

## Original

# Experimental and clinical study of the influence of premature contact on masseteric activities

Hiroyuki MIURA, Emiko INOMATA, Mitsuro FURUMACHI,  
Masaru ISHIGAME, Minoru YAGI, and Fujiro ISHIKAWA

Department of Orthodontics, School of Dentistry, Iwate Medical University

(Chief : Prof. Fujiro ISHIKAWA)

[Received : September 16, 1997 ; Accepted : November 14, 1997]

**Abstract** : It is generally acknowledged that premature contact causes occlusal trauma and temporomandibular joint dysfunction. However, there are numerous points yet to be clarified concerning the changes premature contact would initiate in regards to the activities of the masticatory muscles.

In the present study, we, with the assistance of electromyography, detected masseteric excitation (periodontal-masseteric reflex) which is induced by pressure stimulation applied to the periodontal membrane in dogs and human beings. Through the detection we clarified the influence of premature contact upon the masseter. We also discussed changes in the masseteric functions following the elimination of premature contact.

The results show that information generated from the periodontal membrane by premature contact will influence masseteric excitement and that this reflex will be formed and eliminated at a relatively early stage. Our findings also indicate that the information produced by pressure stimulation upon the periodontal membrane has the possibility of not only influencing the excitation of the masticatory muscles but also influencing mandibular movement.

**Key words** : premature contact, periodontal-masseteric reflex, masseter, electromyogram

## Introduction

Abnormal mandibular movement due to premature contact is considered to be one of the causes of abnormal occlusion (malocclusion) and temporomandibular joint (TMJ) dysfunction. Conventional tools employed to examine premature contact are

articulating paper, bite-registration wax and adjustable articulator. There have been reports about methods utilizing a 'myomonitor'<sup>1)</sup> and occlusal sound<sup>2)</sup>. Although all these tools or methods may be effective in the detection of premature contact or the identification of the teeth involved, they do not assist in an analysis of

---

Experimental and clinical study of the influence of premature contact on masseteric activities.  
Hiroyuki MIURA, Emiko INOMATA, Mitsuro FURUMACHI, Masaru ISHIGAME, Minoru YAGI, and  
Fujiro ISHIKAWA  
(Department of Orthodontics, School of Dentistry, Iwate Medical University, 1-3-27 Chuodori,  
Morioka, 020, Japan)

岩手県盛岡市中央通 1 丁目 3-27 (〒020)

*Dent. J. Iwate Med. Univ.* 22 : 187 - 196, 1997

the influence of premature contact upon mandibular movement nor provide a clear picture of myofunctional changes following the elimination of premature contact.

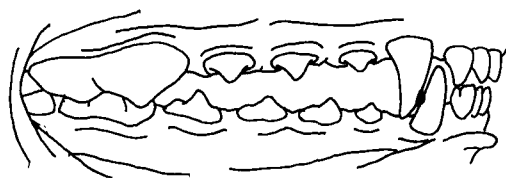
One of the two aims of this study is to clarify the influence of premature contact upon the masseter by the detection of masseteric excitation induced by pressure stimulus applied on the periodontal membrane employing an electromyography method. And the other is to discuss functional changes, particularly changes in the masseteric function, after premature contact has been cured.

### Materials and methods

#### 1. Influence of premature contact as seen in the masseteric electromyograms of dogs

For one segment of the experiment, we used two dogs (Dog 1 and Dog 2), both about 1 year old, and attached a 1 mm high artificial premature contact device, made of the adhesive resin (Orthomite Super-Bond supplied by Sun Medical Co., LTD.), to the mesial surface of the upper right canine tooth of each dog (Fig. 1). To examine the influence on the periodontal-masseteric reflex induced by premature contact, electromyograms were taken from the right-hand-side masseter using a bipolar induction method with 80-micron-diameter stainless steel needle electrodes for electroencephalography, placed 5 mm apart from each other, and amplified signals therefrom by the use of a bio-amplifier with a 0.03 second time constant (Model AB601GS manufactured by Nihon Kohden Corp.).

As a pressure stimulus on the canine tooth, a load of 1 kg was applied on the tooth by pressing a load cell (LM-1 KA supplied by Kyowa Electronic Instruments Co., LTD.)



**Fig. 1.** Schematic view of the premature contact device which has been attached on each dog's upper right canine is showed with an arrow.

directly onto the tooth. Signals from the load cell were transformed with a strain amplifier (DPM-711B manufactured by Kyowa Electronic Instruments Co., LTD.) into strain curves. The stimulus was applied in the vicinity of the rest position of mandible with the mouth open in labiolingual and perpendicular directions against the coronal axis of tooth. Then, using a data recorder (FC-14 manufactured by Sonymagnescale Corp.), the masseteric electromyograms and strain curves were simultaneously recorded, the latter obtained by transforming signals from a load cell with a strain amplifier. These data were analyzed using an FFT analyzer (VC-2400 manufactured by Hitachi Denshi, LTD.).

Data were gathered from the two subject dogs once prior to the attachment of the premature contact device, then, 3 hours (1/8 day) and 6 hours (1/4 day) after it was attached, and thereafter everyday from the first to 7th days. Data were also taken 3 hours (1/8 day) and 6 hours (1/4 day) after the device was removed, i.e., the premature contact was eliminated, and thereafter everyday from the first to 7th days. The stimulus and electromyography procedures were performed with the dogs fixed on experimental tables without anesthesia.

## 2. Influence of premature contact as seen in masseteric electromyograms of human beings

To generate the electromyograms, signals from the masseter were taken using 4 mm-diameter silver-surfaced silver-chloride electrodes<sup>3)</sup> placed 10mm apart from each other at the center of the muscles on both sides, rectangularly against the run of the muscles, and the signals were then amplified with a bio-amplifier with a 0.03 second time constant (Model AB601GS manufactured by Nihon Kohden Corp.). We applied a pressure stimulus by pressing a load cell (LM-1 KA supplied by Kyowa Electronic Instruments Co., LTD.) directly onto the tooth. Signals from the load cell were transformed with a strain amplifier (DPM-711B manufactured by Kyowa Electronic Instruments Co., LTD.) into strain curves which, together with the masseteric electromyograms, were recorded on a data recorder (KS-616W manufactured by Sonymagnescale Corp.). These data were analyzed with an FFT analyzer (VC-2400 manufactured by Hitachi Denshi, LTD.).

Similar tests were performed on a male and a female human beings. Subject A was a 28-year-old man who had no premature contact symptom and no particular abnormality affecting about his dentition, occlusion or TMJ. An artificial premature contact device, made of the adhesive resin and approximately 0.5mm high, was attached to the distolinguo-occlusal bevel of the right first molar of his upper jaw<sup>4)</sup>. A pressure stimulus of about 700g was applied on the molar in the buccal and lingual directions, with the rest position of mandible and the mouth open. This was done before the device was attached, on the first day after it was attached and thereafter

everyday on the 3rd to 5th days. Data therefrom were recorded together with electromyograms. The device was removed thus eliminating premature contact on the 5th day and pressure stimulus and electromyographic data were taken immediately after and on the first and second days following removal.

Subject B was a 30-year-old woman with premature contact on the right first molar of her upper jaw. She reported having felt something slightly unusual with her right TMJ but had not contacted a doctor in connection with this condition.

A 700g pressure stimulus was applied on the molar both in the buccal and lingual directions and recorded data therefrom together with electromyograms. Her occlusion was adjusted and data of electromyograms generated by pressure stimuli applied to her was collected immediately after the occlusal adjustment and on the first to 3rd days following.

## Results

### 1. Influence of premature contact as seen in the masseteric electromyograms of dogs

The dogs (Dog 1 and Dog 2) recorded somewhat reduced weight after the premature contact device was attached to them during the test period. Their weight, however, returned to normal levels by the 7th day (Table 1).

In appraising electromyograms under pressure stimulus, representation was made using a double plus (++) when myoelectric discharge with a potential of 40 $\mu$ V or over was observed; a single plus (+) when 20 to 40  $\mu$ V, a plus/minus (+/-) when less than 20  $\mu$ V, and a minus (-) when no discharge was observed.

**Table 1.** Changes of dog's body weight during experimental period (kg).

Dogs	Before	After (days)							Removal (days)				
		1	2	3	4	5	6	7	1	2	3	4	5
Dog 1	11.0	10.5	10.5	10.0	10.0	10.5	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Dog 2	10.5	10.0	9.5	9.5	10.0	10.0	10.5	10.5	10.5	10.5	10.5	10.5	10.5

Before : no premature contact

After : after attachment of premature contact device

Removal : after removal of premature contact device

**Table 2.** The evaluation of masseteric electromyograms in Dog 1 and Dog 2 with the attachment of the premature contact device.

Dogs	Sites	Before	After (days)									
			1/8	1/4	1	2	3	4	5	6	7	
Dog 1	Labial	—	±	+	+	+	+	+	±	—	—	—
	Lingual	—	—	—	+	+	+	±	—	—	—	—
	Axis	—	—	—	—	—	—	—	—	—	—	—
Dog 2	Labial	—	+	+	+	+	+	±	—	—	—	—
	Lingual	—	—	±	+	+	±	—	—	—	—	—
	Axis	—	—	—	—	—	—	—	—	—	—	—

Dogs	Sites	Removal (days)									
		1/8	1/4	1	2	3	4	5	6	7	
Dog 1	Labial	+	+	+	+	+	±	—	—	—	—
	Lingual	—	—	—	—	—	—	—	—	—	—
	Axis	—	—	—	—	—	—	—	—	—	—
Dog 2	Labial	+	+	+	+	±	—	—	—	—	—
	Lingual	—	—	—	—	—	—	—	—	—	—
	Axis	—	—	—	—	—	—	—	—	—	—

Before : no premature contact

After : after attachment of premature contact device

Removal : after removal of premature contact device

++ : 40 $\mu$ V or over, + : 20 to 40 $\mu$ V, +/- : less than 20 $\mu$ V, — : no discharge was observed.

For Dog 1 and Dog 2, myoelectric discharge, which was responsive to a pressure stimulus from the labiolingual side, was observed in their masseter immediately after a premature contact device was attached to them. On the first day following that, discharge marking a potential of 40 $\mu$ V or over was observed. However, this myoelectric discharge was induced by a pressure stimulus on the periodontal

membrane disappeared in 3 to 4 days following the attachment of the contact device. It was unrecognizable 2 to 3 days after the removal of the device. A similar tendency was observed regarding lingual-direction stimuli, although the stimuli previously described demonstrated a greater weakness than that in connection with labial-direction stimuli. No discharge was observed with a perpendicular stimulus

**Table 3.** The evaluation of masseteric electromyograms in subject A.

## Right side masseter

	Sites	Before	After (days)				Removal (days)		
			1	3	4	5	Just	1	2
6]	Buccal	—	±	±	+	—	±	+	—
	Lingual	+	+	±	+	—	+	—	—

	Sites	Before	After (days)				Removal (days)		
			1	3	4	5	Just	1	2
6]	Buccal	—	±	+	±	—	±	—	—
	Lingual	+	+	+	+	+	+	+	+

## Left side masseter

	Sites	Before	After (days)				Removal (days)		
			1	3	4	5	Just	1	2
6]	Buccal	—	+	+	±	—	+	±	—
	Lingual	+	+	+	+	+	+	+	+

	Sites	Before	After (days)				Removal (days)		
			1	3	4	5	Just	1	2
6]	Buccal	—	—	±	—	—	±	—	—
	Lingual	+	+	+	+	+	+	+	+

Before : no premature contact      After : after attachment of premature contact device

Removal : after removal of premature contact device

++ : 40 $\mu$ V or over, + : 20 to 40 $\mu$ V, +/- : less than 20 $\mu$ V, — : no discharge was observed.

(Table 2).

Tooth migration or remarkable tooth instability as a possible result of the premature contact device during the experiment was absent. The devices were worn off to about a half their original height when they were removed.

2. Influence of premature contact as seen in masseteric electromyograms of human beings

Myoelectric discharge was appraised in Subjects A and B with pressure stimuli applied on them in a fashion similar to that in the animal test (Tables 3 and 4).

Subject A :

In regard to Subject A, who normally had no premature contact, we observed a 20 to 40

$\mu$ V potential discharge from his masseter on both sides when his upper right molar was stimulated on its lingual side. A buccal-side stimulus caused no discharge from his masseter.

One day following the point when an adhesive resin premature contact device was attached to the distolingual cusp of his upper right first molar, myoelectric discharges of not less than 40 $\mu$ V and 20 to 40  $\mu$ V were observed in his right masseter and left masseter, respectively, in response to a stimulus applied to the molar from its buccal side. Similar reactions were also observed on the 3rd day.

When we applied a stimulus on the same molar of Subject A from its lingual side, a 20

**Table 4.** The evaluation of masseteric electromyograms in subject B.

## Right side masseter

	Sites	Still	Adjustment (days)			
			Just	1	2	3
6]	Buccal	+	+	+	—	—
	Lingual	+	+	±	—	—

	Sites	Still	Adjustment (days)			
			Just	1	2	3
6]	Buccal	+	+	+	+	+
	Lingual	+	+	+	+	+

## Left side masseter

	Sites	Still	Adjustment (days)			
			Just	1	2	3
6]	Buccal	+	+	±	—	—
	Lingual	+	+	+	+	+

	Sites	Still	Adjustment (days)			
			Just	1	2	3
6]	Buccal	±	±	±	—	—
	Lingual	+	+	+	+	+

Still : subject B still has premature contact

Just : just the occlusal adjustment

Adjustment : after the occlusal adjustment

++ : 40 $\mu$ V or over, + : 20 to 40 $\mu$ V, +/- : less than 20 $\mu$ V, — : no discharge was observed.

to 40 $\mu$ V myoelectric discharge was observed in both sides of his masseter. 40 $\mu$ V or over discharge was observed on the 3rd day in the right masseter of Subject A. With stimuli applied on his upper left first molar from its buccal and lingual sides, myoelectric discharges of 20 to 40 $\mu$ V and less than 20 $\mu$ V, respectively, were observed in both sides of his masseter.

The reaction to a buccal-side stimulus on Subject A's right first molar disappeared on the 5th day following the installation of the device on the tooth. The device was removed to eliminate premature contact, and electromyograms were taken which showed no less than 40 $\mu$ V discharge from his right masseter and 20 to 40 $\mu$ V discharge

from his left masseter when his upper right first molar was stimulated from its buccal side immediately after premature contact was eliminated. The reaction of the right masseter was reduced to a discharge of 20 to 40 $\mu$ V on the day after premature contact elimination. It disappeared the following day.

A lingual-side stimulus applied on Subject A's upper right first molar soon after the elimination of premature contact caused a 20 to 40 $\mu$ V discharge from his right masseter. This reaction, however, disappeared on the following day of contact elimination.

Reactions to pressure stimuli on the upper left first molar disappeared earlier than those to stimuli on the upper right first

molar.

In terms of clinical symptoms after device installation, Subject A felt stiffness in his right masseter on the first day following installation, but this condition did not become serious. The stiffness disappeared a few days after the termination of premature contact. No particular abnormality was found with his TMJ or any other masticatory muscles.

Subject B :

In response to a stimulus applied on her upper right first molar which had premature contact from its buccal side, a  $40\mu\text{V}$  or over myoelectric discharge was observed in her right masseter and a 20 to  $40\mu\text{V}$  discharge in her left masseter. In response to a lingual-side stimulus to the same tooth, her masseter on both sides discharged a potential of 20 to  $40\mu\text{V}$ .

Upon stimulating her upper left first molar from the buccal and lingual sides separately, a 20 to  $40\mu\text{V}$  discharge was observed in her right masseter while in her left masseter 20 to  $40\mu\text{V}$  and  $20\mu\text{V}$  or under discharges occurred in response to stimuli applied on the tooth's lingual and buccal sides, respectively. All reactions to pressure stimuli disappeared on the 2nd day after the elimination of premature contact by occlusal adjustment.

Clinically, the previously reported unusual feeling in her TMJ disappeared on the following day of occlusal adjustment.

### Discussion

We conducted an examination of the reflex of the masseter to pressure stimuli applied on the periodontal membrane by analyzing electromyograms which recorded masseteric excitation induced by such

stimuli in a series of tests using dogs and human beings with an artificial premature contact device attached to a tooth.

Concerning the dogs with a contact device attached to the upper right canine and Subject A with such a device installed on his upper right first molar, a strong reaction was observed in their right masseter, on the same side as the tooth which was stimulated, during the periods immediately after the device was mounted and soon after it was removed, i. e., premature contact was eliminated.

Concerning Subject B who had already had premature contact on her upper right first molar, her masseter on both sides reacted to stimuli applied on her upper first molars on both sides. Her right masseter reacted particularly sharply to a stimulus on her upper right first molar which experienced premature contact.

These findings demonstrate that information sent from the periodontal membrane of a prematurely contacting tooth induces masseteric excitation. It has also been found that the formation and elimination of such reflexes from the periodontal membrane occurs relatively early as seen in the case of artificial bite raising<sup>5)</sup> or in reports on electromyographic study of the influence of occlusal interference<sup>4, 6-10)</sup>.

Meanwhile, a pressure stimulus on the upper left first molar, which had no premature contact, caused a reaction, strong or weak, from the masseter of both sides. This is perhaps an indication that the mandibular movement is so controlled that the upper right first molar will avoid premature contact and that, consequently, the upper left first molar is made to change

its occluding/contacting relations allowing a pressure stimulus on it to cause a reaction similar to that of the upper right first molar which actually experienced premature contact.

Concerning the tested dogs, no reaction to vertical pressure stimuli was observed. As for Subjects A and B, the masseter of both sides reacted to a pressure stimulus from the buccal side despite the presence or absence of premature contact. Reactions to stimuli on their first molars with premature contact were found to be different from each other. The variation of reactions is perhaps because the sensor mechanism of the periodontal membrane will possess a sort of directivity to specific stimuli, in addition to anatomical differences between the stomatognathic systems of canines and human beings.

It has been reported by researchers investigating the reflective control of signals sent from the periodontal membrane to the masticatory muscles that a mechanical stimulus on a tooth causes either an excitatory or inhibitory reflex to the occlusal muscles depending on stimulus vectors and pre-stimulation muscular activities<sup>11-16)</sup>.

According to Okabe's report<sup>17)</sup>, the periodontal receptors were distributed most densely on the distal surface of the periodontal ligament in the dog's canine tooth. Tabata and Karita<sup>18)</sup> have also reported that the periodontal mechanoreceptors of the cat's canine tooth may distribute predominantly on the distal surface of the ligament.

Yamamura, et al.<sup>19)</sup> and Inai et al.<sup>20)</sup> have reported from their study of the relationships between stimulated portions and stimulus

vectors that an excitatory reflex occurs when a pressure stimulus is applied in the direction to which a load is liable to be applied in normal occlusion but that inhibitory reflex results from a stimulus applied in the direction to which a load is hard to apply in normal occlusion.

With these reports taken into account and reviewing our findings in the present study from the viewpoint of investigation into the causes of TMJ dysfunction, we conclude that a prematurely contacting tooth may be exposed to incessant lateral pressure during daily occlusion and mastication activities which renders periodontal receptors sensitive to pressure stimuli, produces a facilitation-effect in the reflex mechanism and prompts the masticatory muscles to cause unusual strain and eventual fatigue. We also conclude that this process will adversely affect mandibular movement. And, above all, a series of such phenomena seem to be part of the possible causes of TMJ dysfunction and to be substantially related to clinical views we have noted concerning the masseter and TMJ in this report.

Our findings on the periodontal-masseteric reflex will be useful in identifying a prematurely contacting tooth and providing in time a clear picture of a series changes in muscular functions after premature contact is eliminated. This will clarify the influence of premature contact on the masticatory muscles, which is difficult to diagnose clinically. This study will also help orthodontists in the performance of fine tuning occlusion for patients in the retention period.

## Conclusion

Abnormal mandibular movement caused



by premature contact is considered to be one of the causes of malocclusion and TMJ dysfunction. Our study has made clear that information sent from the periodontal membrane by premature contact gives rise to an excitation of the masticatory muscles and that this reflex is produced and eliminated at a relatively early stage.

Additionally, we detected the excitation of masseteric muscles (periodontal - masseteric reflex) induced a pressure stimulus upon the periodontal membrane by means of electromyography and thus identified a prematurely contacting tooth and obtained in time a series changes in the muscular functions after premature contact has been eliminated. This indicates generated the possibility to clarify the influence of premature contact upon masticatory muscles which is difficult to diagnose clinically.

These findings suggest that information sent from the periodontal membrane by a pressure stimulus will cause changes to the excitation of the masticatory muscles and eventually have an adverse influence upon mandibular movement.

This study has been performed under the support by the Grant-in-Aid for the Scientific Research (C) by Japanese Ministry of Education, Project No. 05671720, 1994-1996.

### References

- 1) Jankelson, B., Swain, C. W., Crane, P. F., and Radke, J. C. : Kinesiometric instrumentation : a new technology. *J. Amer. Dent. Ass.* 90 : 834-840, 1975.
- 2) Nakano, H., Miura, H., Kamegai, T., and Ishikawa, F. : Study of functional analysis apply to occlusal sound : With regard to discrimination of premature contact tooth. *Dent. J. Iwate Med. Univ.* 5 : 148-153, 1980.
- 3) Miura, H., Nakano, H., Kamegai, T., and Ishikawa, F. : Experimental study on miniaturization of surface electrode for use in measurements of EMG. *Dent. J. Iwate Med. Univ.* 6 : 130-135, 1981.
- 4) Ogawa, H. : Influences of experimental occlusal interference on time parameters in EMG records of the masticatory muscles. *J. Osaka Dent. Univ.* 39 : 421-440, 1976.
- 5) Miura, H., Murata, K., Osawa, T., Kinno, Y., Kamegai, T., and Ishikawa, F. : An experimental study on adaptation of masticatory muscle function. *Dent. J. Iwate Med. Univ.* 12 : 233-240, 1987.
- 6) Schaerer, P., Stallard, R.E., and Zander, H. A. : Occlusal interferences and mastication: An electromyographic study. *J. Pros. Dent.* 17 : 438-449, 1967.
- 7) Hayashi, K. : Influences of experimental occlusal interference on masticatory system. *J. Nihon Univ. Sch. Dent.* 70 : 687-764, 1982.
- 8) Riise, C., and Sheikholeslam, A. : The influence of experimental interfering occlusal contacts on the postural activity of the anterior temporal and masseter muscles in young adults. *J. Oral Rehabil.* 9 : 419-425, 1982.
- 9) Sheikholeslam, A., and Riise, C. : Influence of experimental interfering occlusal contacts on the activity of the anterior temporal and masseter muscles during submaximal and maximal bite in the intercuspal position. *J. Oral Rehabil.* 10 : 207-214, 1983.
- 10) Nishigawa, K. : Influence of occlusal contact on mandibular movement and masticatory muscle activity. *J. Jpn. Pros. Soc.* 33 : 822-835, 1989.
- 11) Goldberg, L. J. : Masseter muscle excitation induced by stimulation of periodontal and gingival receptors in man. *Brain Res.* 32 : 369-381, 1971.
- 12) Funakoshi, M., and Amano, N. : Periodontal jaw muscle reflexes in the albino rat. *J. Dent. Res.* 53 : 598-605, 1974.
- 13) Klopogge, M. J. G. M. : Reflex control of the jaw muscles by stimuli from receptors in the periodontal membrane. *J. Oral Rehabil.* 2 : 259-272, 1975.
- 14) Taguchi, Y. : Excitatory and inhibitory reflexes of the jaw-closing muscle elicited by mechanical stimulation to the incisors in the rat. *Jpn. J. Oral Biol.* 26 : 1228-1244, 1984.
- 15) Taguchi, Y., Takahashi, Y., Sato, S., and Shimada, K. : Periodontal jaw reflexes induced by pressure stimulation to the upper incisor in the rat. *Jpn. J. Oral Biol.* 28 : 253-269, 1986.
- 16) Matsugishi, K., and Shimada, K. : Reflex control of masseter muscle activity by lateral pres-

- sure to the upper and lower molar. *J. Jpn. Orthod. Soc.* 52 : 327-344, 1993.
- 17) Okabe, K. : Studies on nerve endings in the periodontal ligament in the dog. *J.Jpn.Stomatol. Soc.* 14 : 341-354, 1940.
- 18) Tabata, T., and Karita, K. : Response properties of periodontal mechanosensitive fibers in the superior dental nerve of the cat. *Experi. Neurol.* 94 : 469-478, 1986.
- 19) Yamamura, C., Shimada, K., and Taguchi, Y. : Approach to physiological occlusion : How does periodontal sensation control activity of the masticatory muscles. *Dental Outlook* (separate volume), Ishiyaku Publish., Inc., Tokyo, pp65-80, 1992.
- 20) Inai, C., Takahashi, Y., Sato, S., and Shimada, K. : Masseteric reflexes induced by pressure stimulation to the incisor in man. *J. Niigata Dent. Soc.* 17 : 32, 1987.

## 早期接触が咬筋活動に与える影響に関する実験的, 臨床的研究

三浦 廣行, 猪股 恵美子, 古町 瑞朗,  
石亀 勝, 八木 實, 石川 富士郎

岩手医科大学歯学部歯科矯正学講座

(主任 : 石川 富士郎 教授)

**抄録** : 一般に早期接触は咬合性外傷や顎関節症の原因となることが知られている。しかし, 早期接触が咀嚼筋活動にどのような変化をもたらすのかについては未だ不明な点が多い。そこで, 本研究では, 歯根膜の圧迫刺激によって誘発される咬筋の興奮(歯根膜咬筋反射)を筋電図法を応用して検出し, 早期接触の咬筋に与える影響を解明するとともに, 早期接触を取り除いた後の筋機能の変化について検討した。

その結果, 早期接触によって生じた歯根膜からの情報が咬筋の興奮性に影響を及ぼしており, この反射の形成ならびに消失は比較的早期に行われることが判明した。さらに, 圧刺激による歯根膜からの情報が咀嚼筋の興奮性を変化させ, 下顎運動にも影響を及ぼしている可能性があることが示唆された。