A Finite Element Study of an Implant and Natural Tooth-Supported Mandibular Overdenture

This work Studied the magnitude of stresses around a natural tooth and a asseointegrated implant supporting a mandibular overdenture when subjected to a functional load applied at three situations (premolar-molar region of tooth side, premolar-molar region of implant side and incisal region midway between the tooth and the implant). The natural tooth was a canine while the implant was placed in the site of the other canine. The effect of the applied load was analyzed using the finite element method (FEM). By this method, a two-dimensional finite element model was generated to stimulate the mandibular arch. The model contained the implant, the tooth, and the acrylic overdenture. Mathematical equations were designed relating the forces to displacements. The equations were solved using a computer.

From this study, it was a concluded that when a natural tooth and an implant are used to support an overdenture:

1. All the forces on the implant are of the compressive type,
2. The vertical component of axially applied load produced an acceptable distribution of the stresses to both the tooth and the implant,
3. The lateral component of forcef produced by posterior loading showed more compressive stresses on the distal side of the tooth
4. The lateral component of forces produced by midline loading showed a potential distal movement of the tooth
5. When a natural, tooth and an implant are used to support a mandibular overdenture, the incisal loading affected the natural tooth more than the posterior loading.

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