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Original Article

LIP SEAL STUDY OF JAPANESE ADULTS WITH MALOCCLUSION

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Abstract

The purpose of this study to clarify the factors an effecting lip seal in Japanese adults with malocclusion. Sixty-three malocclusion patients aged 20 to 27 years were randomly selected and compared with fourteen normal occlusion controls aged 22 to 26 years old. The subjects were divided into a good seal group and a poor lip seal group by observing the distance between the upper and lower lip at rest. Results of this adult study were as follows; There were no poor lip seals in normal occlusion subjects. Significant differences were observed for tongue thrust ($p<0.05$) and mouth breathing ($p<0.05$) between the good lip seal group and poor lip seal group of malocclusion subjects. Adults with poor lip seal should be treated for their malocclusion prior to be other functional approaches to improving their lip seal.

Key words: Lip seal—Adult malocclusion—Tongue thrust—Mouth breathing

INTRODUCTION

In our previous study of Japanese children; there were no statistical differences between subjects with malocclusion and those with normal occlusion. There were, however, significant differences in overbite ($p<0.01$), overjet ($p<0.01$), and oral muscle force by button pulling ($p<0.05$) between the good lip seal and poor lip seal groups of malocclusion. The behavior of adults, such as the diversification of eating habits or the development of the language followed by maturity, are different from those of children. Mew⁵⁾ states

that lip seal influences the growth and development of children, but he does not discuss lip seal issues for adults. We could not find any other research addressing this issue. This investigation was done to clarify some questions about adult malocclusion. The subjects and methods were the same as those in our first report about Japanese children¹³⁾.

SUBJECTS AND METHOD

Sixty-three orthodontic patients with malocclusion (38 men and 25 women, average

Table 1 Number of subjects

	Normal occlusion (average age 23.6 ± 0.83 years)	Malocclusion (average age 24.3 ± 1.67 years)				Total
		Maxillary protrusion	Crowding	Anterior cross-bite	Total	
Male	17	15	10	13	38	55
Female	5	9	11	5	25	30
Total	22	24	21	18	63	85

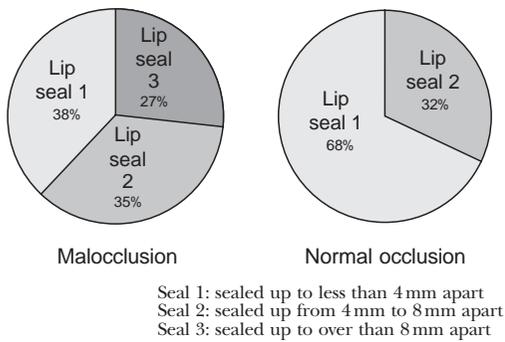


Fig. 1 Distributions of lip seal degree

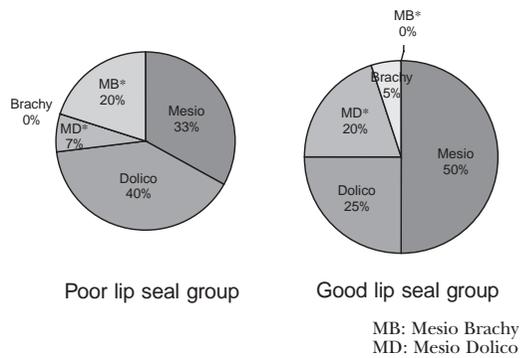


Fig. 2 Distribution of facial type

age 24y3m ± 1y7m) were selected randomly and compared with 22 normal occlusion (17 men, 5 women, average age 23y6m ± 9m). The malocclusions were classified into maxillary protrusion, crowding, and anterior cross-bite, as shown in Table 1.

The subjects were divided into a good lip seal group (Lip seal 1: sealed up to less than 4 mm apart) and a poor lip seal group (Lip seal 3: open over than 8 mm apart) by observing the degree of space between the upper and lower lip at rest while counting from 1 to 6 by the method of Mew⁵⁾. Lip seal 2 (sealed up from 4 mm to 8 mm apart) was omitted to clarify differences¹⁾.

The morphological measurements was analyzed by gnathostatic model analysis. The cephalometric measurements was analyzed according to Ricketts analysis. The upper indicator line and the lower indicator line by Mew and the entity instrumentation of face

were measured.

For a functional evaluation, the medical history of conventional morhinology was investigated. Tonsil and adenoids were inspected and classified according to Mackenzie³⁾ and analyzed by McNamara airway⁴⁾ analysis with lateral cephalograms. Tongue behavior was evaluated according to the degree of tongue protrusion during swallowing and pronunciation. Oral muscle force was measured by button pulling with a tension gauge (HaldexAB: HALDA, Sweden).

Differences between the groups was determined with the χ^2 test for functional investigation and the *t* test for morphological evaluation and oral muscle force.

RESULT

The reproducibility was confirmed by sev-

eral repeated measurements and statistical calculations¹³⁾. No poor lip seal was recognized in the normal occlusion adult group. About one third of the malocclusion was recognized with poor lip seal (Fig. 1). No significant difference by facial type was recognized (Fig. 2).

No significant difference in morphological measurements was observed within the group of malocclusions, however, there were significant differences in tongue thrust ($p < 0.05$)

(Fig. 3) and mouth breathing ($p < 0.05$) seen by functional evaluations (Fig. 4) of the good lip seal and poor lip seal groups (Table 2). Although allergies (nose allergy, eye allergy), were found in a high percentage of patients, no statistical difference was recognized between the two groups (Fig. 4). There were no statistically significant differences between the oral muscle force (Fig. 3) or the degree of tonsil hypertrophy and adenoid between the two groups.

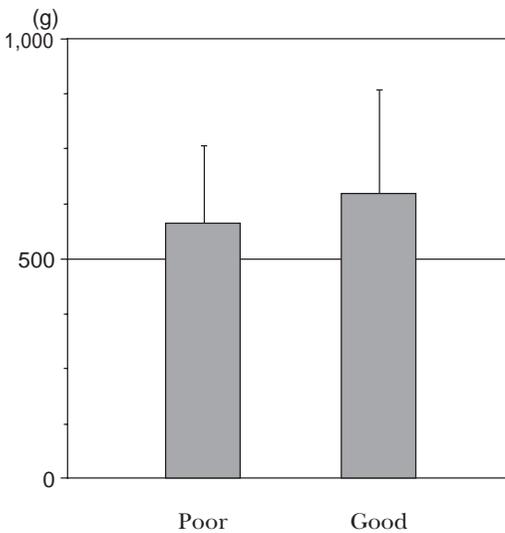


Fig. 3 Oral muscle force

DISCUSSION

Angle¹⁾ asserted that function usually influences the teeth. There are functional influences of the morphology, however, very few reports^{8,9)} have examined such issues. Form is a functional result and a function reflects form as discussed in Moss' report⁷⁾. No poor lip seal persons were found in the normal occlusion group in this research. If the form is good lip seal appears to be good in adults.

No morphological variations were observed between the good seal and poor lip seal group in malocclusion subjects. Yoshino⁸⁾ stated disturbance of nose respiration can cause skeletal abnormality, and Mew⁶⁾ asserted that poor lip seal affect the growth direction toward the vertical. However no statistical difference was recognized in this study. One

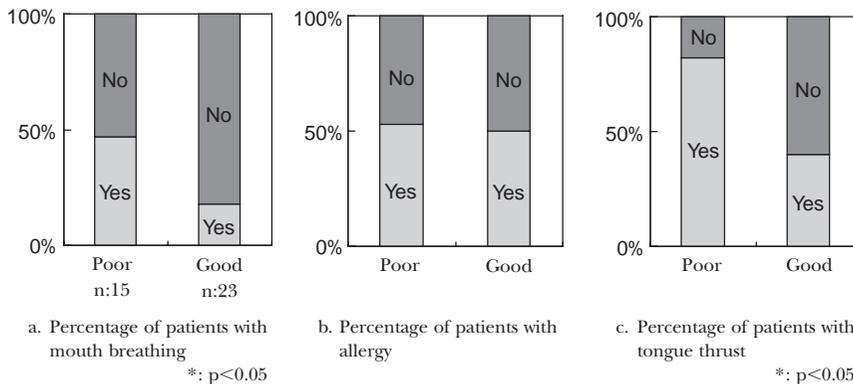


Fig. 4 Functional evaluation

Table 2 Results of morphological analysis

	Poor lip seal group (n = 17)		Good lip seal group (n = 20)	
	mean	S.D.	mean	S.D.
DENTURE (mm)				
Overbite	2.65	1.55	2.5	1.09
Overjet	3	2.45	2.3	1.39
Upper crowding	-1.93	2.63	-1.95	2.59
Lower crowding	-2.4	3	-1.8	2.83
Upper molar width	48.01	1.64	49.15	3.48
Lower molar width	42.07	5.04	44.26	2.61
FACE (mm)				
Facial height	233.3	1.54	231	1.03
Facial width	142.7	1.45	138.1	0.84
Ratio (%)	61		59	
Upper indicator line	46.9	3.49	45.5	3.55
Lower indicator line	50.87	3.26	50.74	5.98

reasons might be that not many Japanese have facial growth that tends to the vertical direction¹⁰⁾.

Friel²⁾ stated that the static function of tongue but not the dynamic function can help form the arch labiolingually. Tully¹¹⁾ also recognized that static tongue posture affects the arch form more than the dynamic tongue posture. The poor lip seal group had many tongue thrusts in this research. Such a low tongue condition could influence the arch form. Tongue thrust could be think as one of the infant behavior, it is need to aware the proper tongue position and function to them.

Vig *et al.*¹²⁾ states most of the people whose are mouths always open are oronasal breathers. However mouth breathing does not necessarily correspond to mouth opening. In other words, mouth opening can be a habitual act rather than a necessary one. When people mature a suitable lip seal unusually develops from social pressure rather than from unconscious reasons. Adults in the poor lip seal group cannot keep their mouths closed because of their malocclusion even if they are aware of the problem.

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