



TONGUE SANITIZATION

For an effective deep
cleaning of the tongue



Scientific Publications

Content

Scientific Publications

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From a cardiovascular, muscular and postural point of view, sport is a healthy activity. However, when practiced as competitive sports, it poses a series of health risks for the apparatus which are not directly connected to the sporting activity – such as the oral cavity. Particularly when athletes practice so-called contact sports, traumatic, dento-maxillo-facial pathologies can and must be avoided through preventative measures.

Coordination of home and professional treatments in patients practicing competitive sports

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Presentation of the clinical case

The patient (m, 50 years old) is in apparent good health. He complains about the loosening of a gold-ceramic crown for which the rehabilitative treatment was performed in another dental practice. The medical history reveals that the patient is in the best of health and shows no sign of systemic disease. However, his lifestyle puts excessive pressure on the masticatory apparatus. The patient practices several types of sport on a competitive level and believes that he is maintaining a lifestyle which is physically healthy. Upon initial examination, the fracture of the crown on an implant TBR 3.5 x 13 mm as well as the corresponding loss of the prosthetic crown nine years after fitting are immediately apparent. The patient had worn facets on all dental elements (pic. 1). In the course of discussion with the dental hygienist, the patient reports that sporadic check-ups have been conducted at his dentist, and that he clenches his teeth powerfully and repeatedly. Additionally, at Thai boxing training sessions,

he is subject to strong hits in the face and often uses a silicon mouthpiece when diving for underwater fishing. Furthermore, he suffers from nocturnal bruxism, which further impairs the clinical picture.

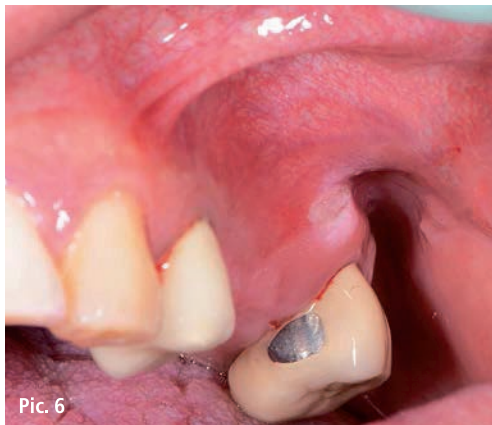
Materials and methods

A thorough examination was performed with the aid of an intra-oral camera (Acteon SoproCare™). Thanks

to special filters, the camera makes it possible to quickly and accurately detect the areas of demineralization and infection and show them to the patient in real-time. In this way, the patient is able to get directly involved and see the damage for themselves. On the other hand, in perio mode, the same camera displays the bacterial biofilm, tartar and gum inflammations in the lingual and vestibular areas of the lower incisors (pic. 2 - 3).



Pic. 1: Clinical situation. – Pic. 2 and 3: Picture with the intra-oral camera (Acteon SoproCare™) in perio mode. – Pic. 4 and 5: Images in daylight mode.



Pic. 6: Major aphtha.

The pictures obtained from the fluorescence analysis are placed on top of the anatomical images to produce an image of the tissue that is immediately and easily comprehensible for the patient and which would not be visible using simple white light. The radiated tissue is depicted with a simple and easily comprehensible color palette. In daylight mode with white light and a 100x zoom, a significant amount of plaque was evident on the lingual surface of the lower incisors (pic. 4) and the loss of tooth substance on the biting surface of the incisors visible (pic. 5). Additionally, a major aphtha (pic. 6) could be seen on the mucogingival border of tooth 26. In caries mode, the system can reveal carious areas around the enamel / dentine border from as early as stage 1 (System ICDAS II), which were not detected with the patient. As the camera images could be shown in real-time, the patient was made aware of the risks caused by stress to

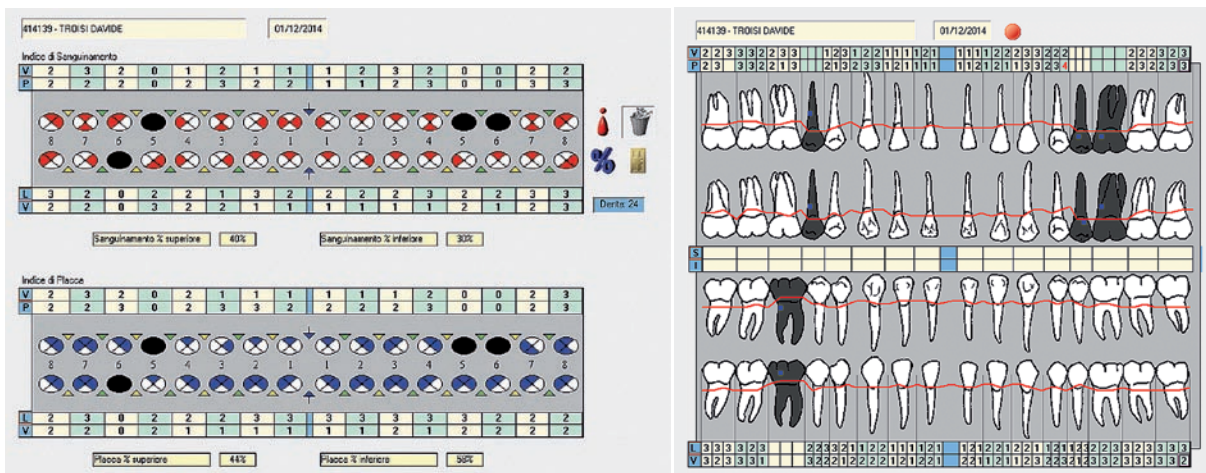
the masticatory apparatus as well as the risk of insufficient plaque control and was directly shown the areas requiring conservative, periodontal and implantological treatment. Procedures for home and professional oral hygiene were recommended and then agreed with the patient. After seeing the damage to the oral cavity for himself, the patient was in complete agreement with the suggestion to follow the procedures recommended by the dentist.

Decontamination

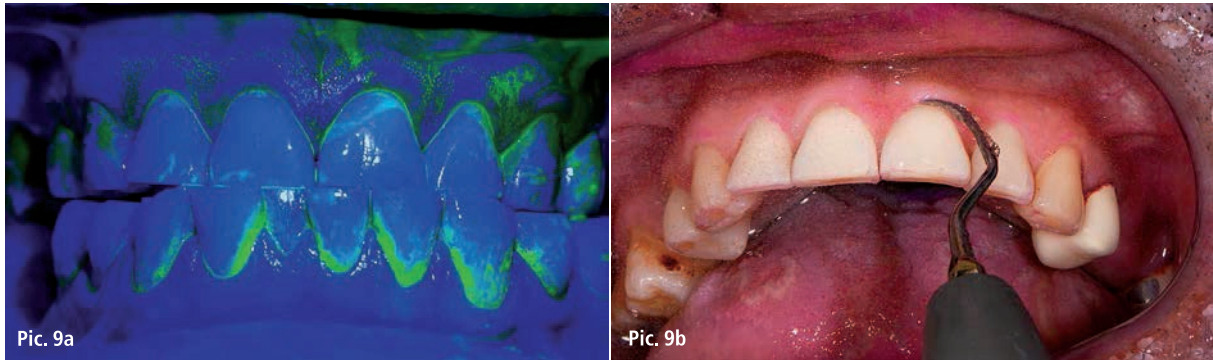
The collection and recording of the clinical data (pic. 7 and 8) was followed by plaque removal during which an airflow device for dental prophylaxis with dual function was used (Air-N-Go easy; SUPRA: supragingival application with carbonate or natrium carbonate, and PERIO: for subgingival application with glycin and appropriate attachments). In this particular case, the device was used on the SUPRA setting for supragingival polishing and cleaning. Using a plaque remover (Newton P5 XS B.Led Acteon Satelec) with plaque detection system, (pic. 9a), ultrasonic scaling was conducted which enables the user a minimally invasive procedure and simultaneously a precise recording of the toxins and tartar to be

removed. After the FLAG liquid was added to the 300 ml container, the surfaces were decontaminated in a targeted manner with the aid of the blue light of the Newtron Slim B.Led handpiece, which was operated with a standard attachment (pic. 9b). With white light, the LED ring of the plaque remover enabled optimum lighting of the areas requiring treatment in the retromolar area. Subsequently, a tongue sanitizer (TS1 Tongue Sanitizer, TSpro) for professional tongue cleansing was attached to the saliva ejector for use. Using a gel, the reverse side of the sanitizer is moved gently over the tongue. The tongue sanitizer is then turned around and soft ribs suction the bacterial biofilm from the surface of the tongue (pic. 10a and b).

After the periodontal debridement, a protective varnish containing fluoride (Fluor Protector S, Ivoclar Vivadent) was applied, whereby a thin and even layer was applied to the demineralized tooth surfaces (pic. 11a und b). For the treatment of various aphthae in the oral cavity caused by the snorkel mouthpiece, the use of a mouthwash (Fertomcidina U, Theriaca) based on iodine and salicylic acid with bactericidal and anti-inflammatory effect was recommended which is dabbed on for five days, three times a day for 30 seconds after rinsing twice a day with the 50 percent diluted product. At a later check-up, the healing status of the aphthae tissue was checked and the patient reported that he would like a teeth whitening treat-



Pic. 7 and 8: Patient form.



Pic. 9a: System for plaque detection. – Pic. 9b: Periodontal debridement with Newtron Slim B.Led handpiece.

ment to be conducted as soon as the initial phase of preparation of the oral cavity has been completed and before the implant treatment is continued.

Surgical phase

A decision was made to extract the broken implant with a bore milling with a diameter of 4 mm and to replace it with a new implant three months later (pic. 12–15).

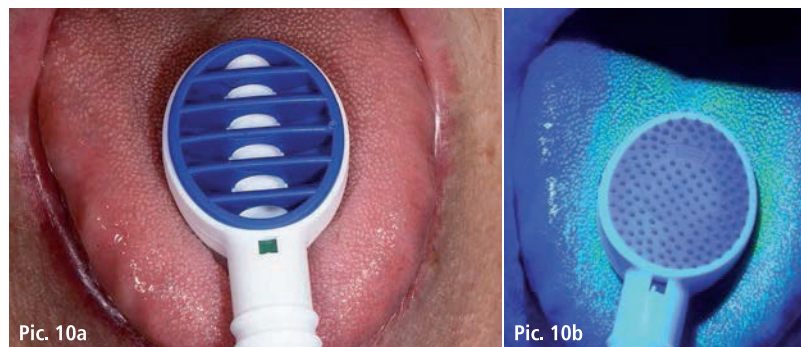
Procedure in the domestic environment – tailoring

To motivate the patient to efficiently control bacterial plaque, he was treated using the brushing method defined as "individual and accompanied tailoring" (Nardi et al., 2014). Prior to treatment, we used a plaque indicator with fluorescein to get an impression of the bacterial biofilm in the oral cavity. After careful assessment of the tissue biotype, we determined diastema and observed the manual skill of the patient. As intended with the tailoring procedure, a hand toothbrush (GUM Technique Pro, Sunstar) was recommended which guarantees efficient plaque control in the interdental spaces through its extremely pointed, cylindrical and angled bristles. We recommended to the patient that he improve plaque control in the interdental spaces by using the interdental brushes (GUM Travler) and, together with the patient, selected the appropriate size for the attachments of the brushes to be used (pic. 16). We recommended that the

patient use disposable dental tissues (Digital Brush) for oral hygiene on the go at training and a toothpaste (EP Enamel plus, Micerium) with low abrasion value (25 RDA). We also recommended to the patient that he only use whitening toothpastes on rare occasions.

Procedure in the domestic environment – whitening

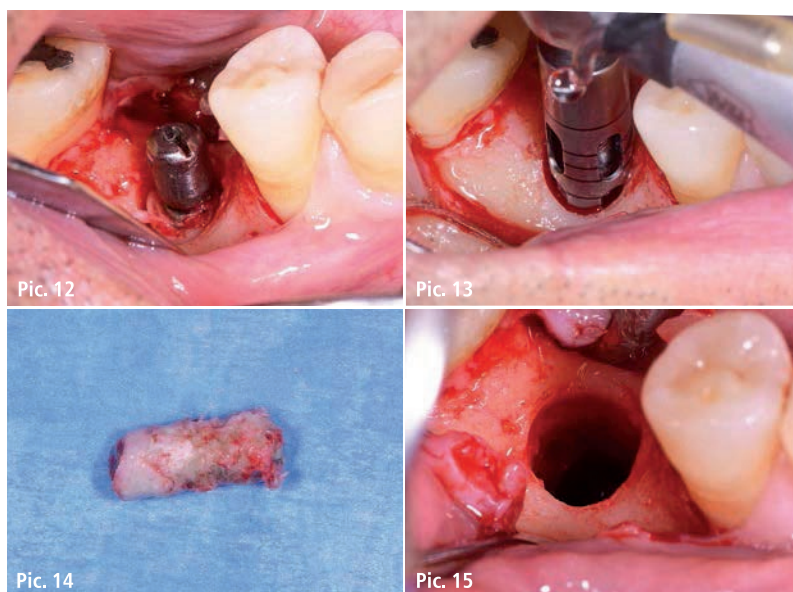
We recommended a whitening treatment (Ena White 2.0) to the patient and advised him to conduct this in the mornings and evenings



Pic. 10a and b: Professional tongue cleanser TS1 Tongue Sanitizer during application.



Pic. 11a: Application of protective varnish containing fluoride. – Pic. 11b: Application of Fluor Protector S (Ivodar Vivadent) gel.



Pic. 12: Fitting of the TBR healing screw which determined the correct position and angle for the bore milling. – Pic. 13: Use of the bore milling up to a length of 13 mm. – Pic. 14: Extracted implant with the fully intact bone which surround the implant. – Pic. 15: The post-extraction area.

after brushing his teeth over the period of 20 days and to subsequently rinse his toothbrush with water. When the patient became aware of how easy the system was to use, he immediately agreed to the treatment, which we were able to show him using a brochure.

Conclusion

We saw the patient again 15 days after treatment. The video camera was used during the examination in order to show the patient the improvement resulting from the domestic plaque control in real-time. The



Pic. 16: Better plaque control in the interdental spaces using interdental brushes. - Pic. 17: Handover of the mouthguard (Pro Guard).

patient stated his satisfaction with the achievement of the desired aesthetic results and with the whitening conducted at home as well as with the improved oral hygiene thanks to the selected brushing technique we support ("tailoring procedure"). The patient also became aware of the risks caused by his sporting activities. Again, the patient's attention was drawn to the importance of relaxation through stretching the masticatory muscles.

After a close postural examination on the posturometric and stabilometric platform Lizard Ultimate, the patient received a bite mouthguard and thus a device with a protective function, in that it protects the teeth from impact, as well as a bite function, which improves performance through its muscular, postural and articular effect (pic. 17).

In addition to the appointments for the rehabilitative therapy plan with the implantologist, the patient was included in a plan for regular professional check-ups for oral hygiene which enables the dental hygienist to conduct clinical practices which counteract the stress through competitive sports and ensure a healthy, functional and aesthetic smile. The technique of the whitening procedure conducted at home (Ena White 2.0) is an effective instrument to stimulate compliance with the procedure for domestic dental care and gets the patient used to paying closer attention to regular check-ups which provide the dentist with the opportunity to check the patient regularly and examine the status of the oral cavity health. It also enables the dental hygienist to correct unfavorable lifestyle habits to ensure a beautiful and healthy smile.

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Halitosis clinic at Basel University



Foto: benika/Shutterstock.com

The clinical picture of "halitosis" is extremely complex and involves various causes. These are most frequently found in the oral cavity – the first point of contact should therefore be a dentist specializing in this area. For the last 13 years, a professional halitosis clinic has been offered at Basel University. The following report provides a brief insight into the diagnosis and therapy concept.

Introduction

In the past few decades, the awareness of the topic of "bad breath" has been raised among patients and dentists. This is not only due to the topic's media presence but also to the increase in scientific publications on this subject. Despite well documented diagnosis and therapy concepts, in daily practice there is a certain helplessness when dealing with halitosis patients (1). More than half of those affected had been to one or more doctors about the issue prior to visiting the halitosis clinic, without success (2). Unfortunately, general treatments are often conducted which swallow time and money and lead to frustration. Time and again, patients travel far to seek help at a professional halitosis clinic (1). Often, they have been suffering from bad breath for years, which results in a large degree of psychological stress in those affected and can have a negative impact on their quality of life.

Epidemiological studies have shown that around 25 percent of the population sometimes and 6 percent permanently suffers from halitosis (1). As the causes of this are often found in the oral cavity, the first point of contact should be a dentist. The following report on the halitosis

clinic at Basel University only provides a small insight into the large and complex topic "halitosis". Those interested in further details should refer to the book "Halitosis, Professionelle Behandlung von Mundgeruch in der zahnärztlichen Praxis" (3).

Terminology

The term halitosis (Latin Halitus: breath, mist) describes unpleasantly smelling breath, regardless of the cause. Terms used synonymously such as bad breath or Foeter ex ore only refer to cases where the cause lies in the oral cavity. According to a recently published international guideline, the term "halitosis" should therefore be the only term used in order to include all possible clinical pictures (4). A differentiation is now made between intra and extra-oral halitosis, depending on the location of the cause .

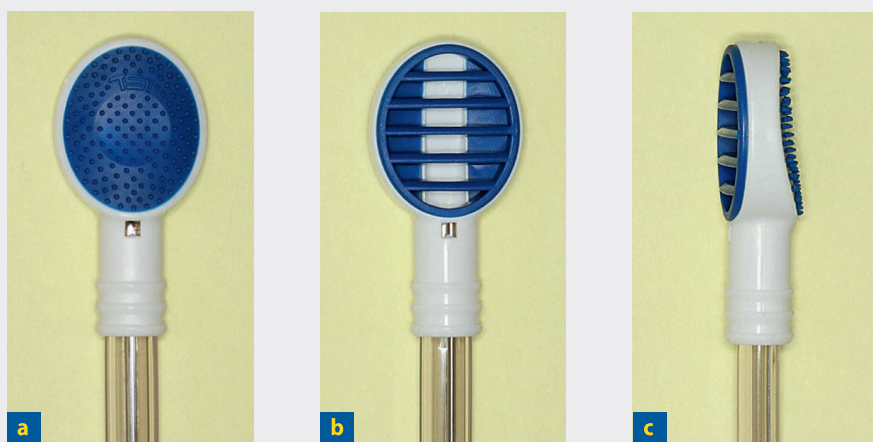
As well as real halitosis, there is also mentally-associated halitosis (pseudo-halitosis/halitophobia). In these cases, the patient complains of unpleasantly smelling breath which cannot be verified objectively. As opposed to halitophobia patients, with diagnosis and information, patients with pseudo-halitosis can receive therapy to be convinced otherwise.

Temporary halitosis is caused by food such as onions or garlic.

This recommended terminology for the diagnosis of halitosis (4) (Tab. 1) corresponds to a simplified international older classification (5-7).

Causes

Various studies have shown that in around 80-90 percent of cases, the source of an actual halitosis lies in the oral cavity (1, 2, 8). As most oral bacteria (>50 percent) are found on the surface of the tongue, the back of the tongue, in combination with the tongue coating, is the most frequent culprit. Micro-crevices and furrows of the epithelium of the tongue form oxygen-protected niches for gram-negative, anaerobic bacteria (1). Through the breakdown of organic materials (saliva, food residue, shed residue of the epithelium), these produce primarily volatile sulfur compounds (VSC) (9), which penetrate the breath and are perceived as an unpleasant smell. These bacteria are also responsible for gingivitis and marginal periodontitis (10) which, together with open carious lesions, a lack of oral and prosthetic hygiene or local infections such as pericoronitis, peri-implantitis and candidiasis, are possible causes of halitosis



Pic. 1a-c: TS1-Tongue Vacuum Cleaner with disposable saliva ejector
Pic. 1a: View of the nubby side, **Pic. 1b:** View of the lamella side, **Pic. 1c:** Sideview

of halitosis (1, 2, 8). Additionally, there are cofactors which promote halitosis originating in the oral cavity. Examples of this are reduced saliva flow rate, stress, smoking, oral respiration, an unbalanced diet, a Body Mass index that is too high or too low, not drinking enough water per day and consuming coffee and alcohol (11-13).

Contrary to popular opinion, extra-oral causes are rare (around 5 percent). These are most frequently found in the ear, nose and throat area (e.g. tonsillitis, sinusitis) and more seldom in the gastrointestinal tract (e.g. gastroesophageal reflux, diverticulum). Systemic illnesses (e.g. serious liver or kidney disease, diabetes mellitus type I) can also be responsible for halitosis (1, 3).

Diagnosis and therapy concept

Diagnostics

When making the appointment, the patient is informed about what they should do before the first appointment – this is the only way to obtain applicable examination results. Any treatment with antibiotics should have been completed at least four weeks previously. For two days beforehand, the patient should refrain from eating onions and garlic. Additionally, on the day of the examination, the patient should refrain from anything which may cover up the halitosis. This includes the use of perfumed

cosmetic products, sweets, chewing gum and mouthwash as well as smoking. Four hours prior to the appointment, the patient may not perform any oral hygiene, eat anything or drink any coffee.

The person performing the examination should not be suffering from rhinitis or

sinusitis, have bad breath themselves and should possess a good sense of smell. A simple test (Smell identification Test TM, Sensonics Inc.) can be used to detect a possible smell disorder (4). Anyone performing the halitosis clinic in Basel must pass this test before the first appointment.

The patient fills in a questionnaire developed especially for the halitosis clinic and brings it along to their appointment (www.andreas-filippi.ch). This special halitosis medical history form includes 35 questions about the type, frequency, time of day and extent of the halitosis, treatment already performed by doctors and dentists or home treatments, resulting psychological stress in the patient and typical cofactors. This also serves as the basis for the introductory discussion with the patient. In addition to the halitosis case history, a comprehensive medical and dental history is recorded. This also serves as the basis for the introductory

Tab. 1: Recommended terminology for the diagnosis of Halitosis (4,6)

Diagnosis	Description
Transient Halitosis	The unpleasant smell is nutritionally (z. B. by garlic)
Intraoral Halitosis	Existence of an obviously unpleasant odor beyond the social compatibility with / without impact on social contacts The source is the dorsal- posterior portion of the tongue and / or a pathology or dysfunction oral tissue (eg. as periodontal disease) Is by cofactors in influence, the impact on the saliva quality and can have quantity (eg. as smoking, medication, Sjögren's syndrome, etc.)
Extraoral Halitosis	The odor source comes from pathologies outside the oral cavity (nasopharyngeal space, lung or upper digestive tract)
Pseudohalitosis	An unpleasant odor may not be noticed by other people, nevertheless the person firmly expects that it has a bad breath. This condition is improving by enlightening advice and instruction in oral hygiene measures
Halitophobia	After treatment of halitosis or Pseudohalitosis the patient remains firmly convinced to suffer from halitosis, although not objectively there are indications

discussion with the patient. In addition to the halitosis case history, a comprehensive medical and dental history is recorded. Form asks primarily about existing medical and systemic diseases and the dental history form about frequency of dentist visits as well as the type and frequency of oral hygiene aids used (4, 14).

The clinical examination focuses on the oral predilection sites for halitosis. This includes the oral and pharyngeal soft tissue, in particular the tongue coating, pharynx ring and wetness of the oral mucous membrane. Additionally, the oral hygiene and dental restorations are assessed and a periodontal screening conducted.

The diagnosis of the respiratory air takes place organoleptically (with the examiner's sense of smell) as well as instrumentally (15, 16). During the introductory talk and the clinical examination, the perception of the halitosis depending on the distance between the examiner and the patient is recorded (distance 1 m = 3rd degree, distance 30 cm = 2nd degree, distance 10 cm = 1st degree) (17). The instrumental measurements with a sulfide monitor (Halimeter, Interscan) and a gas chromatograph (OralChroma™, Abilit) provide information about the strength and distribution of existing volatile sulfur compounds.

Therapy

An individual therapy concept is presented depending on the patient's findings and diagnosis. Generally speaking, micro-organisms and bacterial nutrient supply should be reduced and volatile sulfur compounds converted into non-volatile compounds. Oral cosmetics are used if required (18).

Existing inflammations such as gingivitis, marginal periodontitis, pericoronitis or peri-implantitis are treated. If necessary, a conserving, prosthetic or surgical treated is performed, if required with the support of a dental hygienist.

If tongue coating was diagnosed, profes-

sional tongue cleansing is performed. Due to the high risk of injury, professional teeth cleansing brushes are no longer used and the sonic or ultrasonic attachments available so far are inefficient on the soft tongue mucous membrane. A recently launched product is the TS1 Tongue Sanitizer (TS Pro GmbH, Karlsruhe, Germany) (pic. 1a-c). This disposable plastic item is connected to the suction device of the dental unit with a single-use saliva ejector. Two functional sides enable professional cleansing of the tongue. First of all, a "tongue paste" is massaged in by moving the nubby functional surface back and forth across the tongue (pic. 2a and b). In doing so, the plastic nubs loosen the biofilm upon the surface of the tongue. The tongue sanitizer is then turned 180 degrees and the grooved side used to suction off the loosened coating (pic. 2c and d). To avoid injury, the tongue sanitizer should only be used to the highest point when the tongue is extended ("top of the hill"). The patient is recommended to clean their tongue at home using a tongue brush and tongue paste as part of their daily oral hygiene. Patients with thick tongue coating or a strong gag reflex should additionally use a disinfectant mouth wash for a short period of time. If cofactors were registered in the halitosis case history, these are discussed with the patient and corrected if possible. If necessary, the patient's general practitioner or appropriate doctor is consulted. Every patient receives an advisory guide on the topic of bad breath (19) so that they can take the time at home to read the information contained there.

About two weeks after the initial consultation, a check-up takes place. If the patient does not want a check-up appointment (e.g. due to living so far away), inquiries are made by phone or by e-mail to record the subjective opinion.

In the base of halitosis with extra-oral causes, the patient is referred to the relevant specialist (internal medicine, otorhinolaryngology).

If no halitosis could be diagnosed, the

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Pic. 2a-d: Professional tongue sanitization with the **TS1 Tongue Vacuum Cleaner**

Pic. 2a: Sticking out the tongue, **Pic. 2b:** Application and distribution of the tongue paste with the nubby side,

Pic. 2c: Extracting the dissolved organic films with the lamella side, **Pic. 2d:** Result of the professional tongue cleaning

patient is given another appointment at another time of day. In this way, circadian fluctuations can be recorded. In the case of patients with mentally-associated halitosis (pseudohalitosis/halitophobia), the patient is only informed of the diagnosis at the check-up appointment.

This enables the formation of a relationship of trust and increases the likelihood of the patient accepting the recommendation of any necessary psychological advisory services. The duration of a professional halitosis therapy is limited on average to two appointments of

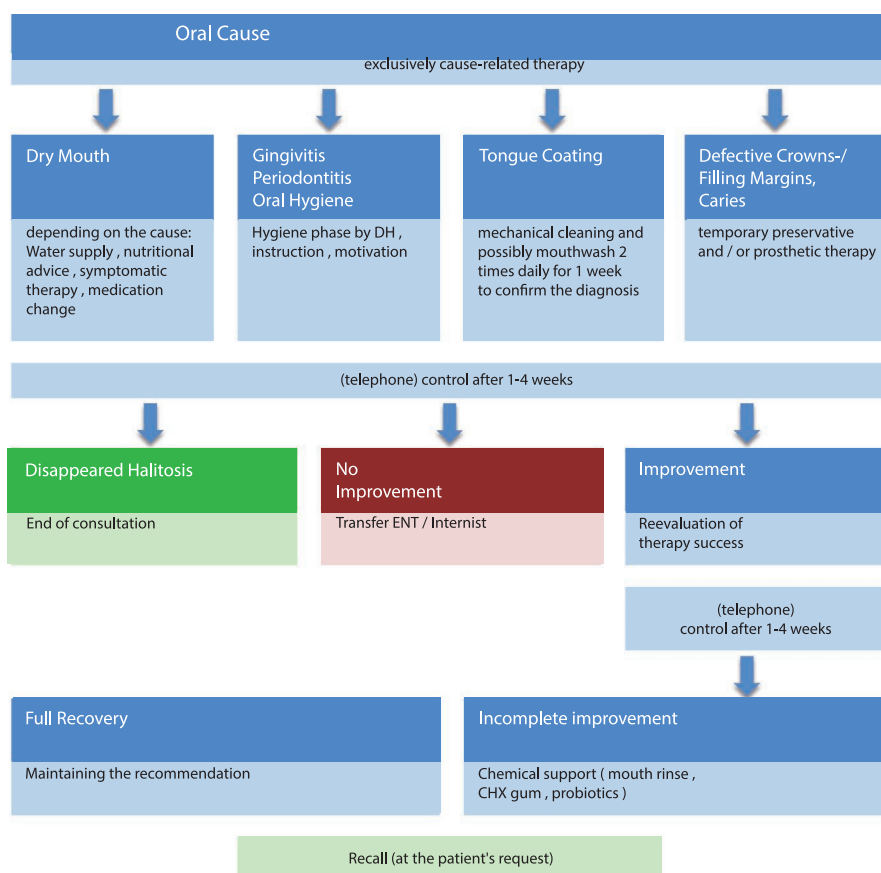
around an hour. With the aid of a strictly cause-related therapy concept (pic. 3), Basel University has been able to achieve a consistently high therapy success rate (>90 percent) over the years (2).

Conclusion

When it comes to halitosis patients, blind or general treatments are almost never successful and lead to dissatisfaction on the part of the patient and the person responsible for the treatment. If the treatment is conducted in line with a standardized pattern, a high level of therapeutic success (>90 percent) can generally be achieved. *pi*

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Pic. 3: Therapy concept the University of Basel (3)

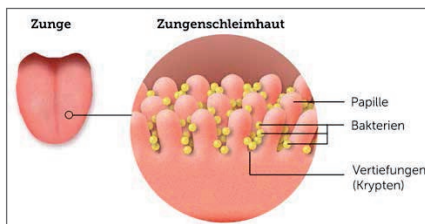
On the tip of your tongue!

Professional Oral Prophylaxis PLUS!

A Chinese proverb says, "The mouth is the entrance of the body and the cause for all suffering".

For this reason, the tongue can be likened to the red carpet of this entrance. A clean carpet is the basis for good oral and general health.

For some time now, the praxisHochschule has been looking into a holistic treatment approach for professional teeth cleaning which also caters to the fact that around 2/3 of all bacteria in the mouth can be found on the tongue.



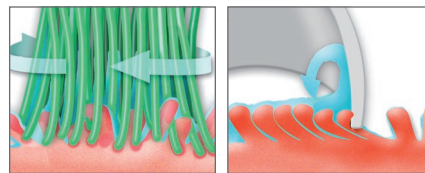
The structure of the tongue can be compared to a deep-pile carpet. The bacteria settle in particular in the crypts (depressions) between the papillae.

The tongue forms a particularly complex ecosystem. Thanks to its large surface and the special papillae structure, it is able to retain food residue and host a diverse tongue flora, the tongue coating. There, organic substances are broken down by anaerobic gram-negative bacteria. The main cause of halitosis is primarily the formation of volatile sulfur compounds (VSC) through the metabolic activity of the anaerobic bacteria. The rear third of the tongue in particular is affected.

Until now, we removed the tongue coating mechanically with the aid of rotating brushes, tongue brushes and scrapers. Chemical additives were then able to reduce the number of gram-negative bacteria.

Accessibility to the rear third of the tongue, where the largest amount of tongue coating is found, is also ex-

remely restricted due to the height of the brush. Subsequently scraping the tongue coating from the tongue only removes the coating above the papillae.



An innovative technology now enables professional tongue sanitization through effective and gentle suctioning of the tongue coating.

It couldn't be simpler to use.

- Remove the protective cap from the saliva ejector.
- Attach the TS 1 Tongue Sanitizer to the saliva ejector until the saliva ejector completely fills the window.
- Then attach the saliva ejector with the attached TS 1 Tongue Sanitizer to the appropriate suction adapter.

The tongue sanitizer is multifunctional. On the one hand, it can be used for removing the tongue coating without the additional use of tongue cleansing gel by simply suctioning using the ribbed side. While doing so, the tongue is held in place with a damp gauze compress (5x5cm) in order to enable dorsal and ventral suctioning. On the other hand, it can be used as part of full-mouth disinfection (FMD), for halitosis therapy or in the case of acute tongue coating, in which case the additional use of a tongue cleansing gel is recommended. In this way, the number of gram-negative bacteria can be chemically reduced by chemical agents such as chlorhexidine digluconate (CHX) with the Cervitec Gel from Ivoclar Vivadent or other agents. In a first step, the tongue cleansing gel is applied to the dosing-recess of the ribbed application surface. The tongue is held in place with a damp gauze compress and



the tongue cleansing gel applied to the tongue in winding movements. In a second step, the TS1 Tongue Sanitizer is reversed and the ribbed side moved gently back and forth over the tongue from the tip to the root of the tongue and back. This makes the papillae erect and subsequently removes the tongue coating from the depths of the crypts evenly, effectively and gently.

Professional oral prophylaxis PLUS:

Today, professional tongue cleansing is an integral part of professional oral prophylaxis. It enables gentle and effective cleansing without the gag reflex being activated and gives the patient a pleasant, velvety feeling to the tongue, significantly increasing their motivation to perform tongue cleansing at home.



TS1 Tongue Vacuum Cleaner

The TS1 Tongue Vacuum Cleaner is a high-quality product, produced in Germany in accordance with ISO 9001.



patent pending

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