

GapSeal® – Periodontitis and peri-implantitis prophylaxis through sealing the superstructures

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- 1972 – 1974 Doctor's degree for dentistry and medicine
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- 2010 Speaker and consultant

Periodontal disease is still a key area of interest in dentistry today. While, in the past, we relied on improving treatments in technical and material terms, with today's possibilities, treatments that enable or guarantee long-term success are being sought. The hard and soft tissue surrounding the tooth or implant unfortunately continue to be a weak point in ongoing treatment with any kind of prostheses whatsoever.

The causes of periodontal disease are complex and range from individual predisposition to inherent components, from errors in treatment to poor hygiene. The clinical presentation is usually inflammation of different degrees of severity. Besides all of the known causes, periodontal disease can be attributed to the unrestricted exchange of fluids within the microbe-laden oral cavity and the recesses located in and underneath reconstructions (Fig. 1). This can be significantly improved by sealing areas of possible colonisation, which are often very large, with a microbe-proof material.

The microbe-laden oral cavity and hollow spaces as a cause

From a microbiological perspective, there are significant hollow spaces (Fig. 2) in and underneath screw-retained superstructures, hybrid prostheses and partial prostheses. These hollows are inevitably laden with microbes from the oral cavity. Even patients that have good immune systems and use proven hygienic measures may develop diseases of the hard and soft tissue due to chronic inflammatory irritation from bacteria and their toxins. These may be encouraged by excess prosthesis adhesive, calculus and plaque.

Even though there are many therapeutic approaches, peri-implantitis continues to be a problem in implantology that has yet to be sufficiently resolved. Among the factors to be considered is microleakage, which facilitates peri-implantitis through reinfection from microbe-laden implant interior spaces. In addition to surgical treatment, prophylactic options are available as supporting measures, such as sealing the gaps and hollow spaces in multipart implants. These have achieved a significant reduction in infections.¹

Multipart implants produce movements in the micro-metre range, and even with these dimensions, this allows free exchange of microbes between the micro-gaps and the oral cavity. These are pumped into the gaps by these micro-movements² within the reconstruction, as well as being sucked in by capillary action. The gaps in screw-retained superstructures and those supported by widely varying attachments can be classified in the order of up to several millimetres. Owing to the moist environment, the optimum temperature and the favourable breeding grounds, from a microbiological perspective, they provide the best opportunities for microbial growth, which causes additional damage to the periodontal tissue. In the literature, the growth of tissue into bridge spaces, for example, is thus included among the periodontal diseases.³ Microbe-proof sealing therefore seems desirable in this case as well.

A simple solution

A highly viscous silicone matrix material, which has now been in use successfully in industry and medicine for many years, ensures a reliable seal, making the colonisation of microbes impossible. First, owing to its volume,

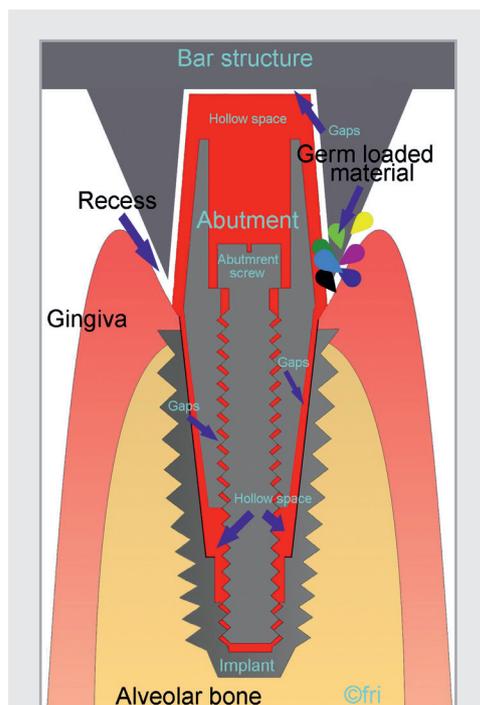


Fig. 1: Schematic representation of a multipart endosseous implant with a bar construction. The recesses, hollow spaces and gaps in the implant and the superstructure are marked with arrows.



Fig. 2: Recesses underneath a mandibular prosthesis supported by an implant bar.

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Video

GapSeal Set (applicator with 10 Tips)	REF 152 041
GapSeal Refill Pack (10 Tips à 0,06 ml)	REF 152 040
Applicator separately	REF 152 042

List of references

- 1) Fritzemeier CU, Schmüdderich W. Periimplantitisprophylaxe durch Versiegelung der Implantatinnenräume mit GapSeal. [Peri-implantitis prophylaxis through sealing implant interior spaces with GapSeal]. *Implantologie*. 2007 Mar;15(1):71–9. German.
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- 3) Wolf HF, Rateitschak EM, Rateitschak KH. Band 1: Parodontologie: Farbatlanten der Zahnmedizin. [Periodontology: colour atlases of dentistry]. 3., Aufl. Stuttgart: Thieme; 2012. 544 p. German.
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the base material works according to the principles that, where something occupies a space, nothing else can occupy it, and if the medium is not conducive to colonisation, no bacteria can grow there either. Additional requirements for an effective sealing material are hydrophobic properties and mechanical strength to give it high retention, so that it cannot be washed away. It must also not harden, or else shrinkage could cause gaps to form again. Furthermore, a viscous material facilitates movement into the gaps. GapSeal (Hager & Werken) consists of a specially adapted silicone matrix that prevents the infiltration of bacteria by sealing hollow spaces. Although it is always placed extracorporeally, it has the proven advantage of not having any sensitising (allergenic) effects. In fact, it shows no damaging effects to the organism at all, and it can therefore be used without concern for all patients. The material has additional benefits. Its high viscosity improves the anchorage of telescopic or conical crowns, since with increasing viscosity, retention also increases.⁴ The thixotropic properties of the base material prevent the formation of calculus, as the silicone film makes sustained adhesion of plaque on the supporting elements impossible.

Easy application

GapSeal is supplied in sterile blister packs containing ten ampoules of 0.06 ml each and an applicator, ensuring sterility even for surgery (Fig. 3). The applicator can be resterilised for reuse. Hollow spaces should be sealed as soon as possible – preferably at the time of restoration. After inserting the GapSeal ampoule into the applicator and removing the cap, the clinician applies GapSeal directly by simply turning the wheel. The space is filled with a surplus of material so that there are no air pockets. The ampoules are designed for single use. In the situation that the hollow spaces cannot be loaded with the sealing material until later, it is recommended to clean them thoroughly beforehand with hydrogen peroxide and alcohol. In the case of a prosthesis with retaining screws, the dentist should re-apply GapSeal at recall appointments (Fig. 4). Replacement of GapSeal in the case of removable prostheses can be done by the patients themselves. GapSeal is extremely well retained, which means it only needs replacement after cleaning the prosthesis. For home use by patients, the material should be distributed with a cotton bud after application if the recesses are sufficiently large.

Astonishing results

A demonstrable reduction in microbes and healthy periodontal conditions were verified in patients with a variety of prostheses after periodontal therapy and the use of GapSeal to seal any recesses in and underneath the superstructures. Follow-up examinations after more than ten years documented a long-term effect. No patients complained of any adverse effect on taste due to the material.

The oral cavity is simply not designed for reconstructions. The hard and soft tissue mainly react negatively to excessive or unphysiological stresses or infectious irritation. The occurrence of infection usually worsens and becomes chronic if oral hygiene is poor. With today's wide variety of prostheses, there is therefore an emphasis on preventing recesses from becoming infected.

GapSeal, which has been proven in implantology and clinically tested, now offers new possibilities for prophylaxis even for superstructures. Consistent use of GapSeal will reduce periodontal disease and increase long-term success of treatment.



Fig. 3: GapSeal



Fig. 4: Filling of an implant bar construction in the mandible with GapSeal.

