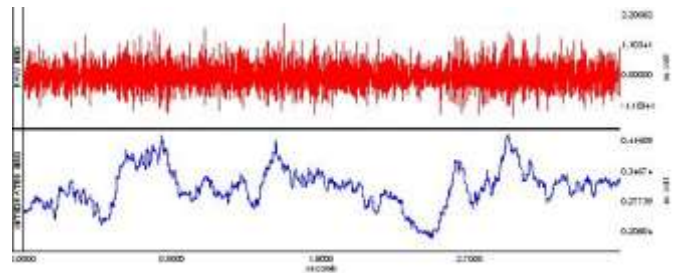


Figure 6. Electromyography of right median temporal muscle at clenching.

Table 1: Means of mean EMG values (μ V) at rest position and maximal EMG values (μ V) at clenching of each muscle.

Muscle	Rest Position	Clenching
Right Masseter	13,2	152,4
Left Masseter	11,9	67,5
Right Anterior Temporalis	14	282,6
Left Anterior Temporalis	13,4	227,4
Right Median Temporalis	11,4	424,4
Left Median Temporalis	16	344

μ V: Micro Volt

DISCUSSION

It is commonly accepted that the main causes of TMJ ankylosis are well known trauma and local-systemic infections.^{3,6,8,9,13} If the cause is trauma, it is hypothesized that intra-articular hematoma finally organizes and ossifies and this leads to hypomobility and ankylosis.⁵

Trauma not only results in TMJ ankylosis, but also may have devastating effects on the future growth and development of the jaws and teeth when

it occurs in a child. Therefore, treatment should be initiated as soon as the condition is recognized, with the main objective of re-establishing joint function and harmonious jaw function.¹ If the patient was left untreated, bird-face deformity was reported secondary to bilateral ankylosis.^{14,15} These problems may result in functional and esthetic disorders as well as causing difficulties related with nutrition and oral hygiene. Thus, severely convex facial profile, impaired oral functions, poor oral hygiene and difficulty in eating are foreseeable results of TMJ ankylosis. It was also stated that M. digastricus and M. mylohyoideus produce a marked notching in the lower border of the mandible in front of the insertion of the M. massetericus and M. pterygoideus medialis.¹⁶

Recording of EMG outputs of masticatory muscles by surface electrodes is a non-invasive method when compared with wire electrodes. Thus, we preferred surface electrodes for patient comfort. Because electromyographic records may be affected by changing head position, electromyographic data were recorded at natural head position.¹⁷ It was observed from the records that there were little differences among electromyographic outputs of investigated muscles at rest position. Corresponding author of present study, Kiliç,¹⁸ investigated EMG activities in a sample subjects having no temporomandibular joint disorders or symptoms using same EMG acquisition and analyzing system. This author found that average integrated EMG values of the investigated muscles ranges between 11-16 µV at rest position. Thus, postural integrated electromyographic values of the case are approximately same with findings of Kiliç.¹⁸ Similar integrated EMG values at rest position were shown by some authors in normal adult individuals.¹⁹ Conventionally, it has been thought that the resting EMG values of contracture patients remain within a normal range.²⁰

Comparing the present study with the report of Kiliç,¹⁹ it seems that maximal biting activity of MM was affected negatively by ankylosis, but this negative effect was significantly less on temporal muscle. The reduced electromyographic activity in masticatory muscles of the case may result from impaired oral functions.²¹ In addition, degenerative changes in muscle fibers can influence the electromyographic activity negatively. Since, El-lebban et al²² reported that masticatory muscle fibers degenerated in patients

with restricted mouth opening and TMJ ankylosis. It was also showed that amiantoid fibers accumulation occurs in masticatory muscles when TMJ ankylosis occurs.²³

Another EMG features of the case that all muscles on the right side at clenching have significantly higher EMG values than those on the left side. There is no periodontal mechanoreceptor on the right side, because patient has lost the teeth on this side. Thus, absence of these mechanoreceptors on this side may account for reduced electromyographic activity. Some authors^{24,25} reported that these mechanoreceptors have an important effect on electromyographic values. According to McNamara,²⁴ sensory impulses from the periodontal receptors travel through the mesencephalic tract of the trigeminal nerve to sub-cortical or cortical levels where together with stimuli from articular, muscular and other receptors, and these sensory impulses can influence the motor output to the masticatory muscles.

Although patient was referred to a maxillofacial surgeon for surgical and rehabilitation treatments, patient did not accepted any treatment.

Present study is a pioneer paper assessing effects of TMJ ankylosis on electromyographic activity of masticatory muscles. The findings of the present case report revealed that bilateral TMJ ankylosis has potential negative effects on facial and mandibular growth and motor outputs (EMG values) of masticatory muscles. Electromyographic findings support the concept that the neuromuscular system is altered in patients with craniomandibular disorders.²⁶

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