

was observed during the initial chewing strokes.³⁷ This might be the result of a foreign body sensation when a magnet or splint was inserted within the oral cavity. Under the experimental condition, we used the mean velocity of the first ten consecutive open-close motions instead of individual ones for later comparison. After the unstable initial velocity pattern, a more stable open-close velocity appeared in the subsequent tracking record. This might be an adaptation of the stomatognathic system due to habituation and practice.³⁷

The velocity of the masticatory movement was the developed by the mandible as it approached or moved away from the maxilla.⁵ The velocity of the chewing movement showed great variation and it was dependent on the type of food, consistency of the chewed materials, and mostly individual variation. The mean velocity of the masticatory movements in gum chewing was between the range from 64 to 135 mm/sec, higher in the opening phase than in the closing phase.^{1,5} To avoid the influence of food consistency on the chewing movement, the model of empty mouth movement was chosen for measuring the jaw motion velocity. A variation of velocity was observed among test subjects. The maximal opening velocity was in the range of 180.0 mm/sec to 524.5 mm/sec in the maximal opening phase velocity, and 188.8 mm/sec to 537.6 mm/sec in the maximal closing velocity. The mean velocity was higher in the closing phase than in the opening phase before occlusal splint insertion (Table 1). The data could not be compared with those of other studies because of differences in experimental conditions. In this study, the test subjects were asked to open and close the mandible as fast as possible, so we could note a higher empty open-close velocity.

As to individual variation, the major determinants of contraction speed of muscle fibers and motor units were the myosin ATPase activity, and this varied according to the myosin type.⁴ The variation in inherent muscle characteristics might explain to some extent the variation of speed among test subjects (Table 1). The velocity of muscle contraction varied inversely with the load on the muscle. At a given load, the velocity was maximal at the resting length, and declined if the muscle was shorter or longer.¹⁸ This was based on the viewpoint from a single muscle fiber. Masticatory muscles were composed of thousands of muscle fibers. Whether the condition could be applied to the entire

masticatory muscles as a unit remained to be tested. "What the optimal rest length is in the masticatory system" was still a controversial issue. The electromyographic resting position was the position of the mandible with minimal myoelectrical activity, and this was not the same position as that of the clinical rest position.³ In this study, a splint was fabricated with an average thickness of about 2 mm at the incisor area in accordance with the rest position of the mandible as could as possible to avoid encroaching on the freeway space in the large majority of subjects studied.^{27,42}

Occlusal splint was stated to have beneficial effects on relieving the signs and symptoms of TMD.¹⁶ The underlying mechanism of its therapeutic effects was not clear at this time. Some stated that the occlusal splint could reduce the degree of sensory input from the periodontal receptors during nocturnal clenching or grinding, and this could result in decreased masseter muscle activity giving rise to muscular relaxation.^{6,24} In addition, occlusal splint had the effect on muscle activity by decreasing activity in the elevators.⁷ Occlusal splint was also believed to improve the maxillomandibular relationship and thus altered the relationship of the condyle to the fossa.⁴³

The design of the splint would affect EMG activity during sleep or on clenching efforts, i.e., the thickness of the splint, number and position of occluding contacts.^{13,14,45} The splint used in this study was well adjusted and had a stable and flat occlusal contact position. All splints used in the study were adjusted by an experienced operator. These factors were considered beforehand to minimize the variables in these experiments as far as possible.

In Table 5 we noted that the closing velocity of mandibular movement decreased after occlusal splint insertion ($P < 0.01$). Although there was no significant reduction in the opening phase velocity and the terminal velocity ($P > 0.05$), the mandible had a tendency to decrease the opening phase velocity and the terminal velocity after occlusal splint insertion. The maximal closing velocity and average closing velocity decreased after occlusal splint insertion ($P < 0.01$). This phenomenon might be a biological response of the oral cavity to the inserted occlusal splint. At the beginning, the velocity would slow down and then the velocity would probably return to normal after the oral cavity was accustomed to the inserted splint. The oral cavity