

In vitro evaluation of the adhesive strenght of a luting agent for passive fitting of implant prostheses

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Introduction:A passive fit between dental implants and prosthetic framework is particularly important in immediate loading protocols to avoid dangerous stresses on periimplant bone. A luting technique is used by some authors [1] to lute implant cylinders to the metal framework in full-arch immediately loaded implant prostheses and has been claimed to allow a good passive fit. But the adhesive strength of this luting technique has not been evaluated yet. The aims of this preliminary in vitro study were: 1) to create an appropriate experimental set-up for the evaluation of the adhesive strenght between the luting agent and the metal components; 2) to evaluate if implant cylinders with different heights (5 or 10mm) can affect the adhesive strength.

Material and Methods:The samples to be tested are composed of two cylinders each: the implant cylinder (internal cylinder) (type IV titanium alloy) and the customized cylinder simulating part of the prosthetic framework (external cylinder) (commercial gold alloy). The two cylinders have been fixed with a luting agent (CEKA SITE) with a standard thickness of 0.2mm. In order to fix the sample to the testing machine, the internal cylinder has to be screwed to an implant analogue, using standard screws. In the first experimental set-up (Test 1) an universal testing machine (Instron) with a 10 kN load cell was used to carry out pull-out tests. The software version Plus Windows 98, Series IX version 8, was employed for data acquisition and processing. A cross-head speed of 2 mm/min was applied. In the second experimental set-up (Test 2) a compression load was applied to the internal cylinder using the universal Instron machine and a customized stainless steel device. The load values applied were recorded in kN.

Results:During Test 1 (pull-out test) a failure of the internal screw was observed. No damage to the metal-luting agent interface was evident. During Test 2 (compressive test) the maximum load of 300 kN was reached when the deformation of the specimen began, due to lateral components of the applied force.

Conclusions: The weak points of the sample appeared to be the cylinder-abutment screw in pull-out tests, and the metal framework in compressive tests. It is necessary to design an alternative experimental set-up to record the strength of the adhesion. Preliminary data suggest that this luting technique provides enough adhesive strength for clinical use.

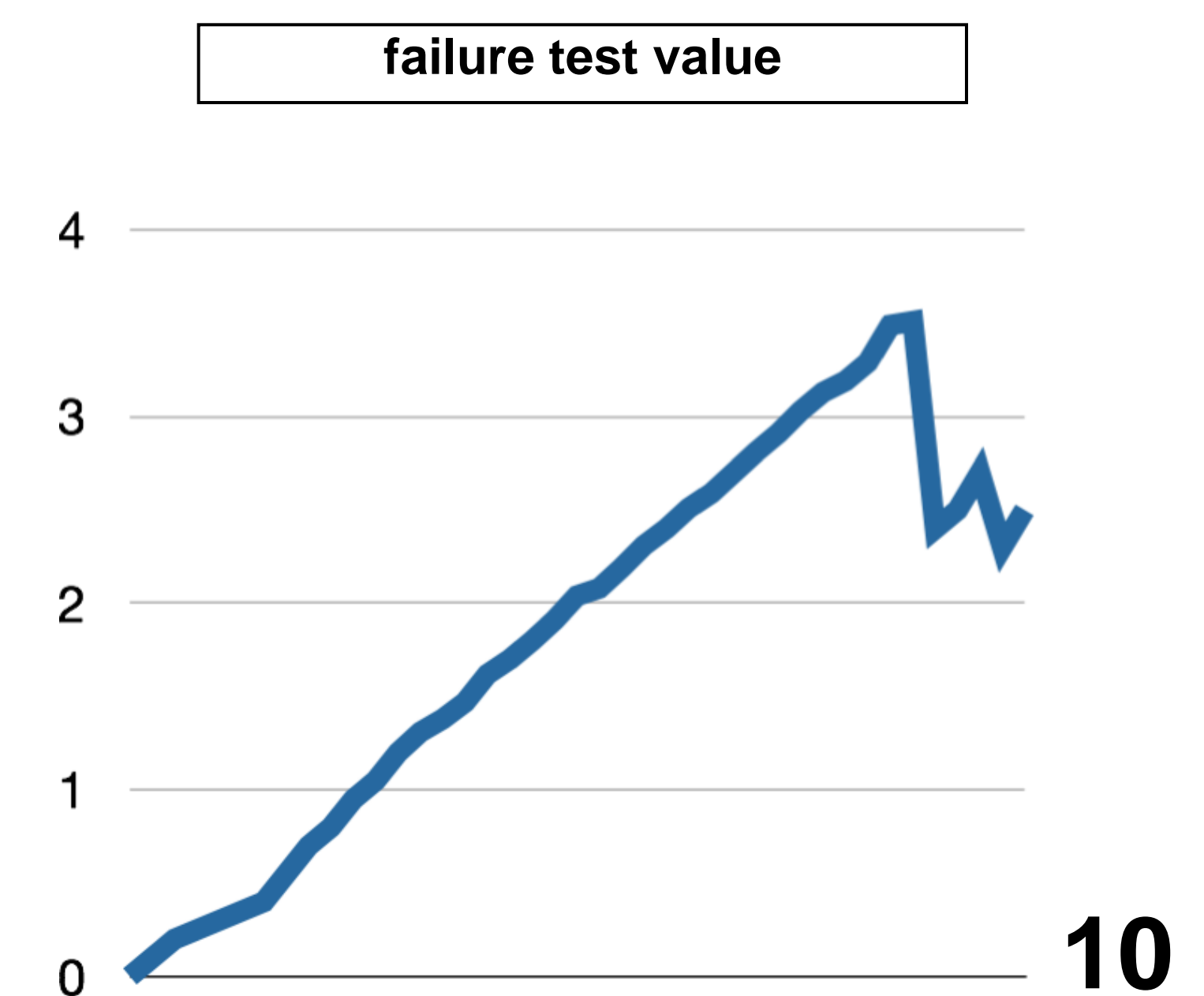
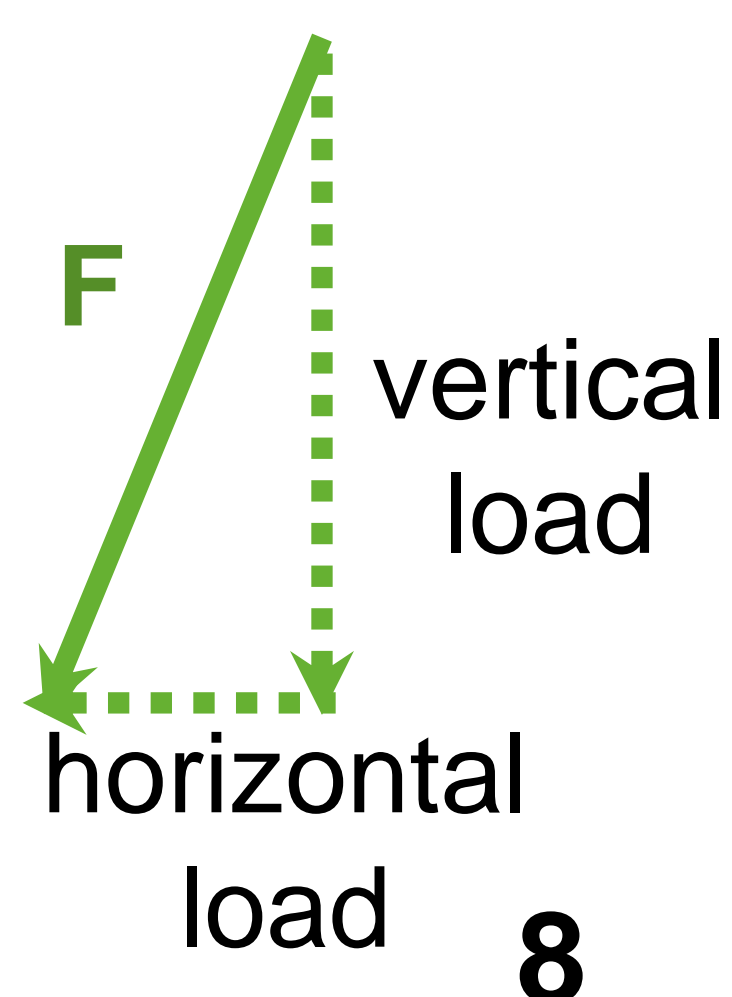
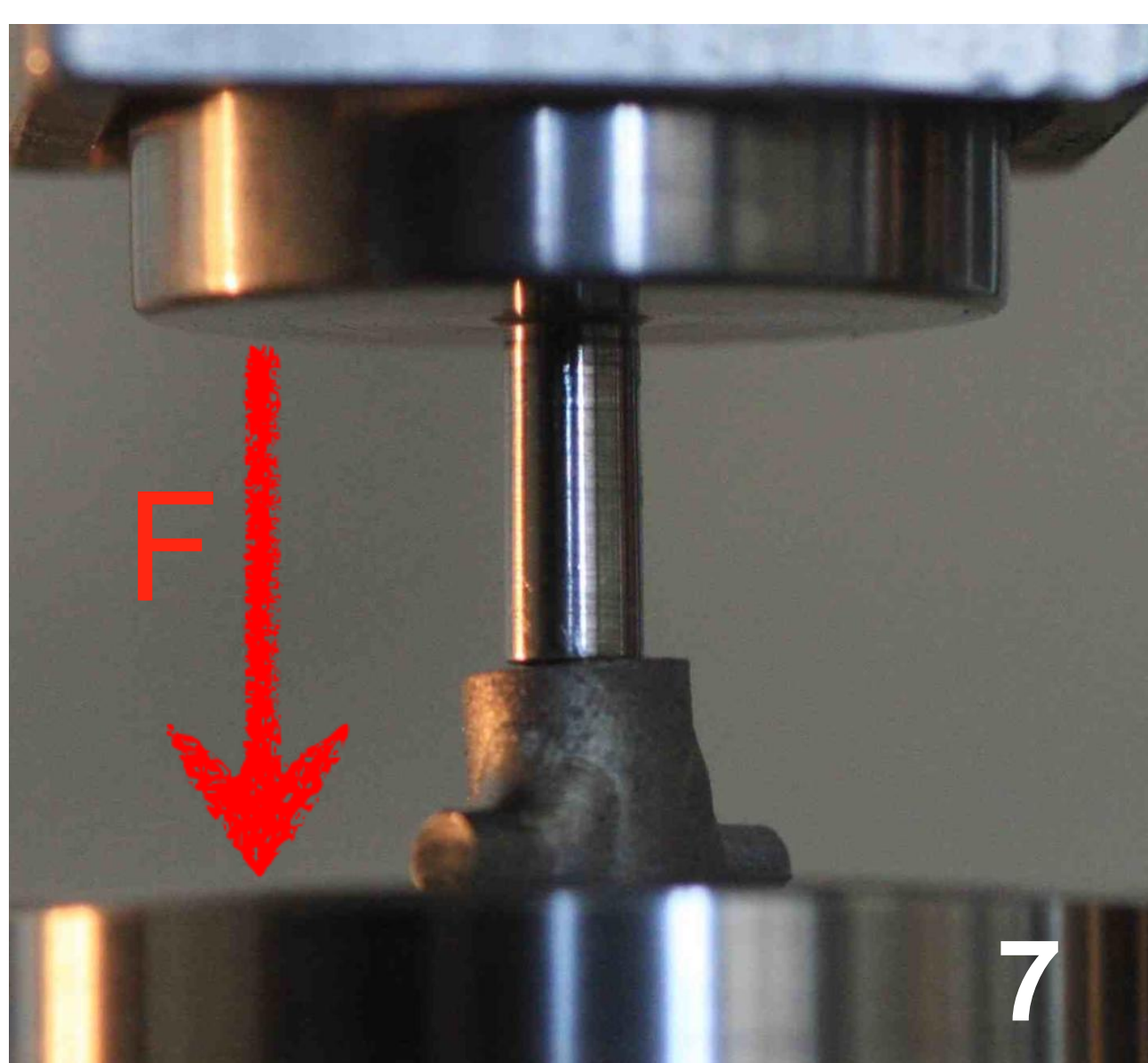
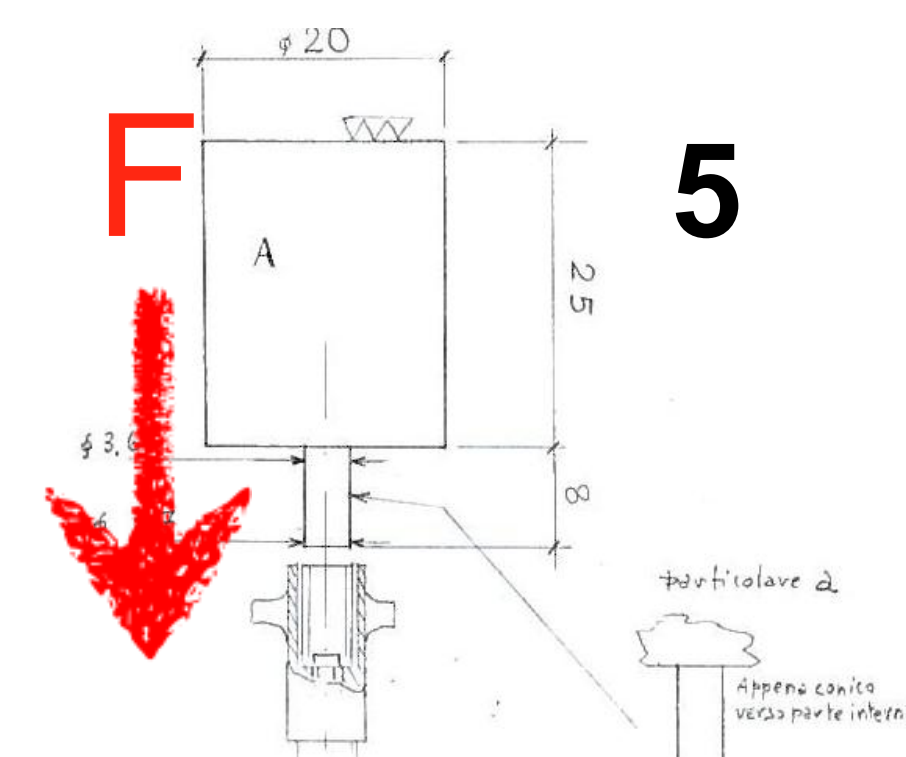
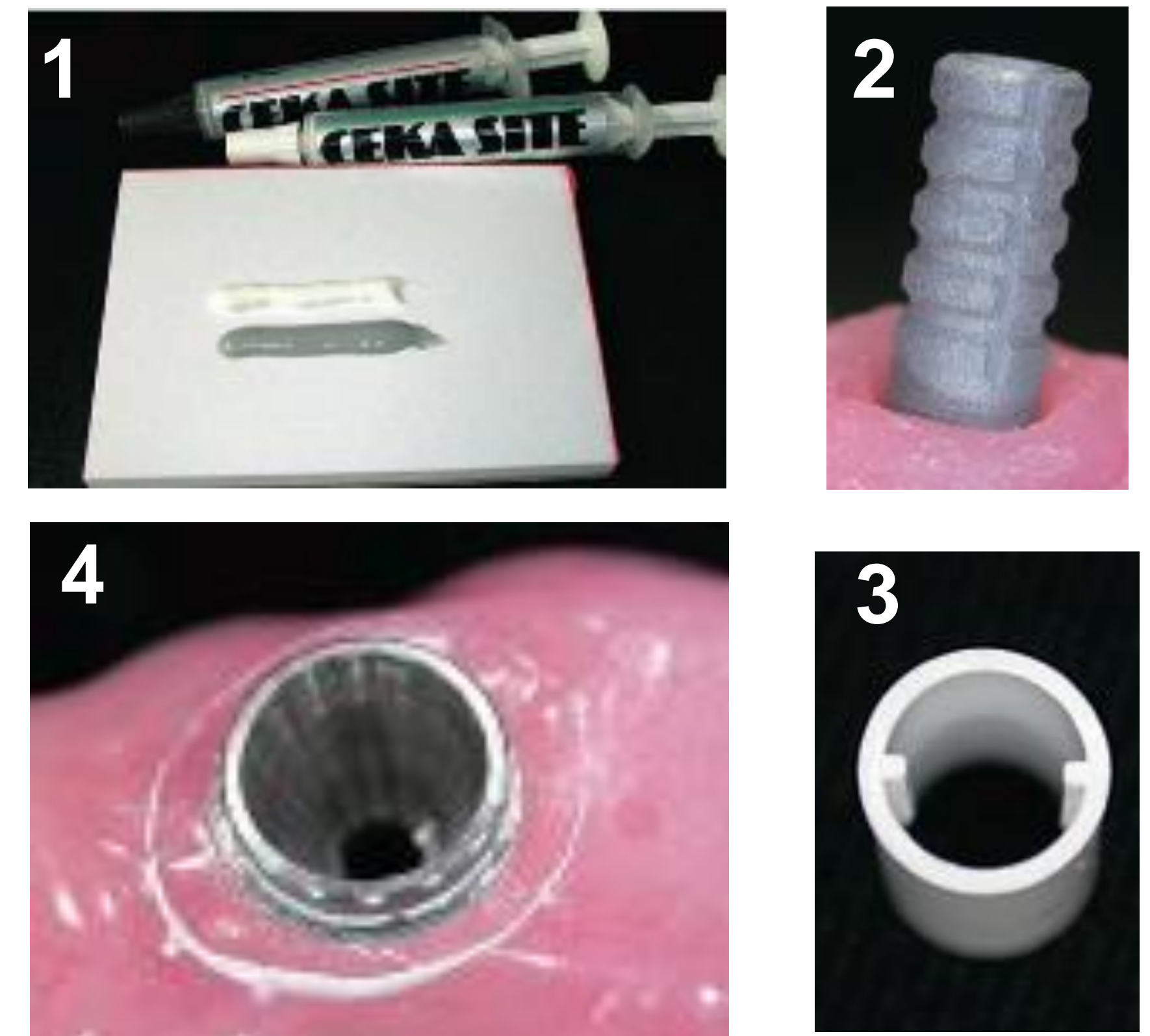


FIGURE LEGENDS

- Fig. 1 Luting Cement Ceka Site.
- Fig. 2 Inner Cylinder, titanium alloy type 4.
- Fig. 3 External castable Cylinder.
- Fig. 4 Components cemented.
- Fig. 5 Experimental set-up 2.
- Fig. 6 Universal testing machine (Instron).
- Fig. 7 Picture of experimental set-up 2
- Fig. 8 Vectorial force analysis of experimental set-up 2
- Fig. 9 Sample of the experimental set-up 2 after loading
- Fig. 10 Experimental set-up 2 load results.

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