

Prevention concepts in paediatric dentistry - orthodontics as an integral part of preventive care concepts

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Indices

Ectopic eruption of teeth, saliva test, caries risk, Streptococcus mutans, Lactobacillus, chlorhexidine (CHX), myofunctional disorder, nasal breathing

Summary

Preventive care for children and adolescents is closely linked to orthodontic issues. Tooth eruption disorders not only influence the development of an eugene dentition, the affected teeth are subject to an increased caries risk. In addition, the appliances inserted during orthodontic treatment can have an unfavourable influence on the ecological balance. At the same time, individual patient behaviour such as diet, hygiene and regular compliance with agreed prophylaxis appointments have an effect on the biotope in the oral cavity. Especially in the case of long-term orthodontic treatment, patient compliance can change again and again, resulting in a higher caries risk. However, since years pass between the change in cariogenic conditions and the appearance of a carious lesion, an analysis of subclinical risk parameters such as Streptococcus mutans and Lactobacillus should always be carried out to correctly assess the clinically assessable situation.

Introduction

Preventive measures for children are often closely linked to orthodontic issues. The path to a healthy caries-free and functionally adequate adult dentition is therefore not limited to caries prevention during the development of the primary and permanent dentition. Early detection of tooth eruption disorders and/or skeletal deviations as well as knowledge of the effects of non-treatment and persistence of an orthodontic problem are an integral part of preventive care for the child or adolescent.

This includes knowledge about potential risks and changes in the oral microbiome. This also includes knowledge about potential risks and changes in the oral microbiome that can be triggered by orthodontic measures. Thus, there is a close bidirectional relationship between prevention and orthodontics in children and adolescents.

Clinical case presentation

The following example of preventive and orthodontic care over 18 years shows how such interdisciplinary cooperation can work in practice.



Fig. 1 Initial situation at the age of 2 years from the front.

Initial situation at the beginning of treatment in 2007 at the age of 2.3 years (*2004)

Preventive findings

Figures 1 and 2 show the findings of the male child at the age of 2.3 years. The bite is caries-free, but there are deep plaque and food-retentive fissure systems in all deciduous molars. The clinical situation is unremarkable and the oral hygiene is good. The nutritional history shows more than 5 sugar impulses outside the main meals, usually consisting of sweets, juices and fruit yoghurt. In view of this history, the stability of the clinically healthy situation is questionable.

An assessment of the caries risk in this age group is well possible on the basis of the detection of streptococcus mutans (SM) in the oral cavity. In a review in 2006, ^{Thenisch41} was able to show that the risk of caries doubles when SM is detected in saliva, and even quadruples when it is detected in plaque. The detection in the plaque presupposes a corresponding colonisation of the child's oral cavity with this germ. However, this can only take place in the presence of an adequate substrate in the form of low-molecular carbohydrates. The early detection of SM is a decisive factor for the caries prevalence to be expected in the next few years^{1,16}. This means that the time of colonisation is important. Even after 10 years, the prevalence of caries in children with early postcolonisation is still lower than in children with early postcolonisation.



Fig. 2a and b Initial situation upper jaw left and lower jaw left.

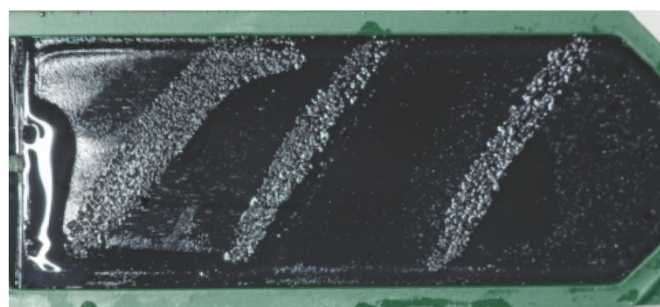


Fig. 3 Plaque smear of teeth 51 and 61: detection of *Streptococcus mutans* (SM; CRT - bacteria, Ivoclar Vivadent, Schaan, Lichtenstein).

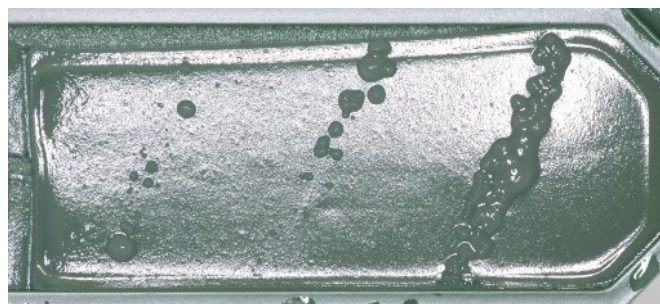


Fig. 4 Plaque smear of teeth 51 and 61: Here evidence of *Lactobacillus* (LB; CRT - bacteria).

of SM is ^{higher15} (Figs. 3 and 4). In the present case, the SM counts suggest an early colonisation of the oral cavity to a considerable extent. The *Lactobacillus* (LB) counts at this age not only indicate regular sugar consumption, but also explain the high SM counts. The microbiological findings correlate with the anamnestic data.



Fig. 5 "Temporary fissure sealing" with a glass ionomer cement (here: Ketac-cem, 3M, Neuss).

Fig. 6 Fibre-optic transillumination between two deciduous molars.

Preventive action concept

Due to the distinctly food and plaque retentive occlusal surfaces in conjunction with the microbiological findings, the following preventive measures were carried out¹⁹⁻²⁰:

- Consultations to improve the nutritional situation,
- 4 applications of chlorhexidine (CHX)-containing gels/varnishes to the occlusal surfaces at 14-day intervals,
- Professional application of CHX-containing varnishes/gels in the approximal spaces of the deciduous molars,
- adequate home fluoridation concept.

The microbiological parameters were checked 14 days after the last treatment step. No more MS and LB could be detected on the occlusal surfaces of the deciduous molars. On the one hand, this can be interpreted as a success of the measures taken. On the other hand, it also shows that the compliance of the child and the parents was sufficient.

Since the fissure system - especially in deep and retentive fissures - represents a retreat niche for cariogenic germs, recolonisation with this germ was very likely here^{20,37}. It therefore seemed to make sense to treat the fissure system with a "temporary fissure sealing" using a glass ionomer cement (GIZ) (Fig. 5). This can also be applied well and quickly at this age if it is coated with petroleum jelly or better at the curing stage.

tasting cocoa butter. If such a risk finding is present at the beginning of preventive care of an infant, it should be clarified immediately whether there is already demineralisation between the milk molars. Due to its morphological appearance, this appropriate space often represents a risk area that requires special interdental hygiene. Preventive measures can possibly slow down the progression of demineralisation that is already present. However, it is not always possible to avoid the onset of initial caries in the next 6 to 7 years. Fibre-optic transillumination is a suitable examination method in this case - to avoid X-rays (Fig. 6). This diagnosis is important because a later onset at this point without informing the parents about the risk is often interpreted as a failure of the entire treatment.

Orthodontic findings and orthodontic treatment concept

The orthodontic findings showed a loss of overbite with a tendency towards an open bite (cf. Fig. 1). This indicated a visceral swallowing pattern that was still present. The tongue has its resting position in the floor of the mouth. This is the prerequisite for a strong sucking effect - whether during breastfeeding or when drinking from a teat bottle. With the breakthrough of the milk molar, the chewing reflex establishes itself and replaces the sucking reflex. At the same time, this also means a change from a visceral to a somatic swallowing reflex.

Fig. 7 Indentation distal to tooth 64.



Fig. 8 Improvement of the overbite.



pattern. This changes the resting position of the tongue. The tongue now lies in the palate with the tip of the tongue behind or on the incisive papilla.

The prerequisite for this change in the resting position of the tongue is that the milk molars are also used for chewing. This means discontinuation of bottle-feeding or cessation of breastfeeding. So-called soothers should also be discontinued. If the visceral swallowing pattern persists, the tongue develops a protrusive pressure on the incisors, which not only prevents tooth eruption but also leads to an open bite. The orbicularis oris muscle is often weak because the mouth is not closed when swallowing. Strengthening the lip muscles through myofunctional therapy therefore makes sense.

full (e.g. hold-pull exercise).

In the present patient case, all the suggestions listed here were recommended. In particular, attention was paid to appropriate chewing activity and training of the tongue rest position.

Findings at the age of 4.5 years (2009)

At the age of 4.5 years, the temporary sealants with GIZ were replaced by a composite material. Despite regular prophylaxis and remotivation, the nutritional history in 2009 showed a significant increase in the consumption of sweets and sweet drinks due to the daily care of the grandmother. The resulting increase in cariogenic germs could be proven by renewed saliva diagnostics ($SM < 10^6$; $LB < 10^6$). This subclinical finding cor-

The caries was related to the caries that had occurred; in particular, the LB numbers reflected the high sugar consumption. In the meantime, there had been an eruption distally on tooth 64, which was treated with composite in connection with the replacement of the sealants (Fig. 7).

Preventive treatment concept

The therapeutic consequence was an intensification of professional cleaning measures - partly also using CHX-containing cleaning pastes. The application of CHX-containing varnishes in the approximal spaces was particularly important³⁰. After the cleaning measures, professional fluoridation was carried out in the practice. Home measures included the substitution of carbohydrates with non-cariogenic sweets or sugar-free chewing gum. The intensification of hygiene measures, especially the use of dental floss in the approximal space of the milk teeth, was emphasised, as was the careful implementation of the proposed fluoridation concept. At the time of the treatment in 2009, this included the administration of fluoride-containing children's toothpaste with 500 ppm 2 times daily.

Orthodontic findings

The advice given in 2006 to stop the myofunctional disorder led to an improvement of the overbite (Fig. 8). Due to this situation, there was no need for further orthodontic action at that time.

Findings at the age of 6 (2010)

Preventive findings

Compared to 2009, there had been no change; the patient regularly attended the prophylaxis sessions 3 times a year. Oral hygiene was good, but the approximal spaces of the deciduous molars were not regularly cleaned with dental floss. The sugar intake could be assessed as moderate.

Orthodontic problems in this age group

The control of tooth eruption is extremely important in this age group. Ectopic tooth eruptions, for example, require short-term intervention, as otherwise a regular tooth position and interlocking is dissolved (e.g. frontal crossbite). In addition, such tooth position deviations always mean a problematic hygiene situation at this point. Other tooth eruption disorders cause a change in the final bite position, such as a lateral forced bite. Here, the sliding of the mandible into the forced bite position laterally often leads to skeletal growth changes.

Premature loss of milk teeth leads to a reduction of the support zone due to the mesial migration of the erupting premolars/molars. Without precise control, this is often only noticed when the canine tooth erupts, as there is then insufficient space for the canine tooth. Premature loss of the 2nd deciduous molar is particularly problematic because the gap created by the loss of the deciduous molar is narrowed very quickly due to the mesial pressure of the first molar. In case of premature loss of deciduous teeth, a space maintainer plate should therefore be considered.

Orthodontic findings

In the present case, significant problems occurred with the eruption of the anterior and 6-year molars. The loss of the deciduous anterior teeth again led to a massive myofunctional disorder, because as a result the tongue again had a free space towards the anterior. Due to this tongue posture defect in connection with the still lat-

In this visceral swallowing pattern, the breakthrough of the permanent incisors was massively impeded and forced into a protrusive position by the anterior pressure of the tongue during the swallowing act (Figs. 9 to 13).

This protrusive position also led to an incompetent lip closure. The lower lip was already positioned behind the maxillary incisors in the resting position (cf. Fig. 11). This resulted in a further worsening of the sagittal position of the anterior teeth (Fig. 14). Tooth 26 broke through ectopically. It tilted mesially and caused undermining resorption on tooth 65^{34,37} (cf. Figs. 12 and 13a). Due to the lack of tongue pressure on the palatal roof during swallowing, a transversal crowding with an oral tilt of the posterior teeth ("narrow jaw") additionally developed.

Orthodontic therapy at the age of 6.5 years (2011)

Figures 13a and b show the protrusive position of the maxillary incisors and the mesial tilt of tooth 26 in the model on the basis of the X-ray findings. Tooth 65 has been removed in the meantime. The findings required immediate orthodontic intervention. The continuous further mesial tilting of tooth 26 led to a collapse of the supporting zone. A distal bite position of half a premolar width (PB) was present, which resulted in a "pseudo-distal bite position" of 1 PB on the left side due to the mesial tilting of tooth 26. The extraction of tooth 65 was combined with immediate measures to distalise tooth 26. This treatment was carried out during the day with a lip bumper and at night with a high pull headgear³⁴. The "lip bumper" simultaneously succeeded in retruding the protruded front, as it had slight contact with the labial facet of teeth 11 and 21 (Figs. 14 and 15). The myo-functional problem was addressed by special exercises. This primary orthodontic treatment goal was achieved after one year; further tooth eruption was monitored with a removable appliance.

After a short therapeutic break, the then the necessary transversal post-development of the upper jaw. This transversal extension of the



Fig. 9 Open bite situation due to myofunctional problem.



Fig. 10 Tongue posture in rest position.



Fig. 11 Positioning of the lower lip behind the upper incisors.

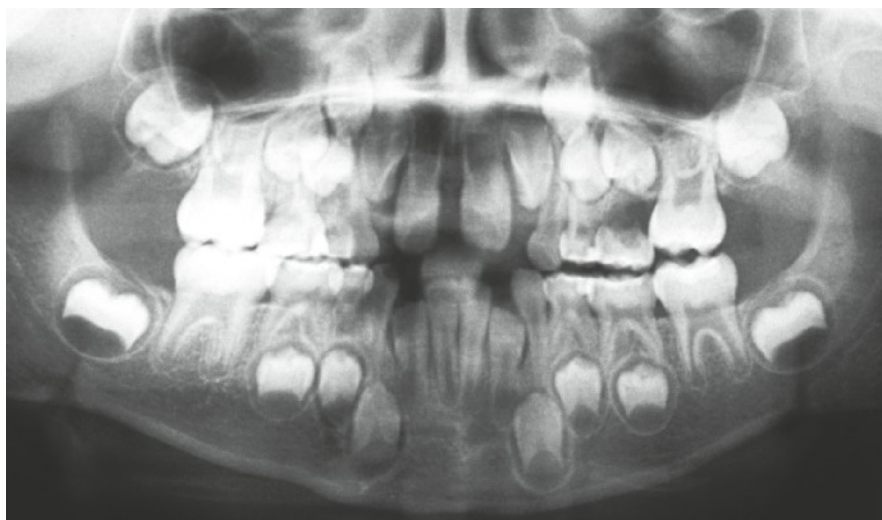


Fig. 12 Panoramic layer images from the year 2010.



Fig. 13a and b Bite position assessment right and left.



Fig. 14 "High pull" headgear to straighten tooth 26.



Fig. 15 "Lip Bumper" with contact on the anterior teeth.

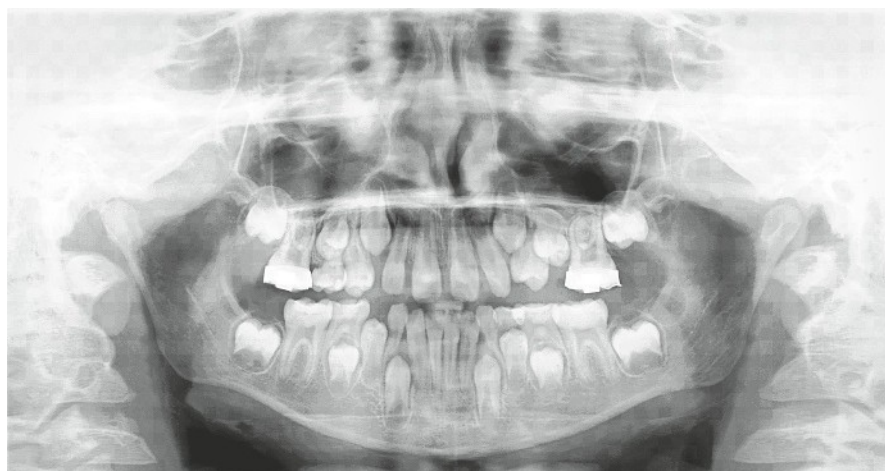


Fig. 16 X-ray findings in 2012 before removal of the bands on the molars.



Fig. 17 Condition shortly before the end of the second phase of the exchange bite.



Fig. 18 Plaque colonisation with removable orthodontic appliance (other patient).

Fig. 19 Multiband treatment for shaping and levelling the dental arches.

Fig. 20 Severe plaque development in the "shadow" of the brackets (other patient).

The upper jaw allowed enough space for the tongue to return to its resting position on the roof of the mouth. At the same time, the establishment of a somatic swallowing pattern was controlled. Further correction of the distal bite position on both sides was done with an activator. Figures 16 and 17 show the findings after successful implementation of these treatment measures.

Preventive findings (2011-2015)

Any insertion of orthodontic appliances leads to increased plaque accumulation by creating new retention surfaces (Fig. 18). This also includes the acrylic of the inserted appliance. This can lead to the growth of cario-geous plaque.

germs^{3,7} (Fig. 20). With removable devices, however, this risk can often be considered lower due to the improved hygiene situation. However, the prerequisites are good compliance on the part of the child and regular professional care in the practice.

The orthodontic measures described were accompanied by regular preventive sessions. The preventive services included

- Control of the nutritional situation with appropriate sugar substitution,
- professional cleaning measures,
- Sealing of all molars and premolars,
- Application of antibacterial varnishes in the approximation rooms,



Fig. 21 Final findings after 10 years of care.



Fig. 22 Final X-ray findings.

- Application of antibacterial varnish around the bands on teeth 16 and 26,
- adequate domestic and professional fluoridation concept,
- Checking of bacterial saliva parameters (saliva test), in case of orthodontic treatment measures with removable appliances every 2 years.

The saliva diagnostics at the control examination in 2015 showed a clearly reduced sugar consumption and no excessive contamination of the oral cavity with SM ($> 10^5$ CFU/ml) and LB (10^3 CFU/ml). With these findings, the clinically healthy condition of the teeth could be verified by the subclinical parameters. After completion of the initial orthodontic measures, there was no serious change in the risk factors in the oral cavity. The patient's information on the nutritional situation could be classified as accurate.

Findings at the age of 11 to 13 years (2015-2016)

Orthodontic treatment concept after complete eruption of all teeth

A multiband treatment was indicated to shape and level the mandibular arches (Fig. 19). At the same time, the bite situation achieved with removable appliances was stabilised in class I by wearing class II elastics, since the bite situation was not stabilised before inserting the multiband appliance.

a regular bite situation had already been established by functional orthodontic appliances. These class II elastics were necessary because with the "straight-wire technique" used here, an established normal bite situation can be lost again due to unwanted tooth movements²⁶.

Possible changes in the oral biotope during fixed orthodontic treatments

The insertion of orthodontic treatment devices - regardless of whether they are removable or fixed - can always lead to changes in the biotope of the oral cavity. The longer the orthodontic treatment lasts, the more serious these changes become²⁷. However, these changes are not only favoured by the additionally integrated retention niches. Changes in hygiene and the nutritional situation also cause a shift in the balance between apathogenic and pathogenic, i.e. acid-forming germs. However, particularly dramatic changes are always found when multibracket appliances are fitted. The longer the fixed treatment lasts, the more the caries risk and the expected caries prevalence change.²⁷ Studies have shown that the changes in the caries risk can be quite different. While some orthodontic treatments only led to a moderate change in the caries risk, these were offset by a much greater change in the caries prevalence.

The number of cases in which the caries risk increased considerably due to the proliferation of cariogenic germs. In preventive care, it is important to identify these cases in ^{time25}.

Various studies in recent decades have shown that fixed orthodontic treatments can have the following side effects on the oral biotope:

- Orthodontic treatment generally increases the risk of caries^{6,10}.
- There is a strong plaque development in the shadow of the arch and ^{cervically33} (cf. Fig. 20).
- The Papilla Bleeding Index (PBI) and Parodontitis Index (PI) increase almost continuously, almost ^{linearly29}.
- There is a constant increase in SM numbers^{22,25}.
- Due to the individual situation, different risk areas arise in the oral cavity. For example, one study showed that there was less of a change in homeostasis in central incisors than in posterior ^{teeth42}.
- The increase in acidogenic bacteria leads to increased lactate production. This causes a drop in the pH value in the ^{saliva27}.
- Even after intensive tooth cleaning, vital bacteria remain on the tooth surface^{8,12}.
- The risk of developing demineralisation on the teeth and around the brackets increases significantly.
- Due to the changes in tooth position and changes in the supragingival bio- film situation, the sulcus flora can change and thus favour the growth of periodontal pathogenic bacteria.

All these changes lead to a selection advantage of acidogenic bacteria. According to the extended ecological plaque hypothesis, there is initially an increased acidification of the non-mutans group (acidogenic phase). This phase creates the prerequisite for SM and LB to overgrow the entire system (aciduric phase) and thus significantly change the caries risk. At the same time, this displaces the less acid-producing ^{non-SM39}.

SM is not only one of the strongest acid formers, but also creates ideal conditions for the metabolic processes taking place in the plaque by forming a matrix of extracellular polysaccharides. This matrix acts as a diffusion barrier that plays a significant role in preventing the acid formed in the plaque from escaping into the oral cavity. At the same time, this matrix protects the biomass on the tooth from the natural defence functions of saliva^{11,17,39,46}.

The changes in the nutritional situation can be documented very well using the LB figures. This makes it possible to objectively check the patient's sugar consumption and thus also his ^{compliance2}. A diagnosis of the food parameters makes it possible to recognise and document such a shift in the balance in good ^{time24}.

Thus, the oral biotope, which is in a state of homeostasis, slowly but inexorably enters a dysbiotic situation. Ultimately, this change is caused by behavioural changes such as poor oral hygiene, high-frequency consumption of easily fermentable carbohydrates, intake of soft and thus less chewing-active food, which consequently cause a change in the subclinical situation (insufficient saliva quality or saliva quantity, reduced host defence, increase in acidogenic germs). Orthodontic treatment devices have a reinforcing effect on plaque formation due to the numerous retention sites that are created. Due to these changes in the oral biotope caused by orthodontic treatment measures, regular, intensive and preventive care measures are always necessary^{4,14}.

The so-called smooth surface sealing offers The protection afforded by the use of a sealant is limited, if at all, due to the significant reduction in layer thickness and loss of integrity of the sealant. This in turn favours the development of demineralisation and carious ^{lesions35}. In addition to oral hygiene measures, tongue cleaning has no influence on plaque colonisation of the oral cavity and on the bacterial counts of SM in ^{saliva31}. Toothpastes containing CHX or

Other antimicrobial agents cause only a slight or no reduction in SM. This is due to a rapid recolonisation of the tooth surfaces due to the increased number of retention ^{sites23}. For the same reason, the effect of fluoride-containing rinses is limited in time, as was also shown for fluoride-containing varnishes applied to the teeth at the beginning of a multibracket appliance^{13,33}. Only fluoride-containing pastes with an increased fluoride concentration (5,000 ppm) are effective. The SM numbers are not influenced by the increased fluoride concentration. Home mouthwashes should have a concentration of 0.2% fluoride^{6,45}. A high-dose fluoride varnish application (e.g. Duraphat varnish) around the brackets seems to be even more effective in professional use in practice⁵.

Preventive care concept during orthodontic treatments

The decisive parameter in this preventive care concept is the identification of patients at risk. Even if it is proven that fixed orthodontic treatments change the caries risk, there are not only inter-individual differences in the change of caries risk, but also time-dependent differences in a patient. The duration of fixed treatment is an important factor^{18,25,44}.

Due to the possible changes in the oral biotope and the associated change in the risk of caries, comprehensive preventive diagnostics should therefore be carried out before, during and after completion of orthodontic treatment. At www.Lutz-Laurisch.de, charts describing diagnostic and resulting therapeutic measures can be obtained free of charge.

Preventive findings after multiband treatment

Changes in the oral biotope were assessed both clinically (increase in approximal plaque index (API), staining, dietary history) and subclinically based on salivary microbial counts.

parameters are documented. However, the clinical parameters such as PI are often not meaningful on their own, as complete cleaning of the teeth under a multibracket appliance is hardly possible for the patient and this often deteriorates with the duration of the treatment. The microbiological control better reflects the changes in the oral ^{biotope24}. The changing eating habits can be well documented with the help of the LB figures. In addition, such documentation is a good starting point for the educational discussion.

Thus, the microbiological control in the present case also showed a clear increase in cariogenic germs during this time. The increased number of LB indicated an increased sugar intake. However, the changes were moderate due to the prophylaxis accompanying the treatment. The close preventive control (one prophylaxis session per quarter) as well as the preventive services performed during the multi-band treatment certainly contributed to this. For example, professional tooth cleaning measures (airflow) were always carried out at every archwire change and CHX-containing varnishes or gels were applied to the proximal lingual/palatal spaces. Without the surrounding archwire, the smooth surfaces are of course easier to clean. Fluoridation measures in the recommended dosage were a natural part of professional care^{32,43}.

Final orthodontic findings and further follow-up (2017-2021)

After completion of the orthodontic treatment (Figs. 21 and 22), the patient underwent remodeling and intensive prophylaxis. During intensive prophylaxis after debonding, the patient brushed his teeth 3 times a day for two days with a gel containing CHX instead of toothpaste. At the follow-up examination after one month, LB and SM had fallen to a reduced level (SM $< 10^5$; LB $> 10^3$). Overall, this indicated a dentally healthy diet. As a retention measure, the patient wears a removable appliance in the upper jaw and a 43-33 retainer in the lower jaw^{9,21,28}.



Fig. 23 Condition 3 years after completion of treatment.



Fig. 24 Situation in April 2021 after staining of the coverings 3 years after completion of treatment before a prophylaxis session. The patient is still "temporarily" wearing the retention plate in the upper jaw.



Fig. 25 LB numbers $> 10^6$, (CariesScreenTest, Aurosan, Essen)

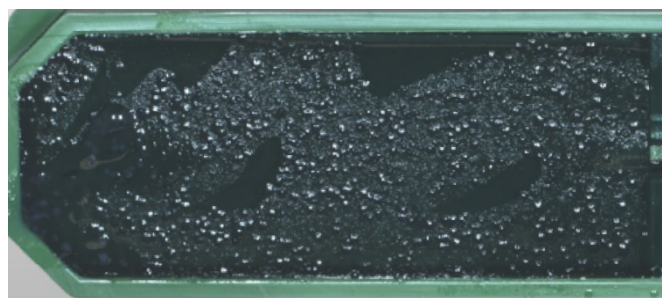


Fig. 26 SM numbers $> 10^6$ (CariesScreenTest).

Preventive findings 3 years after completion of orthodontic treatment 2021 at the age of 17 years

At the end of the orthodontic treatment, the patient was 14 years old. Further recall appointments took place twice a year. In the following years 2018 to 2021, there were significant changes in compliance. Prophylaxis appointments were no longer kept regularly, and the intensity and diligence of oral hygiene measures at home changed dramatically. At the same time, there was an increase in the uncontrolled intake of low-molecular carbohydrates. On the basis of these indications, obtained through information from the mother, and on the basis of the documented missing check-ups, the plaque situation was checked by staining at the beginning of the prophylaxis session (Figs. 23 and 24). This measure was intended to show the patient the consequences of his behaviour with regard to his oral situation. The figu- res

However, the results of the analysis of figures 24 to 26 show a completely different finding than we expected based on the information we received.

However, the good clinical oral situation did not correlate with the information provided by the mother or with the information obtained from the patient's medical history about his diet and hygiene habits. In this respect, it could be assumed that the patient had made a good effort to clean his teeth optimally before the prophylaxis session and had been successful in doing so.

An examination of the saliva parameters can again provide information on whether the clinically good situation also corresponds to the subclinical parameters. The bacterial saliva parameters at the control examination in April 2021 were as follows: SM count $> 10^6/\text{ml}$ and LB count $> 10^6/\text{ml}$ (cf. figs. 25 and 26). The examination of the functional saliva parameters showed an extremely poor secretion rate of 0.5 ml/min with a neutral pH value of the saliva and a low secretion rate of 0.5 ml/min.

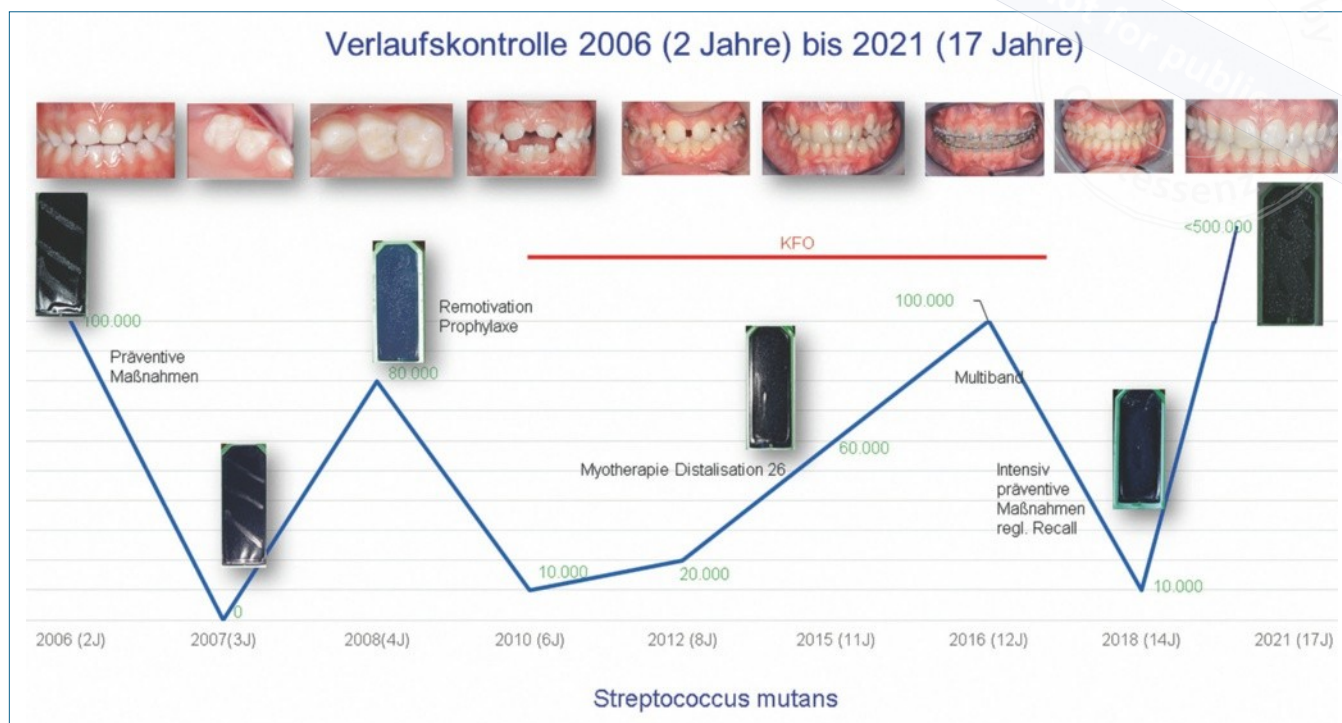


Fig. 27 Overview of the development of saliva parameters during the treatment period: Here SM.

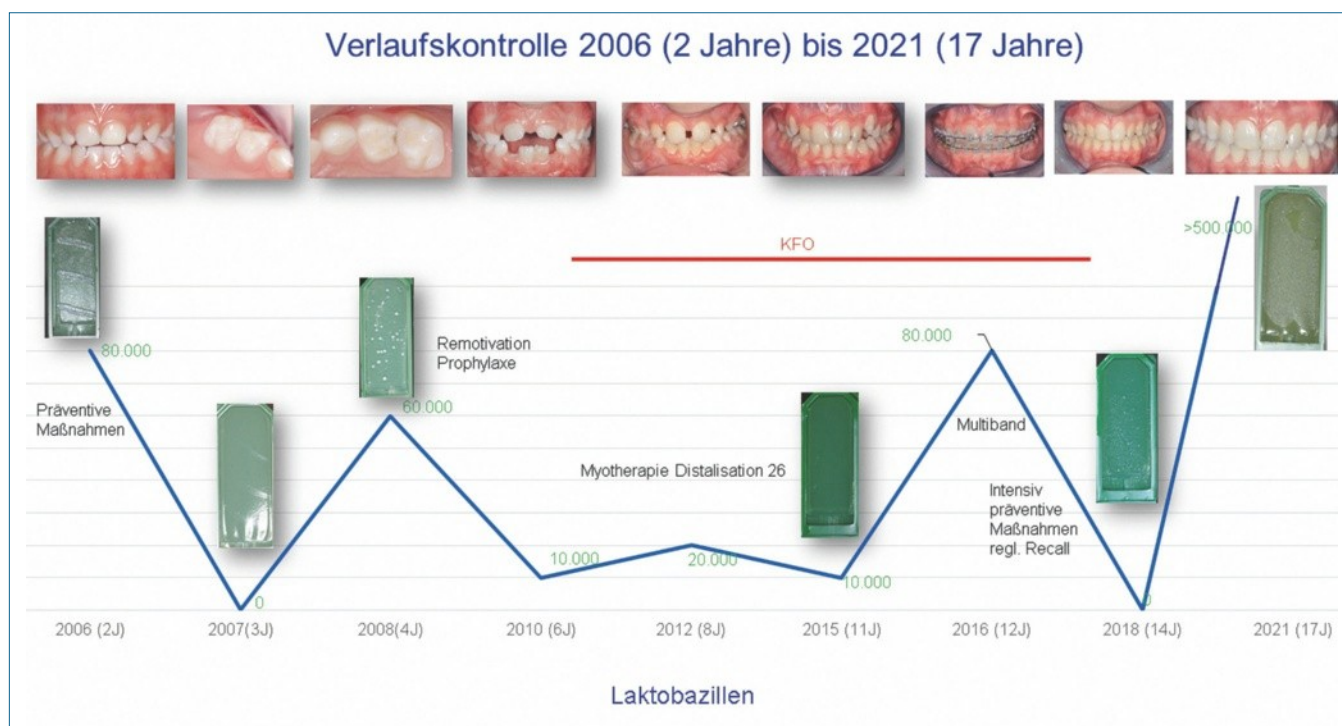


Fig. 28 Overview of the development of saliva parameters during the treatment period: Here LB.

poor buffer capacity of $\text{pH} < 5$ (Fig. 26). The subclinical parameters thus led to a completely different classification of the clinical findings and the caries risk. This diagnostic is

This provides important detailed information for a better assessment of the microbiological balance and, in this case, led to a much more extensive use of preventive measures.

Summary and conclusion

The present case shows that neglect of preventive care in combination with behavioural and dietary changes during puberty can cause a more significant deterioration of the bi-ome than orthodontic treatment. The lack of continuous preventive care is probably primarily responsible for this. However, the case also clearly shows that the sole assessment of the caries risk can be insufficient due to the clinical situation and that further detailed information is important.

The success of the professional and home prophylaxis measures could again be documented.

This means that the changes in the microbiome were reversible - with a stringent concept and good cooperation between the dental practice and the patient (Fig. 27 and 28). Orthodontic knowledge about the problems occurring in this age group is indispensable.

This is an essential prerequisite for the development of an eugene adult dentition. In addition, there is knowledge about the right time for treatment. Some orthodontic problems not only cause massive costs and a high treatment effort if they are not detected in time and treated early - already in the primary or early mixed dentition - but can also lead to unfavourable skeletal changes.

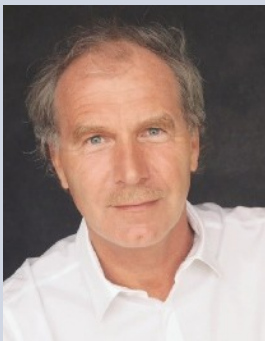
Orthodontic treatment cannot be started without orthodontic knowledge and identification of the orthodontic problem. Since orthodontic measures in turn have an influence on the caries risk, the circle closes here. A synoptic, interdisciplinary diagnosis and action concept, taking into account the changing need for preventive action, is the prerequisite for the development of a healthy caries-free and functionally appropriate adult dentition.

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