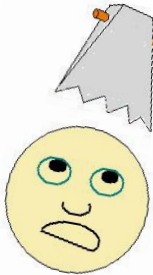


At last Rejection of Screw-Implants ?

These days mainly screw implants are used. The reason therefor is the greater primary stability of the implant, which however decreases immediately (secondarily) afterwards.

To screw an implant, a high force is required. Nowadays up to 70 Ncm torque and more are recommended.



Some experts speak of bone condensation or compression. In fact this bone injury is bone contusion.



After inserting the screw follows a 3-6 months lasting remodeling-phase of the bone.

During this time, the destroyed bone is broken down and after this, new bone can be formed again (S.J.Ferguson et al.2006).

The risk of micro-movements is significantly for many weeks (S. Raghavendra et al. 2005) and we find a gap of stability.



After this phase, it could come to a purely connective tissue attachment to the implant.

Caution: With thin bone lamellae or contusion of blood vessels, the risk of bone loss in the esthetic region is very high.



The risk of micro-movements of a rotationally symmetrical implant without threads that was wanted to be reduced by using a thread, this risk is growing significantly in the weeks after insertion of a screw implant.

Movements occur when the static friction is exceeded. After this we have a sliding friction.

Static friction $F_H = \mu_H \cdot F_n$ (friction law)

It is not surprising that the static friction coefficient μ_H will decrease by the bone contusion. Bruised bone is softer.

When a 10-tons truck goes on wet surface, the friction coefficients μ_H decreases, its weight however remains the same. The truck is beginning to slide around.

With screw inserting, the friction coefficient, decreases, because the bone is crushed.

According to S. Harder the micro-movements are problem of gap formation, and thus causes the bone loss around the implant (Spectator Dentists-Issue 1-2009).

Osseointegration is the final stage of successful implantation. As long as the bone is in the remodeling-phase, there is no osseointegration by definition.

This also means that in the so-called remodelingphase the design of the surface of the implant, such as plasma

coating or measures like blasting with corundum, etching with hydrofluoric acid have no meaning.

The size of the implant-surface plays no role, and it does even not exist in the friction law.

Since the surface energy of the osteocytes and compacta is comparatively high, the bond strength to titanium can thus considerably be reduced. (lotus effect).

Scientific studies have shown that titanium nanoparticles were detected after implantation in various organs (Rubio JC 2008). It is very likely that with special surface treatment (see above) nanoparticles solve by abrasion from the titanium surface (risk of Ti-allergy). As for nanoparticles in individual products, the European Union has already enacted mandatory labeling in 2012.

The DGI (German Society of Implantologists) puts on a multicenter study for patients, in order to verify suspected titanium allergy (25th annual meeting DGI).

There is also a study (published online Jan. 15th 2009 doi 10.1186/1423-0127016-7) that shows an antibiotic resistance of bacteria by TiO₂-particles.

Summary:

All of the above-mentioned, and to implantologist long known evidence, indicates that the screw thread, with high primary stability, will lose this stability over weeks and months, and is accumulating problems that are less desirable.

Alternative solution:

All here mentioned problems can be prevented. This will be a significant convenience for the patient and safety, and shortening the healing time (immediate implantation even in single-tooth loss).

After insertion of a conical implant, it is pressed flat on the compacta. As the compression modul of the compacta is very high (about 20 GPa or 2 tons/mm₂) there is no risk of damaging the bone. With using an oval, rootlike implant, a rotation is absolutely impossible, the friction problem with screws is vanished and the risk of squeezing micro-vessels with thin bone lamellae (anterior region) will be significantly lower (benefit for the aesthetics).

Such non-rotationally symmetric cavities can be produced with conventional drills (description see ROSI® implant), as well as with piezo-surgical procedure.

The tops hereby must have internal cooling and drainage grooves in the surface are needed. (Patent Pending)

Implants may also be produced of composite (PEEK Polyetheretherketone, since 1980)

Benefits: Elasticity of the composite is similar to the bone, allergy free, low thermal conductivity, grindable.

The combination with oval screw-implants brings even more benefits.

Author:

Dr. Bernd Boehm-van Diggelen,

Nuernberg, Jan. 21st. 2012

www.dr-boehm.de, info@dr-boehm.de