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Occlusal forces and chewing ability in dentitions with cross-arch bridges

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Abstract

The main aims of this thesis were 1) to study the pattern of axially directed occlusal forces developed during chewing and biting in dentitions restored with cross-arch bridges, 2) to find out to what extent these forces are influenced by the amount of periodontal tissue supporting the bridge abutments and 3) to study the chewing ability in subjects supplied with cross-arch bridges. For the purpose of aims 1 and 2 a method was developed which permits measurement of occlusal forces in various parts of as well as over the entire dentition simultaneously. The method is based on the use of strain-gauge transducers mounted into pontics or artificial teeth. Two groups, each comprising 12 subjects, were included in the studies of occlusal forces. In one group, the periodontal support included bilateral molar end abutments. In the other group, molar/premolar end abutments were unilaterally missing and replaced with posterior two-unit cantilevers. In each subject, four transducers were used, bilaterally distributed to represent the posterior and anterior regions and mounted so as to measure forces perpendicular to the occlusal plane. The occlusal forces were measured during 3 activities: 1) chewing and swallowing, 2) biting with maximal strength in habitual occlusion, expressing the voluntary capacity of the jaw-closing muscles, and 3) clenching between two antagonistic teeth, expressing the transient periodontal force withstanding capacity in that region. The amount of periodontal tissue supporting the bridge abutments was assessed from radiographs. The chewing ability was studied using a fractional sieving technique in principle according to Helkimo el al (1978) and was compared with the chewing ability of subjects with complete healthy dentitions and complete denture wearers. The mean total chewing force amounted to about 100 Newtons (N) in dentitions with cross-arch bilateral end abutment bridges, compared to about 50 N in dentitions with cross-arch unilateral posterior two-unit cantilever bridges (P less than 0.01). The mean maximal bite force in habitual occlusion amounted to 320 N and 264 N respectively (NS). In the presence of end abutments, the chewing and biting forces were significantly larger in the posterior than in the anterior regions. The local forces on the distal cantilever unit were, however, equal to or smaller than those in the anterior regions and much smaller than have been suggested in the literature.(ABSTRACT TRUNCATED AT 400 WORDS)

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