題名:Natural frequency analysis of implant-bone interface.

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摘要:OBJECTIVE: A number of techniques have been proposed for detecting the stability of dental implants. However, the clinical applicability of those methods is still limited. The purpose of this study was to evaluate a new innovative, noninvasive, minimum-contact method for the stability assessment of dental implants. STUDY DESIGN: Natural frequency is a physical property of a structure, which is strongly related to its boundary conditions. In this study, a modal testing technique was carried out to measure the natural frequency of dental implants. The implants were fixed by a metal clamp stand and were excited to vibrate by an impulse hammer. A noncontact piezoelectric microphone then acoustically acquired the vibration responses of the implants. Natural frequencies of the tested implants were recorded under various clamping forces and clamping levels. RESULTS: Natural frequencies of the tested implants were concentrated from 8 to 19 kHz under different boundary conditions. On the other hand, the natural frequency values decreased when boundary levels and boundary force were reduced. Linear relationships (P <.005) were found between response frequencies and the degree of implant stability. CONCLUSIONS: Our results show that the boundary status of an implant can be monitored by detecting its natural frequency. A noncontact transducer used in this study can also serve as a useful tool for future clinical investigations.