以實驗動物模型驗證一新設計之牙科植體穩固度裝置

黃豪銘;鄭光祐;林哲堂;黃威軍;姚維正;李勝揚

Abstract

Natural frequency (NF) technology was used to design a dental implant stability detector. Both in vivo and in vitro experiments were performed to test the possibility of using such device for detecting the status of implants. The natural frequency increasing ratio (NFIR), defined as the percentage changes between the measured NF value at each testing time-point and its initial testing value, was used as a parameter to assess implant stability. In in vitro tests, changes in stability of the root form of the dental implant were simulated by clamping the implant with a clamping stand. When the clamping torque was increased from 2 to 10 N-cm, the NFIRs obtained from the traditional hammer-impacting method and from the current designed device showed no significantly differences ($p = 0.053$). When the implants placed in a dog's mandible were measured using the NF device, there was a continuous increase in NFIR for the first 8 weeks. The mean NFIR value at the first week was 0.13 ±0.048; the NFIR significantly increased to 0.408 ± 0.076 ($p < 0.05$) by week 8. Thereafter, the measurements maintained at a plateau. When comparing the NFIR curve obtained from in vivo tests to the histological images, a strong correlation between the two data sets was found. In conclusion, the idea of using the present NF device for detecting the degree of bone healing during the osseointegration process seems feasible.