

A New Tridimensional Insight into Geometric and Kinematic Characteristics of Masticatory Cycles in Participants with Normal Occlusion

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The aim of this study was to analyze the general, geometric, and kinematic characteristics of the masticatory cycle's movements in a tridimensional way, using a method developed by our study group to provide a new insight into the analysis of mandibular movements due to advancement in the potential of computational analysis. Ten individuals (20.1 ± 2.69 years), molar class I, without mandibular movement problems participated in this study. The movements of the masticatory cycles, frontal and sagittal mandibular border movements, were recorded using 3D electromagnetic articulography and processed with computational scripts developed by our research group. The number of chewing cycles, frequency (cycles/s), chewing cycle areas/mandibular border movements areas ratios, and the mouth opening and closing speeds on the 3D trajectory of the chewing cycle were compared. The cycles were divided and analyzed in thirds. The masticatory cycles showed high variation among the individuals (21.6 ± 9.4 cycles); the frequency (1.46 ± 0.21 cycles/s) revealed a moderate positive correlation ($R = 0.52$) with the number of cycles. The frontal area ratios between the cycle area and the mandibular border movement presented higher values in the first third (6.65%) of the masticatory cycles, and the ratios of sagittal areas were higher and more variable (first, 7.67%; second, 8.06%; and third, 10.04%) than the frontal view. The opening and closing mouth speeds were greater in the second third of the masticatory cycles (OS, 57.82 mm/s; CS, 58.34 mm/s) without a significant difference between the opening and closing movements when

the same thirds were evaluated. Further studies are necessary to improve the understanding of the masticatory cycles regarding the standardization of parameters and their values. © 2018 Ramón Fuentes et al.