

Economic success in the implantology market in Germany

What role does the choice between two-piece implants with conical and non-conical internal connections play?

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Since the first dental implant consensus conference a good 40 years ago, the development of modern implantology has been impressive, both scientifically thanks to the discovery of the biocompatibility of the titanium surface and economically: the number of dental implants placed in Germany has risen from 400,000 per year around 20 years ago to an estimated 1.3 million today—and the upwards trend is stable. Over the years, not only has an independent, innovation-driven industry developed, but also established global competitors in the dental industry want to participate in this solid market.

In Germany, there are currently more than 200 independent endosseous implant systems, an unusually high number are approved and accordingly many national and international suppliers are vying for the favour of the dental profession. There is no doubt that the German market is a key market in which every market participant wants to succeed, particularly in order to succeed globally. It is not easy for dentists to find their way around the selection of implant systems on offer, especially as the pricing of the products varies greatly. The same applies to the effort

that suppliers put into the publication of studies, advertising, customer care and training events.

Unsurprisingly, the market is dominated by a manageable number of established providers, who are well known by the public thanks to extensive marketing and are often owned by listed companies. In addition, there are the smaller, often independent manufacturers who are characterised by their innovative spirit rather than advertising presence and large field service organisations. There are also numerous outsiders who are known neither for exceptional presence and pricing nor for innovation and customer proximity. Their market share is small.

The role of innovative spirit for success

In dental implantology, besides one-piece systems and the still young ceramic implant systems, the group of two-piece titanium implants has established itself as the dominant one on the market because it is the most versatile. Among their numerous further developments over the decades, the (not so recent) invention of the conical internal connection between implant and abutment is certainly the most significant innovation, dividing the market roughly into conical and non-conical internal connection implant systems. Some of the large established providers do offer a conical internal connection implant, some do not. Many of them offer both.

With the conical internal connection, the aim is to mitigate or even eliminate the system-inherent weaknesses of the rightly popular two-piece implant systems. These concern primarily the enormous mechanical stress on the connecting screw between implant and abutment and in the gap between these two parts triggered by masticatory forces, which can promote bacterial colonisation of the interior of the implant when positioned subgingivally. Conical internal connection designs aim to seal this gap or relieve the abutment screw, ideally achieving both.





Dental professionals' needs

Implant manufacturers must always be aware of limited time and limited staff, even in established and successful practices. Accordingly, dentists want lean and easily reproducible processes, especially with regard to teamwork, but without compromising quality. This does not apply only to implantology. While the differences in surgery between conical and non-conical internal connection systems are minor, they are sometimes clear when it comes to implant exposure and impression taking. Non-conical internal connection implants are usually placed crestally or supragingivally, which is advantageous for quick and easy exposure and impression taking. For implants with a conical internal connection, more care is required, especially in the correct positioning of the impression aids. The special features of optional subcrestal insertion, not recommended for non-conical internal connection implants, must also be taken into account.

At the time of restoration, the differences become greater: the butt joint or joint connections of non-conical internal connection systems enable, for example, a clear determination of the correct height for single crowns without the abutment screw being necessary at this point. With many conical internal connection systems, press fit with the connection screw is first required to determine the fit and occlusion in order to seal the implant and establish the correct fit of the crown. Special unscrewing instruments are often required here to make the extra work easier for the dentist.

Dental technicians too want standardised procedures in order to work economically and avoid mistakes. Furthermore, a diverse selection of abutments is required for modern and sustainable implant prostheses. Conical internal connection implant systems gained a poor reputation among dental technicians in this respect, as the

prostheses are considered to be limited and the press fit between abutment and laboratory analogue on the model is considered to be a hindrance. However, many innovative conical internal connection systems now provide dental technicians with the tools to enable them to work as efficiently as with the butt joint. In particular, consistent digitalisation in the fabrication of dental restorations has led to impressive prosthetic possibilities in recent years—and this now applies equally to both designs.

Preventing complications

The enormous increase in the number of implants placed in Germany over the years automatically brought with it a significant increase in the number of high-risk patients treated. A decisive indicator of the predictability of long-term implant success is therefore whether an implant has the necessary design prerequisites to prevent peri-implantitis. With non-conical internal connection systems, it is inherent in the design that some play remains between implant and abutment, which inevitably results in micro-movements and gap formation. These factors are not suitable for preventing gingival recession and bone resorption in the case of subgingival implant positioning. Good results are nevertheless possible, but only if the surgeon pays the utmost attention to sufficient tissue volume, especially mucosa of at least 3mm thick, which can seal the micro-gap from bacterial intrusion. High surgical effort is unavoidable in many cases.

Conical internal connection implant systems score points in the long term with their tightness and are accordingly more forgiving of tissue deficits. If the construction is designed to completely eliminate micro-movements between abutment and implant, subcrestal positioning is possible and thus a bony seal can form around the implant shoulder, providing the best conditions for stable soft tissue.



Complications include loosening or even fracture of the abutment screw. No one wants regular visits from their patients just to tighten or even replace the screw. It is inherent in the system of non-conical internal connection implants that the screw always has to cope with the force of the connection, and thus complications are latent. With conical internal connection systems, it is worth taking a closer look at the individual details. Especially a large Morse taper can significantly relieve the abutment screw by creating strong self-friction between implant and abutment.

Patients' needs

The patient's desires are ultimately a combination of perfect aesthetics, sustainability and tolerability, as the implantological solution has been recommended to him or her as the best for his or her case. Aesthetically, conical internal connection implants are usually at an advantage, as they are always placed crestally or subcrestally. However, non-conical internal connection systems can also deliver convincing results, provided they are positioned subgingivally, unlike tissue-level implants, and, for example, with a polished shoulder to allow soft tissue on top and bone underneath.

For the patient, the sustainability of the implantological restoration means not only the best possible prevention of peri-implantitis but also, of course, a high degree of tolerance with the aim of achieving the most biological solution possible. While it is up to the dentist to carry out careful patient selection and, in case of suspicion, to test for titanium intolerance, the implant manufacturer of a two-piece system can positively influence the long-term result with its individual design approach to the abutment connection. This is because micro-movements of the abutment in the implant involuntarily result in abrasion of titanium particles, which permanently enter the human organism unnoticed. This must be separated from possible intolerance to titanium surfaces.

The extent and effects of this titanium abrasion are the subject of initial studies, but it can already be said that highly biological solutions with titanium implants can only

be achieved if this abrasion is eliminated. It is apparent that the conical internal connection has an inherent advantage here, since it avoids micro-movements.

Market development

The coming years will be characterised by numerous further developments of conical internal connections—which makes sense, because this principle is the more recent one. The much respected large established providers will also present innovations in this area, and thus the market share of conical internal connection systems will continue to increase, but will also soon reach a point where both designs converge in market share. Because of the efficient prosthetic restoration and the simpler workflow, non-conical internal connection systems will retain their supporters. The key to success will be keeping up to date with customers' wishes and responding to these. Customers will succeed in finding exactly the product that suits their philosophy, owing to the enormous diversity of the German implant market that becomes apparent upon closer inspection.

about the author



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