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Title: Resonance Frequency Analysis – The only longitudinal metric for implant stability

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Literature

1. Glauser R, Rée A, Lundgren A, Gottlow J, Hämmerle CH, Schärer P. Immediate occlusal loading of Brånemark implants applied in various jawbone regions: a prospective, 1-year clinical study. Clin Implant Dent Relat Res. 2001;3(4):204-13. doi: 10.1111/j.1708-8208.2001.tb00142.x. PMID: 11887657.

2. Sanz-Sánchez I, Sanz-Martín I, Figuero E, Sanz M. Clinical efficacy of immediate implant loading protocols compared to conventional loading depending on the type of the restoration: a systematic review. Clin Oral Implants Res. 2015 Aug;26(8):964–82. doi: 10.1111/clr.12428.

3. Khayat PG, Arnal HM, Tourbah BI, Sennerby L. Clinical outcome of dental implants placed with high insertion torques (up to 176 Ncm). Clin Implant Dent Relat Res. 2013 Apr;15(2):227-33. doi: 10.1111/j.1708-8208.2011.00351.x. Epub 2011 May 20. PMID: 21599832.

4. Cha JY, Pereira MD, Smith AA, Houschyar KS, Yin X, Mouraret S, Brunski JB, Helms JA. Multiscale analyses of the bone-implant interface. J Dent Res. 2015 Mar;94(3):482-90. doi: 10.1177/0022034514566029. Epub 2015 Jan 27. PMID: 25628271; PMCID: PMC4814020.

5. Duyck J, Corpas L, Vermeiren S, Ogawa T, Quirynen M, Vandamme K, Jacobs R, Naert I. Histological, histomorphometrical, and radiological evaluation of an experimental implant design with a high insertion torque. Clin Oral Implants Res. 2010 Aug;21(8):877-84. doi: 10.1111/j.1600-0501.2010.01895.x. Epub 2010 Apr 30. PMID: 20528892.

6. Fabrício T, Fabíola B Marina de Oliveira R, Murched OT. Histomorphometric analysis of bone tissue repair in rabbits after insertion of titanium screws under different torque. Acta Cir. Bras. 2011 Aug 26 (4).doi.org/10.1590/S0102-86502011000400003

7. Gehrke SA, Júnior JA, Treichel TLE, do Prado TD, Dedavid BA, de Aza PN. Effects of insertion torque values on the marginal bone loss of dental implants installed in sheep mandibles. Sci Rep. 2022 Jan 11;12(1):538. doi: 10.1038/s41598-021-04313-5. PMID: 35017552; PMCID: PMC8752839.

8. Ramesh R, Sasi A, Mohamed SC, Joseph SP. "Compression Necrosis" - A Cause of Concern for Early Implant Failure? Case Report and Review of Literature. Clin Cosmet Investig Dent. 2024 Mar 7;16:43-52. doi: 10.2147/CCIDE.S453798. PMID: 38469322; PMCID: PMC10926919.

9. Insua A, Monje A, Wang HL, Miron RJ. Basis of bone metabolism around dental implants during osseointegration and peri-implant bone loss. J Biomed Mater Res A. 2017 Jul;105(7):2075-2089. doi: 10.1002/jbm.a.36060. Epub 2017 Mar 28. PMID: 28281321.

10. Norton MR. The influence of insertion torque on the survival of immediately placed and restored single-tooth implants. Int J Oral Maxillofac Implants. 2011 Nov-Dec;26(6):1333-43. PMID: 22167441.

11. Norton M. Primary stability versus viable constraint--a need to redefine. Int J Oral Maxillofac Implants. 2013 Jan-Feb;28(1):19-21. PMID: 23377044.

12. Norton MR. The Influence of Low Insertion Torque on Primary Stability, Implant Survival, and Maintenance of Marginal Bone Levels: A Closed-Cohort Prospective Study. Int J Oral Maxillofac Implants. 2017 Jul/Aug;32(4):849-857. doi: 10.11607/jomi.5889. PMID: 28708918.