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Comparison of residual stress distribution between root-analogue implant and threaded cylindrical implant

Background

This study compares the residual stress distribution and stress-release deformation of root-analogue implants (RAIs) and traditional threaded cylindrical implants to assess their clinical applicability and optimization.

Methods

Three implant types (solid RAIs, mesh RAIs, and traditional threaded implants) were analyzed using contour cutting and finite element analysis to evaluate stress distribution and deformation trends after stress release.

Results

RAIs exhibited lower tensile and compressive stresses than threaded implants (T1: 26 MPa vs. 48 MPa, T2: 18 MPa vs. 74 MPa), but showed greater displacement (T1: 0.02 mm, T2: 0.012 mm, T3: 0.0025 mm), mainly in the apical region.

Conclusion

RAIs offer advantages in stress distribution but require further optimization to address deformation. Future research should focus on improving material selection and manufacturing processes to enhance implant stability and long-term success.

Biography

Bingjing Zhao, MD, Associate Chief Physician. She graduated from the Chinese People's Liberation Army Medical School in 2016, and specializes in orthodontic correction of all kinds of malocclusions for children, adolescents and adults. Research Interests.

My main research includes oromandibular myofunctional orthodontics and early interceptive treatment, digital design and clinical adaptation of customized dental implants. She also devotes herself to the biocompatibility evaluation of new dental biomaterials, as well as structural optimization, clinical translation and standardized R&D of functional orthodontic appliances.