

VARIOflex Demonstrates Highest Strength Values in Fracture Resistance Tests of Titanium Base Abutments

Karasan D et al. Clin Oral Implants Res. 2023; Online ahead of print



Background

Ti

Titanium base abutments generally provide a stable implant connection, but the mechanical stability depends on the interface with the crown



There is little research on the impact of abutment geometry on bonding stability between the crown and titanium base



Aim

Evaluate the impact of abutment geometry factors on mechanical stability of screw-retained implant-supported single crowns (iSCs) made of polymer-infiltrated-ceramic-network (PICN)

Study Design

Mechanical stability testing of six abutment/implant combinations, each with 12 specimens:*

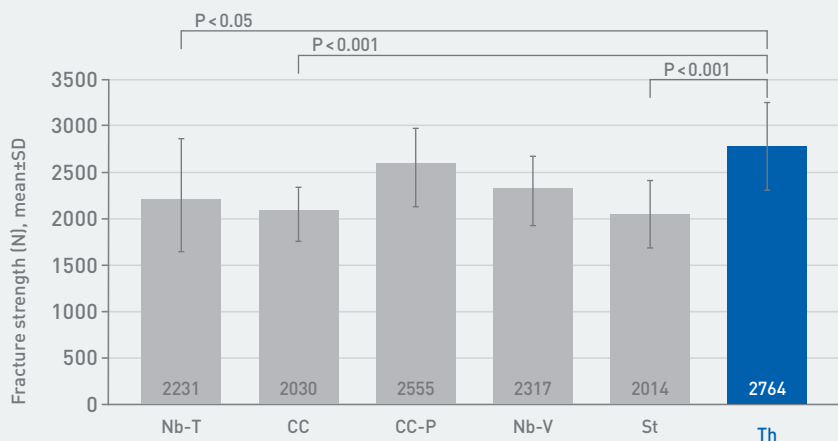
- | | | |
|---------|---------|-------|
| 1. Nb-T | 3. CC-P | 5. St |
| 2. CC | 4. Nb-V | 6. Th |

All implants had an internal-conical connection, except for Thommen Medical implants which featured the EVERGUARD® butt-joint connection with an internal hexagon and external stabilization ring.

Results

Highest strength values observed with Thommen Medical VARIOflex abutment

Greatest strength values with Thommen Medical†



No elastic or plastic deformation under static loading in the Thommen Medical specimens††



100% of specimens survived thermomechanical ageing after 1.2 million cycles**

Key Takeaways

The selection of the titanium base abutment significantly influenced fracture resistance of screw-retained PICN iSCs
All specimens survived thermomechanical loading without complication or failure

The Thommen Medical system, with the butt-joint connection, showed no deformation under load

- This suggests more effective distribution of stress and minimised transfer to the implant versus other connection types
- VARIOflex had the highest prosthetic height (9 mm vs 4.3–7 mm for other groups), suggesting the prosthetic height of the titanium base may influence fracture strength

Further comprehensive research on this topic is warranted

*Nb-T: Nobel Biocare, Universal Base, Crown; CC: Biohorizons Camlog, Conelog Titanium Base, CAD/CAM crown; CC-P: Biohorizons Camlog, Prototype Conelog Titanium Base, CAD/CAM crown (prototype manufactured specifically for this study); Nb-V: Ivoclar Vivadent, Vitebase, Crown; St: Straumann, Variobase; Th: Thommen Medical, VARIOflex, Crown **A simultaneous thermocycling [5°–55°C, dwelling time 120 s] and chewing simulation [1,200,000 cycles, 98 N 1.67 Hz, CS-4.8, SD Mechatronik] was applied to all specimens †The survived specimens were statically loaded parallel to the implant axis until failure using a universal testing machine. †† Image was not taken from the original publication but kindly provided by Dr. Duygu Karasan.