Editorial

Mandibular Flexure and Fixed Long-span Cross-arch Implant Restorations

The mandible is the largest, strongest and lowest bone in the face. The body of the mandible is a curved structure which articulates with the two temporal bones at the temporomandibular joints. Medial mandibular flexure is a functional elastic deformation characterized by medial convergence of hemimandibles in jaw opening and protrusion movements.[1] Burch and Borchers[2] demonstrated a change in the mandibular width during opening and protrusion of the jaw and found an average decrease in the width of the mandible by 0.61 mm. Similarly, Novak[3] found that the mandibular flexure range varies between 0.3 and 1.0 mm.

Complete arch rehabilitation of the edentulous mandible with the fixed long-span cross-arch bridges supported by natural abutments or implants is a common clinical situation. These abutment teeth or implants become loose or get dislodged after a period of usage. Misch[4] in 1999 has stated that, when posterior rigid fixed implants were splinted to each other in a cross-arch restoration, they were subjected to considerable buccolingual force on opening due to mandibular flexure. In this regards, Zarone et al[5] carried out the three-dimensional (3D) finite element analysis of human edentulous mandible to study the deformations and stress distributions in six different designs of implant-supported prosthetic systems (six or four implants, with or without distal cantilevers, cross-arch or midline-divided bar into two free-standing bridges). The analysis suggested that a division of the superstructure at the level of the symphysis significantly allows the natural functional flexure of the mandible. Law et al[6] in 2012 reviewed 20 selected articles to determine the effect of mandibular flexure on the implant-framework system. The review suggested that dividing the prosthesis at the symphysis region, or into multiple implant fixed dental prostheses, may minimize the effect of mandibular flexure on the implant prosthesis. Even during making the impressions, the jaw opening causes the mandibular flexure leading to compromised accuracy in casts and subsequent prostheses. Hence, the impressions should be made with the patient's mouth in a partially closed unstrained mandibular position.[7]

With current clinical advancements in implant dentistry, varieties of options are being suggested to create the implant superstructures for edentulous mandible including six or four implants, with or without distal cantilevers, cross-arch or midline-divided bar or hybrid prosthesis. Hence, it is necessary to understand the nature of flexure of the mandible during its movements. However, the clinical significance of mandibular flexure on the success of dental implant treatment is still unclear and further biomechanical and clinical research is needed.

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