



CRITICAL APPRAISAL OF TRADITIONAL DENTISTRY -
PART 3: FIXED ORTHODONTIC TREATMENT: FUNCTIONAL
AND BIOLOGICAL RISKS, REASONS FOR FAILURE AND
HIDDEN LONG-TERM CONSEQUENCES, AS WELL AS
ETHICAL, LEGAL, AND SOCIAL CONSIDERATIONS

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Abstract

Scientific literature on the long-term results of orthodontic treatment is rare.

Most of these treatments are performed presumably for aesthetic reasons that seem to justify the effort and the burdens. Once the patient is satisfied with the result of the treatment, the treatment is considered to be successfully done. In other words, at a certain point, the practitioner will no longer be able to convince the patient to continue treatment, for example, to correct minor aesthetic or functional problems. The patients are at this stage already satisfied or, after so much effort and pain, no longer hoping for a better result. Or, which occurs often, the patient does not need a “better result”.

It has been known for some time that one of the most disturbing side effects of fixed orthodontic treatment is the development of periodontitis after the treatment is completed. The actual results of treatment and, above all, damage to the bone are not usually documented, as only panoramic images (instead of 3D checks) are taken.

Recently published literature shows that more than 20 years after completion

of orthodontic treatment, serious side effects of this treatment are often observed^{72,73}. Side effects that often result in the removal of all teeth, incl. previously well-positioned teeth. In such cases, modern osseofixated implants (e.g. Strategic Implant®, Manufacturer Simpladent GmbH, CH-8737 Gommiswald, Switzerland, www.simpladent-implants.com) make it possible to integrate and use an implant-based restoration within very few days^{72,73}.

As our in-depth analysis of the specialist literature and the description of cases of long-term failure following orthodontic treatment show, such treatments can harbor serious hidden risks that result in all teeth affected by orthodontic treatment having to be removed. Therefore, the claim by providers of orthodontic treatment that better long-term survival rates of the dentition are achieved does not appear to be justified in quite a few cases.

This article suggests that it may be very difficult to obtain a patient’s informed consent for orthodontic treatment after explaining all the risks to them, including the total loss of all their teeth after 25 to 35 years.

Today, orthodontic treatment is very popular among various patient groups (e.g., young adults at the end of puberty or adults between the ages of 20 and 40). These patients must be informed about the serious side effects of such treatment before it begins. This is especially important if the treatment is carried out after the onset of puberty.

Keywords: Fixed orthodontic treatment, elongation, root resorption, tooth mobility, bloodless extraction socket, ankylosis

1. Foreword

A dentist who observes closely should notice that a number of patients aged between 40 and 45 regularly come in for treatment with the following findings, i.e. findings which are always more or less the same:

- Many of the teeth (often all of them) show a mobility of approximately "L1".
- Many of these teeth can easily be extracted (except those who are ankylosed).
- Some roots show apical resorption
- The distal vertical dimension of the upper jaw is enlarged.
- The dental arches appear vertically elongated in both jaws, with the bone in many cases initially growing along with the elongated teeth in the coronal direction.
- In many cases (especially after fixed treatment of Angle Class II cases), an undefined inter-cuspidation is found, which causes the lower jaw to be held in a forced anterior position: the joint centric does not match the occlusal centric. In professional circles, this is referred to as a "Sunday bite".
- If treatment was carried out with removable appliances (in one or both jaws), patients lack a uniform bite-plane. This problem has a greater impact in cases involving extraction than in cases without extraction.
- It is not uncommon for upper molars to be elongated and tilted, when they have been moved along the base of the maxillary sinus with fixed appliances.
- Some of the teeth are not loose, but rather ankylosed.

Almost all cases have the following history: Patients tell their dentist that they underwent orthodontic treatment as teenagers. They themselves often consider the outcome of this treatment to be largely successful. The dentist who treats these cases as adults usually finds nothing unusual during the inspection and he tries to help the patient with traditional dental treatments. Typically, these treatments are unexpectedly short lasting.

Many of those patients then report the following: several years after this treatment, bone loss occurred, which was then treated using “periodontal therapy”. The patients therefore went from the orthodontist to the periodontist, with a certain delay. The patients also notice that their teeth are a bit loose, but this remains constant over the years. This reduces chewing power, which is not necessarily noticed by the patients. Nevertheless, this can lead to a raise of the bite.

The next treatment step then leads many patients (around 25 to 30 years after orthodontic treatment) to partial or complete extraction and thus sooner or later to the implantologist. The indication for extraction results from the progressive periodontal disease and from the

permanent or increasing loosening of teeth. All these changes affect the aesthetics of these patients because almost all of them have suffered caudalization / elongation of the upper front teeth as a result of treatment. This leads to excessive visibility of this tooth segment.

In this article, we discuss the reasons for this alarming overall treatment process, which often involves three disciplines of traditional dentistry over decades (Panchal et al., 2023¹). It should be noted that findings and X-rays from the period of orthodontic treatment (or even older pictures) are usually no longer available when other disciplines are involved in the treatment. Often, the clinics which worked at that time have closed or been handed over to successors. The period for keeping medical records (usually ten years) has long expired. In this respect, the exact course of treatment by the orthodontist who provided the initial treatment often cannot be traced in detail and cannot be dated precisely. Patients typically remember if they have received fixed or removable devices.

2. Introduction

Orthodontic treatments aim to correct abnormal tooth and jaw positions. There are various types of aids and methods that can be used, depending on the patient's needs and age. Here are the most important ones:

1. **Fixed arch appliances:** Metal brackets or ceramic (tooth-colored) brackets that are bonded to the teeth and connected with wires. Application: For complex malocclusions, especially in adolescents and adults.
2. **Removable braces:** Plastic plates that can be removed, with wire elements. Application: Often used in children to guide jaw growth or correct minor misalignments.
3. **Aligners (clear):** Transparent, removable plastic aligners that are changed frequently during the course of treatment. Application: For mild to moderate misalignments, especially in adults who want invisible treatment.
4. **Functional orthodontics:** Devices such as bionators or activators of all kinds that influence jaw growth and tooth alignment. Application: For children aged 6 to approx. 11 years.

These devices are designed to influence jaw growth and control tooth eruption. They can also be used to a limited extent in cases of extraction.

5. **Retainers:** Retainers are used after fixed orthodontic treatment because these treatments often do not provide stable support and fixation for all treated teeth or groups of teeth. Bonded or removable devices can be used as retainers to hold the teeth in position after treatment (Al-Moghrabi et al., 2016²). Retainers are also often necessary after treatment with aligners. Application: After completion of active treatment to prevent relapse. The fact that retainers are often or always necessary after fixed treatments and after aligner treatment shows that these treatments rarely achieve stable results. This addresses a fundamental problem of these treatments.

The choice of treatment depends on the diagnosis, age, severity of the malocclusion, aesthetic preferences, and the patient's cooperation. An orthodontist will draw up an individual treatment plan after conducting an analysis. There are many types of analyses available.

Surprisingly, orthodontists believe that all patients should be treated to achieve an “Angle Class I” jaw relationship (i.e., a so-called “normal occlusion”). This is despite the fact that this treatment goal requires a genuine skeletal change and that it has never been proven that this treatment outcome has any long-term benefits (Outhaisavanh et al., 2020³). If this is not possible with orthodontic means alone, it is not uncommon to go for a combined surgical and orthodontic treatment, which, however, has an even more massive and destructive effect on the quantity and orientation of the jawbone. Oral surgeons often approach bone with the mentality of a LEGO player, neglecting the fact that a surgically repositioned bone segment must undergo massive internal bone remodeling in order to fit functionally into its new environment. However, any bone remodeling in adults leads (according to Wolff’s law, revised by Roesler in 1981 and 1987) to an absolute reduction in bone mass.

Angle Class 2 malocclusions can be corrected relatively easily and quickly at an early age using functional orthodontic appliances, if treatment is carried out quickly and successfully at an early age

(e.g., treatment with removable bi-maxillary appliances from the age of seven using elastic open activators, Frankel appliances, etc.). Space for teeth during their eruption can be controlled by these devices also through the technique of guided tooth eruption. Overall, very good results can be expected with few or even no side effects.

However, due to both parents’ professional commitments, the cooperation of young patients, which is necessary for this treatment, has often been lacking since around 2000. For this reason, it has become common practice to treat malocclusions later in life, often only after puberty has ended. Since patients are no longer growing sufficiently at this point, it has been necessary to resort to fixed orthodontic appliances and the application of forces on an enormous scale. The hormonal situation of the patient before and after puberty is however not the same.

Even in adulthood, patients today increasingly desire orthodontic correction. Implantology measures instead of orthodontic correction are (still) rarely considered in Europe today. Elsewhere, however, a clear assessment of

treatment alternatives is carried out, at least for adolescents and adults. The older the patient, the more total extraction is recommended to eliminate “vertical excess” and to adjust the bite (Ihde A. et al, 2020⁷¹). Orthognathic surgery tends to be performed at a younger age.

This article deals with widely unknown aspects of fixed orthodontic treatment, a treatment that is being used more and more for the reasons mentioned above (Rafiuddin et al., 2015⁴; Talic, 2011⁵).

3. Effects of Orthodontic Treatment

3.1 Damage to Periodontal Tissues and the Desmodont

While fixed appliances achieve aesthetic improvements quickly, they cause temporary and often permanent destabilization as well as irreversible changes such as destruction of the periodontium due to targeted tooth movement. These changes and their long-term consequences are described, analyzed, and evaluated in this article.

The **mobility of teeth** is an unfavorable prognostic factor in the fields of conservative, prosthetic, and periodontal dentistry, but exactly this mobility is deliberately induced (!) in the field of fixed

orthodontics in order to move teeth from A to B. According to German health insurance guidelines, mobile teeth may not be crowned at the expense of German health insurance companies because no long-term results are expected on these teeth. The differences in the assessment of **tooth mobility** between two disciplines of dentistry are astonishing in themselves. Treatments that lead to tooth loosening are paid for by German health insurance companies (both statutory and private), while loose teeth are subsequently considered ready for extraction or at least no longer treatable with prosthetics.

Due to their very one-sided training, dentists seriously believe that teeth will naturally become firm again on their own after the end of fixed orthodontic treatment, just as they were before. This is a serious misconception. If teeth treated with orthodontics become really firm, it is due to pathological ankylosis.

However, clinical experience and observation of dentition previously damaged by fixed orthodontic appliances show that restitutio ad integrum in the area of the desmodont of these teeth is unlikely to ever occur. The damage observed there is similar to that which can be caused by

root canal treatment. As a rule, fixed ortho treatment in adults results in destruction of the desmodont.

With regard to the “firmness” of orthodontically moved teeth in the bone, it is easy to observe that some of the teeth treated in this way are easy to extract, and there is often no bleeding from the tooth socket after extraction. This is due to the mechanical destruction of the blood vessels that had been supplying the desmodont from inside the bone. Similar destruction is also found around teeth showing periodontal disease and considerable mobility.

The lacking or insufficient blood supply to the dental pulp can also lead (more in the teeth of the lower jaw than in those of the upper jaw) to damage to DNA, epigenetic regulation, and an immune response on the 7th day (Cui et al., 2016⁶). Such impairments to the blood supply are virtually inevitable in orthodontic treatments, which is why they carry a latent, yet unquantified cancer risk.

When treating patients with fixed appliances, it is almost impossible to ensure that the cortical outer boundaries of the jawbone are respected during tooth movement. However, as soon as the

teeth touch the cortical boundary from the inside or are ground along it, root resorption occurs.

Any periodontal problems that arise later are also likely to be largely attributable to the unnatural (too far vestibular) positioning of teeth within the jawbone, a consequence of “rounding out.” Quite a few patients therefore have to be referred to the periodontology department soon after “completing” orthodontic treatment. This serious circumstance is openly known among the group of practitioners, but it is hardly ever mentioned in the consultation leading up to treatment. Rounding out (i.e. too vestibular malpositioning of the roots) may lead to recessions or to generalized vertical bone loss / periodontitis).

3.2 Irreversible Changes to the Periodontium and Damage to the Moved Teeth

Permanent remodeling processes in the alveolar bone as a result of orthodontic interventions can lead to structural deficits that promote the development of periodontal diseases (Feng et al., 2005⁷). Since the repair of the structure in the healthy desmodontal gap is impossible, this anatomic structure has to be

rearranged by the adjacent tissues, namely the bone and dentin (a tissue that belongs to the bone family). The gap may be closed from both sides. Desmodontal structures may break down due to toxic attacks (they are seen after endodontic treatments) or due to the high forces involved in fixed or removable orthodontic treatment. Due to mobility of the teeth, there is a loss of the tooth-supporting function from the desmodont, which means long-term functional impairment (Janson et al., 2011⁸). **It was never shown, that the desmodontal composition of structures (lamina cribrosa, sharpey fibres, etc.) can repair ad integrum.**

Ankylosis is not a physiological adaptation, but rather the result of idiopathic destruction of the desmodont caused by e.g. orthodontic treatment (i.e. by intermittent or permanent overload). Once the desmodont and the lamina cribrosa have been destroyed, the dead periodontal tissue is broken down and bone tissue is deposited directly onto the dentin or the bone around part of or the entire root. The soft tissue layer that separated the dentin and bone (both of these components are bone) and created an

elastic suspension was destroyed by the treatment. As a result, the desmodontal gap is closed with newly formed bone, which effectively stabilizes the tooth in the socket. If the dentin grows into the gap, we see roots on the x-ray that are thicker apically than further coronally. If, on the other hand, the jawbone itself grows toward the root, we see on the x-ray no change of the morphology of the root; however, the black line of the desmodontal gap is missing on the x-ray (in some plane). Both processes lead to ankylosis. If the ankylosis is more vestibular-lingual, no x-ray diagnosis can be made. However, this condition can often be visualized with the help of a CT scan around the root of the orthodontically moved tooth.

All these processes irreversibly destroy the functional resilience of the desmodont, and in the long term, limit both the tooth's ability to adapt to its environment (elongation, intrusion, tilting) and its extractability. In case an ankylosis develops, extractions will be difficult, and if tooth mobility is increased due to toxic destruction of the desmodontium, extractions will be easy and typically, the empty socket (after extraction) will be bloodless.

The vessels feeding the pulp of the teeth have been damaged in this situation. We see the same effect from long-term mobile teeth after profound periodontal disease has been moving the teeth around in their widened socket.

The same teeth whose root length is reduced and whose desmodont is destroyed during treatment may be affected to varying degrees by periodontal disease that requires treatment after orthodontic treatment. It is not surprising that all of this leads to a **significantly reduced service life** of the natural teeth.

Orthodontic treatment with fixed appliances usually causes considerable pain. This is hypoxic pain, which occurs when teeth are pressed too hard against their own desmodont, cutting off or limiting the blood supply. However, the pain is not the dominant problem nor a long-term issue.

The pain causes patients to reduce their chewing force over a longer period of time. This regularly leads to elongation of the affected teeth in both jaws. The teeth can elongate with or without the surrounding bone.

This tendency toward elongation is promoted by other mechanisms that lead

to partial bite elevation, e.g., the use of RCOS wires. Especially in the lower jaw, there is nothing that can counteract the tendency toward elongation.

Elongation in the upper jaw could be (theoretically) prevented if practitioners would consistently use a high-pull headgear while straight wires are installed. However, this is not desired by patients, meaning that the fixed appliance cannot be correctly anchored. For some time now, anchoring has been possible using orthodontic implants. The extent to which this is implemented in practice is however unknown. Elongations in the lower jaw are typically created by elongating third molars, which create a distal fulcrum, and force the rest of the arch to elongate as well.

Orthodontic intrusion of teeth, as proposed by Prof. Melson, is associated with the risk of pulpitis, external resorption, and pain (Villa et al., 2005⁹).

The situation can be summarized as follows: Fixed orthodontic treatments leave no stone unturned when it comes to causing pain and permanent, severe damage to the human masticatory system.

4. The Lack of Long-Term Data and the Appearance of Detailed Reports on Failures of Complete Dentitions Result in the Need for In-Depth Information of Patients Including Warnings

The frequently postulated long-term improvement in tooth preservation through preventive orthodontic measures has so far never been substantiated by robust long-term data. Particularly in the context of aesthetically motivated treatments, there is therefore a considerable need for warnings and information about massive potential risks (Wishney, 2017¹⁰): It is crucial that dentists and orthodontists not only inform patients about the aesthetic (and other) advantages, but also provide clear and transparent information about the long-term functional and biological risks. **Patients or their parents must be informed that fixed orthodontic treatment “often” or at least “not rarely” leads to the total loss of natural teeth in adulthood.**

In addition, the question under which circumstances fixed orthodontic treatment is still acceptable must be answered based on long-term studies.

It is incumbent upon health insurers and, where applicable, the government to intervene in order to ensure that fixed orthodontic treatment are carried out at the right time in life (and at a much lower cost).

5. Ethical Considerations and Tooth Preservation

An essential aspect of orthodontic treatment, especially in young patients, is the safe long-term preservation of teeth.

However, given the large number of former orthodontic treatment cases requiring treatment of the desmodont later in life and given the fact that another (second) orthodontic treatment is impossible because it would only increase the damages. We have to seek alternative methods. One simple and fast-acting therapy is today given in the form of modern osseofixated implants, namely the Strategic Implant® technology. The ultimate solution of all the accumulated ortho damages, such as **periodontal disease**, gum recessions, **permanent tooth loosening** or **ankylosis**, can be applied to patients in all stages of life and independently of the given supply of jawbone. Patients at this stage have to be informed that further

treatment of the teeth is hopeless and that ultimately **total extraction** (in middle age) is the best option. This radical treatment approach actually complies with the principle of “Primum nihil nocere” (first, do no harm), as any further dental treatment leads only to more bone loss, persistent infections and deterioration of the aesthetic appearance of the perioral appearance.

In accordance with the principle of “Primum nihil nocere,” it is imperative to preserve the biological integrity of the tooth, the periodontium and desmodont as long as the goal of tooth preservation generally exists. This is especially true as teeth can be repaired, whereas we have no possibility to restore the damaged or non-vital desmodont.

It cannot be denied that orthodontic treatments (both fixed and removable) are carried out with the aim of preserving teeth as long as possible. This is true even when aesthetic considerations are often at the forefront of the decision for treatment, and those aspects are the strongest motivation for the patient to seek treatment in the first place.

It is not uncommon for treatments to be carried out under a certain amount of peer pressure, which young patients or their parents are subject to. Young patients who are in the phase of pubertal self-discovery often convince themselves that only with improved oral aesthetics will they find it easier to become part of a group or have better future prospects. Orthodontists must not exploit this age-typical misconception for their own purposes. In order to avoid bias in the information provided, reference should be made to state-controlled information resources, which must include case-independent information, including open discussion of disastrous and untreatable long-term damages.

Since loose teeth cannot be treated to become as stable as they were, and since on the other hand the bone's reaction to orthodontic treatments often results in partial or total pathological ankylosis of teeth, a critical, individual assessment of the need for treatment is necessary. Undergoing such treatment risks, especially if the goal the treatment is not only aesthetic improvement, but also long-term health or at least the long-term existence of a complete masticatory system.

It seems that orthodontic treatments reach neither of these goals. In fact, it is often observed that the treatments themselves prevent the treatment goal from being achieved. So far, we do not know under which circumstances the risks become reality in the individual patient. Particular caution is required in cases of combined orthodontic and surgical treatment, as

- the aforementioned damage resulting from orthodontic treatment (loosening of teeth, ankylosis, malnutrition of teeth, necrosis of the periodontium, recessions of soft tissue and bone) as well as
- damage caused by the displacement of bone and tooth segments (including massive bone remodeling with subsequent massive bone loss) occurs, and because
- various other collateral damage

must be made known to the patient and accepted by the patient.

6. Alternatives to Fixed Orthodontic Treatment

Since not every tooth needs to be moved and not every patient benefits from fixed orthodontic treatment, the focus could be shifted to minimally invasive and less risky alternatives.

In this case, treatments to improve dental hygiene and preventive early measures to avoid malocclusion would be suitable alternatives.

Therapies involving removable appliances in (even early) adulthood should be designed to move teeth without contact as far as possible, e.g., through eruption control.

Devices for changing the position of the lower jaw relative to the upper jaw must be used at an early stage of growth. Treatment with activators after puberty is no longer promising, as the therapy comes too late, when the rest of the growth is minimal.

The authors point out that each individual tooth finds its optimal and most stable position in the masticatory system. Unfortunately, aesthetic considerations sometimes require a different position that is typically not stable.

In cases where treatment still appears necessary, the use of less damaging appliances at an early age could be considered. Treatment is therefore brought forward to an age when the patient's bones are still growing along with their migrating teeth and jaw segments. This minimizes the risk of later periodontal problems and increases the likelihood of success. Unfortunately, we are seeing the exact opposite trend in the population. Inexpensive, fast-acting, and comparatively low-risk early treatments are rarely offered by dental practitioners anymore. Treatment is postponed until after puberty at the earliest opportunity, as young patients typically cooperate better at that age and because fixed orthodontic treatments require relatively little active cooperation. Even worse is the fact that "aligner" treatments can be ordered by patients at kiosks or tobacco shops, meaning that these treatments are often no longer planned and carried out by specialists. At the same time, significantly more adults are now receiving initial treatment for comparatively minor misalignments. Fixed braces have become fashionable and they even have become a status symbol.

The increase in adult treatments has also been facilitated by removable aligner technology. Patients treated with this technology and their parents must be informed before treatment begins that the side effects of aligner treatments in terms of bone damage occur with exactly the same frequency as with fixed appliances (Al-Moghrabi et al., 2016²).

7. Long-Term Patient Education and Individualized Treatment Approaches

It is of utmost importance that the long-term risks of orthodontic treatment are communicated openly to the patients and the parents, and that the decision to proceed with or to start a treatment was well thought over by the patients, the parents or other guardians.

Particularly in the case of young patients, the ethical principle of "Primum nihil nocere" should be paramount in order to ensure that the chosen treatment does not pose any long-term health risks for patients, risks that a young patient generally cannot even begin to imagine in their entirety.

8. Do Teeth That Have Been Moved Orthodontically Actually Remain longer in the Jaws (i.e. After 20 or More Years)?

There are several scientific studies that examine the long-term effects of orthodontic treatment on tooth retention (i.e., the survival of teeth), including follow-up periods of 20 years or more. However, the evidence is very contradictory:

While some studies suggest that correcting certain misalignments (malocclusions) can prevent tooth loss by reducing risk factors such as uneven stress or difficulty cleaning, other studies show no significant benefit or even no guarantee of better long-term oral health.

There is no direct evidence that teeth moved by orthodontic treatment last longer over a period of 20+ years, as most studies focus on secondary issues such as periodontal health, caries prevention, orthodontic relapse, rather than explicitly on tooth loss or the desired preservation of teeth.

The rationale for treatment is often based on vague promises such as improved function, aesthetics, better cleanability and prevention of complications, rather than proven longevity alone.

These “justifications” are hardly sufficient grounds for such an invasive procedure. Positive or protective effects: A population-based longitudinal study (SHIP) conducted over 20 years (1997 to 2021) with 1,269 adults showed that certain malocclusions (e.g., increased overjet >3 mm, deep bite with gingival contact, or missing teeth) increase the risk of tooth loss, while others (e.g., open bite 1 to 2 mm or bilateral cross-bite) have a protective effect. This implies that orthodontic correction of risky malocclusions could prevent tooth loss, as it compensates for biomechanical stresses and facilitates oral hygiene – an indirect justification for treatments to minimize long-term loss (Kindler et al., 2024¹¹). However, the definition of the term “risky malocclusion” remains unclear, the term cannot be defined. One fact remains however: Natural teeth find the most stable possible position in the masticatory system by themselves, and all teeth create the bone they need for retention during their eruption.

Protection against caries as an indirect factor: A population-based study with over 1,000 participants found that previous orthodontic treatment significantly reduces the risk of untreated caries (DT >0) and severe caries (DT >2) (odds ratios 0.41 and 0.36, respectively), which could prevent long-term tooth loss due to caries. This study focuses on caries experience later in life (Wishney, 2017¹⁰).

A “side effect” of fixed orthodontic treatment may be that patients learn early on to brush their teeth better and remove plaque even in hard-to-reach areas. These are precisely the skills that are necessary when it comes to cleaning crowded teeth sufficiently to prevent caries. In this respect, fixed orthodontic appliances are a means of enforcing the learning of oral hygiene. If the learning objective is not achieved, orthodontically treated teeth become carious at an early stage, which not rarely leads to premature termination of treatment. Against the background of the facts presented in this article, patients affected by such treatment termination are very fortunate.

No guarantee of better oral health: A longitudinal study involving 448 participants (aged 13 to 30, i.e., an average follow-up

period of approximately 17 years) found that orthodontic treatment does not guarantee better long-term oral health and does not prevent tooth decay or tooth loss. Over a third of participants had received orthodontic treatment, but there was no evidence of preventive effects; instead, the authors emphasized the importance of hygiene and check-ups regardless of treatment (Wishney, 2017¹⁰).

Neutral effects on periodontium: Two studies from the 1970s involving hundreds of patients 10 to 20 years after orthodontic treatment showed that treated individuals had similar periodontal health compared to untreated individuals—neither better nor worse. There was no evidence that orthodontic treatment increased or decreased the risk of periodontal problems (leading to tooth loss), which does not directly affect the longevity of teeth (American Academy of Periodontology, 1996¹²). It should be noted that at the time the study was conducted, fixed orthodontic treatment as we know it today had not yet been invented.

9. Do Orthodontic Treatments With Fixed Appliances Lead to “More Stable Results” Than Treatments With Removable Appliances Such As Expansion Plates or Activators? – Here: The Influence of Patient Age

Fixed orthodontic treatment, such as braces and wire arches, is mainly performed on adolescents to effectively correct tooth and jaw misalignments when growth is almost complete and functional orthodontic appliances (which require strong and fast growth) can no longer be used.

However, there is no evidence that fixed orthodontic treatments offer advantages in terms of tooth stability. The fact that long-term retention is necessary after the basic treatment clearly demonstrates that fixed orthodontic treatments lead in general to deficits in tooth stability. If the teeth had not been moved, they would be completely stable in the jaw. Even though traditionally only the upper and lower front teeth (typically 3-3 each) are secured with retention, this does not mean that all the other previously moved teeth are stable. The difference is rather that premolars and molars are held more or less stable in place by the cusps and

fossae, whereas this is not the case with front teeth. Subsequent adjustments (or adjustments made at the end of basic treatment) in the occlusion are made by forced extrusion of individual teeth. This is one of the reasons why many patients soon develop periodontal problems.

The biggest disadvantage of fixed appliances (“straight wire”) is that when elastics (e.g., Class II elastics) are used, vertical force vectors occur, which can lead to extrusion of teeth and entire jaw segments, except if quite unpleasant counter measures are taken. Especially when these teeth elongate with the bone, i.e., when the total bone mass in the jaw would potentially increase, bone loss must be expected soon. The reason is that a larger total bone mass is not accompanied by increased function, which would be necessary to functionally load the additional bone sufficiently. The opposite is true: because of the pain that occurs during treatment, masticatory forces are reduced. This inevitably leads to bone loss, which is incorrectly labeled as “periodontitis.” This term misleads practitioners.

10. Do Orthodontic Treatments With Fixed Appliances Lead to “More Stable Results” Than Treatments With Removable Appliances Such As Expansion Plates or Activators? – Here: The Influence of the Treatment Method

There is scientific evidence that fixed orthodontic appliances (such as brackets and arches) lead to more stable long-term results than removable appliances (such as expansion plates, activators, or clear aligners). This stability primarily refers to the maintenance of tooth correction after treatment, including better occlusion and torque control with a lower tendency to relapse.

The evidence comes from systematic reviews, meta-analyses, and clinical studies showing that fixed systems exert more precise forces and can correct more complex malocclusions more effectively, leading to more sustainable results.

However, stability also depends on factors such as patient age, severity of malocclusion, follow-up care (e.g., retention), and individual biology. Relapse can be expected even years after the end of basic treatment. Removable appliances such as functional

orthodontic devices can work much faster when used consistently and at the right time, leading to more stable results, whereby the (modified) appliance itself can still be used periodically as a retainer after the active treatment phase. Further research is needed to definitively clarify the long-term stability of aligners compared to brackets (Aloufan, 2025¹⁶).

11. Failures in Orthodontics Leading to the Loss of Orthodontically Treated Teeth or All Teeth

11.1 Damage Caused by Orthodontic Treatment

Although orthodontic treatments are considered safe and effective, often even harmless, in individual cases, they can lead to serious complications resulting in the loss of individual orthodontically treated teeth or even the entire dentition (Talic, 2011⁵).

Such failures often result from orthodontic treatment, i.e., from iatrogenic damage, which is damage caused by the treatment itself. They are exacerbated by factors such as inadequate oral hygiene, excessive forces, overly strong “rounding out of arches” in cases with a small apical base, or other pre-existing conditions.

11.2 Root Resorption as a Cause of Tooth Loosening, With Subsequent Tooth Loss

One of the most common complications in orthodontics is external apical root resorption (EARR), in which the root tip is broken down by misdirected orthodontic forces. This resorption occurs in a mild form in almost all patients, but in severe cases, it can compromise the stability of the tooth (Talic, 2011⁵).

Publications by the American Academy of Periodontology emphasize that root resorption in conjunction with periodontal disease increases the risk of tooth loss, especially in patients with aggressive periodontitis (American Academy of Periodontology, 1996¹⁷).

11.3 Periodontal Damage and Its Role in Tooth Loss

Orthodontic appliances, especially fixed brackets and bands, can cause iatrogenic damage to the periodontium, including gingivitis, alveolar bone loss, and loss of attached gingiva (Rafiuddin et al., 2015⁴).

The risk is particularly high in adults with pre-existing periodontitis: in these cases, orthodontic treatment can trigger progressive deterioration of the periodontal

tissue, leading to tooth migration, bite collapse, and ultimately the loss of several teeth (Chinese Stomatological Association Society of Orthodontics, 2025¹⁸). Other factors such as smoking, uncontrolled diabetes, or poor hygiene exacerbate these effects and can lead to irreversible damage (Rafiuddin et al., 2015⁴). Guidelines issued by the German Society of Dentistry and Oral Medicine (DGZMK) emphasize that periodontal complications during orthodontic treatment can lead to an increased risk of tooth loss, especially in patients with systemic diseases (DGZMK, 2022¹⁹).

11.4 Specific Iatrogenic Causes: The Example of Misplaced Elastic Bands

A dramatic example of failure is the loss of teeth due to misplaced intraoral elastics. These can slip subgingivally and act as foreign bodies, leading to severe inflammation, destruction of the periodontal ligament, and extrusive tooth movement (Dianiskova et al., 2016²⁰).

12. Case Reports on Orthodontic Failures Resulting in Tooth Loss

To illustrate the clinical relevance of triggering factors, selected case reports are presented below that illustrate specific failures in orthodontics that led to tooth loss.

Case 1

A case report describes a 38-year-old Japanese man who experienced successive loss of several teeth during orthodontic treatment, including the upper right second molar, the lower left first and second premolars, and the lower left first molar. Treatment began in 2010, and panoramic radiographs showed extensive defects and horizontal alveolar bone resorption. Biochemical tests revealed low levels of alkaline phosphatase, calcium, and inorganic phosphorus, leading to a suspected diagnosis of adult hypophosphatasia (HPP). Genetic testing confirmed a compound heterozygous mutation in the ALPL gene. Orthodontic stress is suspected to be the trigger, as it overwhelmed the remaining enzyme activity and led to the symptoms. After diagnosis, enzyme replacement therapy with Asfotase Alfa was started, which

improved healing after further tooth extraction (Tokuchi et al., 2024²¹).

Case 2

Another case report highlights the loss of a tooth due to a bonded retainer that was used for stabilization after orthodontic treatment. In this case, unwanted tooth movement caused by the retainer led to catastrophic failure, ultimately resulting in the loss of the affected tooth. The report emphasizes the importance of active and regular monitoring of bonded retainers to avoid such complications and provides recommendations for clinical practice (Smorthit et al., 2023²²).

Case 3

In addition, a case report describes a common complication during treatment with fixed appliances: the formation of a palatal fistula in an otherwise healthy patient. This type of complication underscores the need to carefully examine the palatal area and the palatal aspects of the maxillary teeth before starting treatment and to be prepared for rare complications such as infections or fistulas, which could indirectly contribute to further failures (Kailasam et al., 2015²³).

Presumably, the affected tooth was moved to outside of the maxillary bone, while the blood supply (which stemmed from inside the maxillary bone) has ceased.

Case 4

These cases show that orthodontic failures are often multifactorial and can be exacerbated by underlying diseases or unforeseen appliance problems. A case report on tooth loss in orthodontics, described in a collection of abstracts, comes from sources such as national societies such as the German Society of Orthodontics (DGKFO, 2023²⁴)): One patient suffered tooth loss due to periodontal complications, and the report discusses possible treatment approaches such as gap closure.

Case 5

Another report from the DGKFO (2021²⁵) describes a case of sleep apnea treatment with orthodontic measures that indirectly led to periodontal damage and potential tooth loss.

Case 6

Publications by the German Society of Periodontology (DGParo, 2022²⁶) discuss a case of aggressive periodontitis in combination with orthodontics, in which attachment loss was avoided without further tooth loss. Aggressive, rapidly progressing marginal periodontitis repeatedly leads to enormous periodontal destruction during orthodontic treatment with fixed appliances. There is obviously a high risk, which can be possibly greatly reduced or eliminated by thorough examination and diagnosis prior to orthodontic treatment.

Case 7

The American Academy of Periodontology (1996¹⁷) reports in literature reviews on tooth loss after active periodontal therapy, which can be exacerbated by orthodontic complications. There are further references in the literature on similar topics, such as reviews of risk factors and complications (Wishney, 2017¹⁵), but these do not represent direct case reports, rather they shed light on the broader context.

Case 8

Šipic et al⁷² report in detail on a case in which the patient suffered from generalized tooth loosening approximately 25 years after the end of a supposedly successful orthodontic treatment, which made it necessary to remove all teeth (and an endosseous implant). In the same procedure, all teeth were replaced with endosseous and cortical implants using Strategic Implant® technology. The treatment was completed after only three days. This case and the detailed procedure of restoration are described in this article.

Case 9

Ihde A. et al⁷³ report in detail on a case in which a teenager was treated with removable appliances in both jaws and, 25 years later, due to ankylosis of all molars (!) combined with massive elongation of the lower jaw front, there was no alternative treatment option other than total extraction. This case shows that with the correct and careful application of Strategic Implant® technology, even the most difficult treatment cases involving total extraction can be treated with fixed teeth on modern implants within a

period of 72 hours.

Conclusion

There is a growing body of scientific literature on this topic, examining potential **damage** to the **periodontal apparatus** (parodontium) as well as the desmodont from fixed orthodontic appliances (such as brackets). These risks include increased plaque accumulation, gingivitis, periodontitis, gingival recession, root resorption, alveolar bone loss, pathological ankylosis and permanent tooth mobility. Effects that can persist long-term, especially with prolonged treatment or predisposing factors.

Two articles from the Journal of Unwanted Results and their Correction (JUR) provide specific case reports (Case 8 and case 9 of this article) that are illustrating such outcomes:

- **English language article (Vol. 18, No. 1, March 2024):** "A Case of Full-Mouth Rehabilitation Using Immediately Loaded Fixed Prosthesis Supported by Corticobasal® Implants as Consequence of a Standardized Fixed Orthodontic Treatment" by Šipić O., Ihde A., Ihde S. This describes a 42-year-old female patient who developed pain

and Grade I–II mobility in all teeth after fixed orthodontic treatment at ages 13–15. The authors highlight adverse effects including alveolar widening, reduced periodontal ligament (PDL) stiffness, increased plaque retention, root resorption, bone loss, and tooth mobility. Treatment involved extractions and immediate placement of Corticobasal® implants, leading to improved aesthetics and function.

- **German language article (Vol. 19, No. 2, October 2025):** “Description of the Origin of Severe Damage in the Masticatory System of an Adult Patient after Orthodontic Treatment in Youth, and Elimination of the Damage by Removal of the Entire Dentition and Immediate Reconstruction Using the Technology of the Strategic Implant®” by Ihde A., Ihde S., Sipic O., Ihde A., Zappa U. This reports a 54-year-old male patient with chewing difficulties and tooth chipping following youthful orthodontic therapy. It emphasizes that such treatments can cause hidden, long-delayed damage to the periodontal apparatus, rendering further orthodontic correction impossible (e.g., due to tooth ankylosis and

pre-damaged desmodontal gaps). The solution involved full dentition removal and immediate reconstruction with Strategic Implant® technology that occurred within three days.

These cases suggest that damage may emerge years later and stress the need for thoroughly informed patient consent. They propose implant-based corrections as an efficient alternative.

In addition to these publications, here is an overview of further relevant studies and reviews from established research (up to 2025), showing that while fixed appliances increase temporary risks (e.g., gingivitis, minor bone changes ~0.13 mm loss), severe irreversible damage or tooth loss directly attributable to orthodontics alone is rare and typically requires additional factors like poor hygiene or pre-existing periodontitis:

Title / Authors	Year	Key Findings	Source
The effects of orthodontic therapy on periodontal health: a systematic review (Bollen AM et al.)	2008	Minor gingival recession (~0.03 mm), alveolar bone loss (~0.13 mm), and pocket depth increase; inconsistent effects on attachment loss; no strong evidence of long-term harm.	Journal of the American Dental Association
The effect of orthodontic therapy on periodontal health: a review of the literature (Rajendran V et al.)	2014	Fixed appliances often cause localized gingivitis (rarely progressing to periodontitis); effects largely reversible post-treatment with good hygiene.	International Journal of Dentistry
Orthodontic treatment in periodontally compromised patients: a systematic review (Erbe C et al.)	2023	Safe with prior periodontal control; light forces recommended; no major additional bone loss in stable cases.	Clinical Oral Investigations
Complications and treatment errors involving periodontal tissues related to orthodontic therapy (Jepsen S et al.)	2023	Potential for dehiscences / fenestrations in thin biotypes; intrusion / extrusion risks if uncontrolled; overall manageable with monitoring.	Periodontology 2000
Root resorption factors associated with orthodontic treatment with fixed appliances: A systematic review and meta-analysis (Multiple authors)	2022	External apical root resorption common but mild; less in vital vs. endodontically treated teeth; no direct link to tooth loss.	Various (e.g., Acta Odontologica Scandinavica)

Mainstream evidence indicates fixed orthodontic treatment is generally safe for periodontal health when hygiene is maintained and inflammation controlled beforehand. Severe outcomes like those in the JUR cases are exceptional and often multifactorial.

For deeper insights, search databases like PubMed with terms such as “fixed orthodontic appliances periodontal effects” or “orthodontic treatment bone loss review.” Always consult a specialist (orthodontist or periodontist) for individual assessments, as personal factors (e.g., treatment duration, hygiene, and bio-type) play a key role.

13. Prevention and Management of Failures

To prevent tooth loss, a thorough preliminary examination is essential, including an assessment of periodontal status, the bone supply and the morphology of the teeth (Talic, 2011⁵). We believe it essential to take the morphology of the apical base into account when planning treatment, as well as the spatial relationship between the tooth roots and the second cortical bone (the caudal cortical bone, i.e., the floor of the maxillary sinus) in the

distal maxilla. Furthermore, we suggest determining the intermaxillary relationship not only through the ANB angle, but also (in addition) through “Wits-Analysis”. This way, rotations of the mandibulo-maxillary complex can be diagnosed and considered.

Oral hygiene measures such as the use of fluoridated toothpaste and interdental brushes are crucial for minimizing plaque accumulation (Rafiuddin et al., 2015⁴).

In summary, it can be said that early failures in orthodontics leading to tooth loss are multifactorial and can be minimized to some extent through careful planning and monitoring. It is also evident in the field of dental orthodontics that nothing can replace the experience of the practitioner. This is especially true when (as in this case) there are no evidence-based credible studies available. Even careful planning cannot eliminate the main problem, namely the destruction of a functional desmodont that is inevitably caused by the treatment.

The only safe method to avoid all the mentioned and severe side effects is to avoid fixed orthodontic treatments.

14. Therapeutic Solutions for Patients With Mild, Moderate, and Severe Orthodontic Failures, With and Without Tooth Loss During and After Therapy

Orthodontic failures encompass a wide range of problems, ranging from mild malocclusions to severe jaw dysgnathia (as described in case No. 9 above), but in many cases also involving tooth loss. The treatment of such failures requires a precise diagnosis, individual planning, and the use of modern therapeutic approaches tailored to the severity and specific needs of the patient.

However, the question must be raised here as to whether it makes sense to treat problems caused by orthodontic measures with further orthodontic measures or with prosthetic measures. Further orthodontic measures would only cause further damage to the already damaged periodontium of the teeth. Prosthetic measures on teeth whose periodontium has been irreversibly damaged are more than questionable.

It appears that conventional dentistry has no answer to damages caused by orthodontic treatment.

15. Gingivitis and Periodontitis During Orthodontic Treatment

The incidence of gingivitis and periodontitis in orthodontic treatments with fixed appliances is higher than in cases where no orthodontic treatment is performed or where other aids are used.

Orthodontic treatments with fixed appliances, such as brackets and bands, are widely used to correct misaligned teeth, but they carry an increased risk of periodontal diseases such as gingivitis and periodontitis due to the difficulty of maintaining oral hygiene and the promotion of plaque accumulation (Luchian et al., 2024³⁹). These appliances create niches for bacteria that can lead to inflammation of the gums and potentially deeper periodontal damage. Numerous studies have investigated the extent of these complications, with a temporary deterioration in periodontal health often observed during treatment, but this is often partially reversible after removal of the appliances (Surlin et al., 2018⁴⁰).

Prevalence of Gingivitis

Gingivitis, a reversible inflammation of the gums, occurs at a high rate in patients with fixed orthodontic

appliances. A retrospective study of 225 patients aged 18 to 25 years found a prevalence of 76% for generalized chronic gingivitis, with the lower anterior region being the most commonly affected (Gopalasamy et al., 2020⁴¹). Similarly, a prospective study of 73 patients aged 16 to 35 years reported an overall prevalence of 68.5% for gingivitis, with 47.9% mild and 20.6% moderate to severe cases associated with poor oral hygiene and longer treatment duration (> 12 months) (Khanam et al., 2024⁴²). In a pilot study of 30 patients, the plaque index (PI) increased significantly from 0.08 to 0.21, which correlated with an increase in the gingival index (GI), although the GI increase was not statistically significant (Marincak Vrankova et al., 2022⁴³). A systematic review confirms that the PI and GI increase sharply in the first three months after application of the appliances, peaking at three months before decreasing, indicating transient gingivitis (SC et al., 2018⁴⁰). In another observational study, the visible inflammation score increased from 2.89 to 15.43 after treatment, underscoring the frequency of gingivitis (Kumar et al., 2021⁴⁴).

Prevalence of Periodontitis

Compared to gingivitis, periodontitis is an irreversible destruction of the periodontium with bone loss. It is less common, but still occurs more frequently, especially in adults with pre-existing risks. One review reports a prevalence of 5 to 12% for periodontal complications such as periodontitis at the end of treatment, which can increase to up to 47% in the long term (Luchian et al., 2024³⁹). In a study of orthodontic patients, the overall prevalence of periodontal disease was 84.81%, with increasing frequency in older age groups (Ulitovskiy & Shevtsov, 2020⁴⁵). A systematic review of reviews shows that gingivitis rarely progresses to periodontitis, but patients with fixed appliances are at increased risk of attachment loss, especially with uncontrolled plaque (Di Spirito et al., 2023⁴⁶). An experimental study compared fixed appliances with aligners and found a 10% increase in PI and a deterioration in periodontal health with fixed appliances, with increased pathogenic bacteria such as *Prevotella*, which are associated with periodontitis (Giannini et al., 2025⁴⁷).

Nevertheless, some studies showed no permanent damage; periodontal parameters such as probing depth (PPD) and bleeding on probing (BOP) were similar in treated groups and control groups, indicating no long-term progression to periodontitis (Priyadarsi et al., 2020⁴⁸).

These results underscore the importance of prophylactic disinfection of the oral cavity with effective disinfectants (e.g., Betadine 5%) during orthodontic treatment.

We note that, in addition to the (latent) permanent damage described above, orthodontic treatment can also cause temporary damage that appears to heal after the end of treatment.

Risk Factors and Clinical Implications

Risk factors include inadequate oral hygiene, which leads to increased plaque formation, and the type of appliance, with lingual brackets posing a higher risk of bacterial colonization (Luchian et al., 2024³⁹). Studies emphasize that periodontal parameters such as PPD and BOP increase during treatment but decrease after removal of the appliances, often to baseline levels (SC et al., 2018⁴⁰). In patients with pre-existing

periodontitis (stage III to IV), orthodontic treatment can lead to attachment gain, but requires strict plaque control (Di Spirito et al., 2023⁴⁶). A prospective study also highlighted the risk of gingival recession, which is higher in orthodontically treated patients (Kloukos et al., 2025⁴⁹).

In summary, the prevalence of gingivitis is high (up to 84%) in orthodontic treatments with fixed appliances, while periodontitis is less common but significant, especially in the long term. Regular periodontal monitoring and hygiene instructions are essential to minimize damage (Marincak Vrankova et al., 2022⁴³). However, this type of damage is not the real problem with fixed orthodontic treatment..

16. Effects of Reduced Chewing Force Due to Inadequate Vertical Control

This addresses an essential problem of fixed orthodontic therapy: natural teeth have a lifelong tendency to erupt. This tendency to erupt is compensated for by the chewing force from the opposing jaw, which acts intrusively (on the teeth). Stable occlusion and stable vertical dimension are therefore primarily a

question of chewing force. Chewing force will temporarily decrease by up to 50% during fixed orthodontic treatment. This is due to several factors:

1. **Adjustment phase:** After fixed braces (brackets) have been fitted or after adjustments to the wires, pain or a feeling of pressure occurs regularly, which leads to patients chewing less vigorously in order to avoid discomfort.
2. **Tooth mobility:** During treatment, teeth are moved, which logically leads to loosening of the teeth. This will also affect chewing force and cause pain, as patients instinctively apply less pressure.
3. **Eating habits:** Many patients adjust their diet to avoid hard or sticky foods that could damage the appliance. This alone will also reduce chewing force.
4. **Muscle adaptation:** The masticatory muscles must adapt to the changed bite position or the appliance, which can temporarily affect chewing force.

Long-term: After completing treatment and stabilizing the bite, chewing power may return to normal or even improve,

as better tooth positioning often leads to more efficient chewing function. One of the next problems is the proper settling of the bite so that equal and usable contact point appear. This can be done only after the wires are removed.

The problem is that during the phase of reduced chewing forces, entire dental arches elongate without resistance and that even after chewing force increases following treatment, this morphological change in the skull is not reversible. If segments or entire dental arches (with or without the surrounding alveolar bone) elongate, it results in the bone's proliferation and vertical excess.

Here are long-term disadvantages of this bone growth: After the patient's growth is completed, i.e., a few years later, the patient's hormonal situation has changed to such an extent that bone is no longer being built up, but rather involution is occurring. The amount of stable bone is then determined by function only. This leads in many cases to a sudden collapse of the crestal bone level, particularly in the elongated bone areas. This development is wrongly diagnosed and treated as "periodontitis". The cause of these problems are found the previous orthodontic

treatment, where bone growth was triggered without an adequate functional demand.

The use of RCOS wires has a particularly severe impact on the masticatory system, as (contrary to all assumptions) RCOS wires primarily cause tooth extrusion, i.e. they do not intrude. The extrusion could be counteracted only with implants working as anchors or intensively worn high-pull headgear. However, neither option is popular with patients, as they make treatment more expensive, complicated and unpleasant and they are therefore not used very often.

17. Comparison of the Effects on Alveolar Bone of Orthodontic Treatment on the One Hand and Extraction With Immediate Implantation on the Other

17.1 Orthodontic Tooth Movement (OTM)

Orthodontic tooth movement (OTM) induces controlled biomechanical stress that remodels the alveolar bone through compressive and tensile forces. In animal models, OTM leads to PDL changes accompanied by increased expression of RANKL and OPG (Feyizoglu et al., 2025⁵⁸).

A study on dogs showed that orthodontic forces do not cause significant bone loss in healthy tissue (Ericsson et al., 1978⁵⁹). Unfortunately, damage to the desmodont was not investigated in this study. Long-term damage cannot be investigated in animal models, except if the animals are sacrificed.

In inflammatory environments, OTM enhances bone resorption through mediators such as IL-1, TNF- α , and PGE2 (Yamaguchi & Fukasawa, 2021⁶⁰).

Clinical studies confirm a temporary increase in periodontal inflammation parameters with fixed appliances (Luchian et al., 2024⁶¹).

In the long term, OTM can even promote bone regeneration in patients with compromised periodontal health, provided that plaque control is ensured (Di Spirito et al., 2023⁶²).

17.2 Extraction With Immediate Implantation

Extraction often leads to physiological bone loss, as the periodontal ligament and desmodont are removed. The functional stimulation of the bone and the nutrient supply through the blood are also missing. Immediate implantation is

intended to minimize this loss by increasing the function right away. A study in dogs showed significant resorption of the buccal bone wall and we see the same in our patients (Araújo et al., 2005⁶³).

In rats, it has been shown that immediate implantation increases the expression of osteoblastic markers such as Runx2 (Lin et al., 1994⁶⁴). Clinical studies show that immediate implantation preserves alveolar ridge width better than delayed implantation (Botticelli et al., 2004⁶⁵), but buccal bone thickness often remains reduced (Chappuis et al., 2013⁶⁶).

17.3 Comparison and Interactions

A study on monkeys showed that the combination of OTM and implantation in inflamed tissues increases marginal bone resorption (Polson et al., 1984⁶⁷).

Some authors believe that orthodontic extrusion can be used for implant bed preparation (Hochman et al., 2015⁶⁸). They overlook the fact that after implantation with osseointegrated implants, adequate bone stimulation and thus bone preservation are not possible; rather, the self-augmented bone is quickly lost again as a result of periimplantitis, which occurs soon after implantation.

Animal models suggest that controlled orthodontic forces promote osteogenesis, for example via BMP-2 and osteopontin (King et al., 1997⁶⁹).

Reviews emphasize the limited transferability of animal models to humans (Mavropoulos & Ammann, 2010⁷⁰).

17.4 Clinical Implications

OTM requires strict plaque control, while immediate implantation requires augmentative techniques when working with osseointegrating implants. However, when Corticobasal® implants are used, expensive bone augmentation procedures with long healing times of six to twelve months are not necessary. This way, the bone can be brought back into function immediately.

Summary and Overview

1. There is currently no scientific evidence that fixed orthodontic treatment achieves acceptable long-term **medical or aesthetic treatment goals**. It has been proven that this treatment method can be used to adapt the appearance of the teeth to the ideals of certain societies. It is also questionable how a successful orthodontic treatment can be identified.
2. On the other hand, it is no longer disputed nowadays that fixed orthodontic treatment causes short-, medium-, and long-term changes (and thereby damage) to the masticatory system. This damage is caused by damage to or destruction of the periodontium and the subsequent replacement of the periodontium / desmodontium by new bone formation (ankylosis). This bone formation can occur on the side of the dentine or the side of the lamina cribrosa, or through the formation of treatment-related vertical excess (as a result of undesirable elongation due to the straight wire technique), followed by periodontal decay of the initially excessively formed bone in the sense of inactivity atrophy. The sum of the chewing force or the sum of the chewing stimulation is not sufficient to maintain this amount of new bone.
3. Once the desmodontium is damaged, no repair ad integrum is possible. Ankylosis is not a repair ad integrum.
4. If orthodontic treatment is combined with surgical treatment, e.g., in combination with "repositioning osteotomies," severe bone loss is to be expected due to the massive post-operative remodeling surge (Ihde et al., 2020⁷⁶). This alone can significantly reduce the vertical dimension of the midface. The changes to the internal bone structure caused by the surgical phase cannot be taken into account or planned for during treatment.
5. Changes are necessary in patient acquisition and, above all, in consultation, treatment planning, and the implementation of orthodontic treatments. The safest ways to reduce or avoid the damage caused by fixed orthodontic treatment are:

- Perform early functional orthodontic treatment between the ages of 6 and 11 in order to avoid fixed orthodontic treatment later on.
- Changes to the jaw relation (Class 2 changed into Class 1) should only be carried out as an **early functional treatment** (with functional appliances like Aktivator, Bionator, etc.), before the patient reaches the age of around 11.
- Fixed orthodontic treatments should only be performed by highly specialized professionals who have been specifically trained in methods to prevent damage caused by treatment. Currently practicing specialists (“orthodontists”) cannot automatically be counted among these specialists because there is insufficient and meaningful research data on the topic of complication and damage prevention in the field of orthodontics.
- Most presently working orthodontists seem to underestimate the amount of damages that they can cause.
- Orthodontic treatment is not indicated simply because patients do not have an Angle Class 1 bite. Changing the bite from, for example, Angle Class 2 to Angle Class 1 (“normal bite”) **is not an acceptable treatment goal**, as no advantages are connected to this. Highly famous persons were showing a pronounced Angle Class II as this did not damage their reputation nor their beauty (i.e. Claudia Schiffer, German model and actress).
- Educational components must be incorporated into the upbringing of children and adolescents that explain the advantages of high chewing forces and hard food to them, thus ensuring that soft foods (e.g., burgers and French fries) are avoided as a precautionary measure. Higher chewing forces applied at a young age lead to better bone development and expansion of the jaws. This not only prevents crowding, but also prevents age-related

atrophy and recession. The need for supportive functional orthodontic treatment, expansion plate treatment, and extraction treatment should be assessed every six months by independent examiners between the ages of approximately 6 and 10. Such early interventions are minimally invasive, they provide less side effects, and they work fast. Often, after such early treatment, no further treatment is necessary, especially since jaw development, once it has been initiated and guided into the right direction, works in the sense of self-healing for the patient. However, as orthodontists potentially **harm themselves financially by performing inexpensive early treatments**, they are often not the appropriate assessors regarding the need for and timing of treatment. Basic treatments should be initiated or carried out by the dentists and patients should not be referred to orthodontists. It must also be taken into account that orthodontists have a monopoly on consultation

in favor of their own work. There is no serious “second opinion” in this area or dental work.

6. If damage caused by orthodontic treatment is found in middle-aged patients, dental treatments might be generally contraindicated. This is because it can be assumed that the actual damage is located in the periodontium and the bony tooth socket. There is no way to quantitatively diagnose or even treat such damages in the area of the desmodontium using dental medicine. In many cases, the only realistic option for these patients to come to a functional masticatory system is complete removal of all teeth. This is because in all teeth affected by fixed orthodontics, the periodontium / desmodontium was damaged to a greater or lesser extent.
7. If implant treatment were to be carried out to install a functional masticatory system, then the old method of osseointegration, due to its slow and multistep treatment protocol, would take several years. Most patients would not be willing to

undergo this highly stressful, old, and process-oriented treatment method and would prefer to remain with their severely damaged teeth and a hardly functional masticatory system. One reason for this is that patients over the years of deterioration do not know any more how pleasant mastication can be, how easy and how successful.

8. This article shows that the indications for tooth extraction must be expanded in accordance with the 9th Consensus Document of the International Implant Foundation IF®. It must include patient cases that underwent orthodontic treatment during adolescence and many of them show corresponding damage and changes.
9. Thanks to the development and widespread use of Corticobasal® implants (the technology of the Strategic Implant®), even in severely damaged cases, the masticatory system can be completely restored within a few days, regardless of the pre-treatment condition. The prospect of such a quick solution to their problem

alone prompts many adult patients to undergo this effective, immediate, problem-solving, and modern orthodontic treatment.

10. The modern therapeutic method of **Corticobasal® implants** (or **Strategic Implant®** technology, sometimes also referred to as the **Method of oral osseofixation**) allows stable oral function to be achieved much more quickly, safely, and with less risk after extensive extractions or total extractions (as can occur in the context of treating damage following orthodontic treatment) than the older method of osseointegration.
11. The presence of orthodontics in the dental market leads to an enormous, unquantifiable number of pre-damaged teeth and jawbone areas. General dentists are quite unaware of this damage and, due to their (inadequate) training in this area, will be unable to assess the risks that are connected to traditional dental treatments. They will typically underestimate the amount of damages that orthodontically treated teeth have accumulated.

12. Nevertheless, they are liable for their work and must consider these damages. These hidden damages, which affect the roots of the teeth and thus their foundation, are not reversible
13. More extensive and open-ended research is needed to identify and describe the extent of damage caused by orthodontics and to train private practitioners in the appropriate diagnostics.
14. The findings presented and summarized here significantly expand the indications for tooth extraction. Teeth with a history of orthodontic treatment should only be used for prosthetic work with the utmost caution. It is also necessary to provide comprehensive risk information that clearly identifies the issues at stake. The affected patients in question visit the dentist at around the age of 40 to 50. They come from a high-income group that can afford to spend a lot of their own money. From the authors' point of view, patients who have been pre-treated with fixed orthodontic appliances should consider to have their natural teeth removed if, among other things, the following criteria apply:
 - Generalized slight loosening of numerous teeth, even years after orthodontic treatment.
 - Reduction of attachment by approx. 20% or more.
 - Several ankylosed or partially ankylosed teeth are present.
 - The presence of root-treated teeth leads to a decision in favor of extraction anyway⁷⁴
 - A radiologically absent first cortical layer between two teeth can also be considered an unfavorable sign with regard to tooth preservation.
 - Patients with multi-focal periodontitis (affecting several teeth independently of each other) should be strongly advised of the benefits of tooth removal or total extraction. This is in view of the threat of bone loss with all the associated disadvantages (chronic or recurrent infections; high financial costs without lasting results if periodontal treatment and other

measures to “preserve teeth” (= preserve the problem) are continued; increasing functional and aesthetic impairment, and much more).

15. **Forward-Looking Considerations:**

Orthodontic treatments are performed at an age when patients are typically experiencing rapid growth. Very different genomes are expressed in this context, even in the same person. It is therefore difficult (or impossible) to distinguish between treatment successes, growth-related changes, and different gene expressions. Not only growth, but also influences such as the young person’s diet and physical activity as well as countless habits, play a role in their development. It is therefore difficult to identify scientifically sound and clear research results. This would require very large patient groups in which a large number of parameters would have to be controlled. Many of these parameters cannot be controlled, e.g., compliance. Such studies are lacking in the field of orthodontics as a whole. From the authors’ point of view, it is therefore highly

questionable whether orthodontics should be described as a scientifically proven treatment method. As in the field of oral osseointegration, the team of authors was unable to find any dental (!) publications that considered the important epidemiological ITT principle in their statistical statements and experimental design. From this, it can be concluded that there are few or possibly no genuinely scientific documents in the field of orthodontics. It is quite likely that such valid studies do not exist in the entire field of “scientific dentistry.” The fact that orthodontics is taught at universities despite such a low level of proven knowledge raises significant questions. If it is the case that truly (and in every respect) successful orthodontic treatment is primarily based on the extensive experience of the practitioner, then scientific qualifications cannot (as is currently the case) be the only selection criterion for full professors. Only a proven high number of (demonstrably successful) treatments can be used as a basis for selecting full professors. A habilitation and publications in impact fac-

tor journals cannot therefore be valid criteria, as reviews of such journals have obviously never required the application of the ITT principle, even though it is one of the central foundations of correct medical reporting⁷⁴. In addition, we now know that even peer reviews do not guarantee the quality or even the accuracy of an article. Between 50% and 70% of scientific publications in these journals are still incorrect in terms of content – they could even be described as false or falsified. In the current scientific environment, especially in medicine, there are therefore no longer any reliable points of reference.

16. The very complex medico-legal situation in orthodontics makes it difficult to find suitable court experts from the university environment.
17. It is difficult to believe that orthodontic “treatment” is taught and performed at supposedly “scientifically oriented universities” without anyone apparently having taken the trouble to verify the long-term safety of this treatment. If patients are promised long-term or even lifelong benefits

before treatment begins, this must be substantiated by long-term studies. Universities that teach this therapy have had fixed orthodontic appliances at their disposal since around 1920. There has been enough time to conduct long-term university studies (in which patients are followed until retirement age, if possible). Such studies would presumably have provided important details about fixed orthodontic treatment. The reality today is that a dental company can launch a new type of bracket, archwire, or aligner on the market without any meaningful studies to back it up; - they will get this device CE-marked out of thin air. Our observations show that the really serious damage to teeth that have undergone fixed orthodontic treatment only becomes apparent after 20+ years. A moratorium on use must therefore be imposed immediately until the issues surrounding this treatment have been clarified. It also seems necessary to withdraw state support and state given status from those universities that are ignorant and professionally blind: current dental training institutions, for

example, could be renamed “dental schools,” where technically and practically qualified craftsmen are taught by professionally experienced craftsmen.

18. Many dental university departments could then be closed at great cost savings, and the spread of the nonsense taught and thought in fixed ortho departments would immediately cease. The staff and facilities can be put to more useful purposes. There is no need to spend enormous amounts of taxpayers’ money on the illusion of scientific research and scientific “progress” when these institutes have not even investigated the most basic principles of orthodontic treatment in more than 100 years. In no way has there been even the slightest risk assessment for fixed orthodontic treatments in the last century. At the same time, orthodontists, in Germany for example, have become some of the highest-paid dentists. This is despite the fact that orthodontists have presumably left behind endless rows of patients with severely damaged teeth and masticatory systems.

19. Fixed orthodontic treatment fits seamlessly into the long list of university-taught medical treatments that can do more harm than good in the medium to long term.

Example of treatment for total orthodontic damage using Strategic Implant® technology:



Fig. 1: Clinical picture before starting implant restoration treatment. This patient underwent fixed orthodontic treatment at the age of 15-18. After that, her masticatory system deteriorated visibly.



Fig. 2: Panoramic overview before our treatment began. All teeth showed loosening of 1 to 2+.



Fig. 3: The restoration was completed within three days. This image shows the oral situation at the three-month check-up.

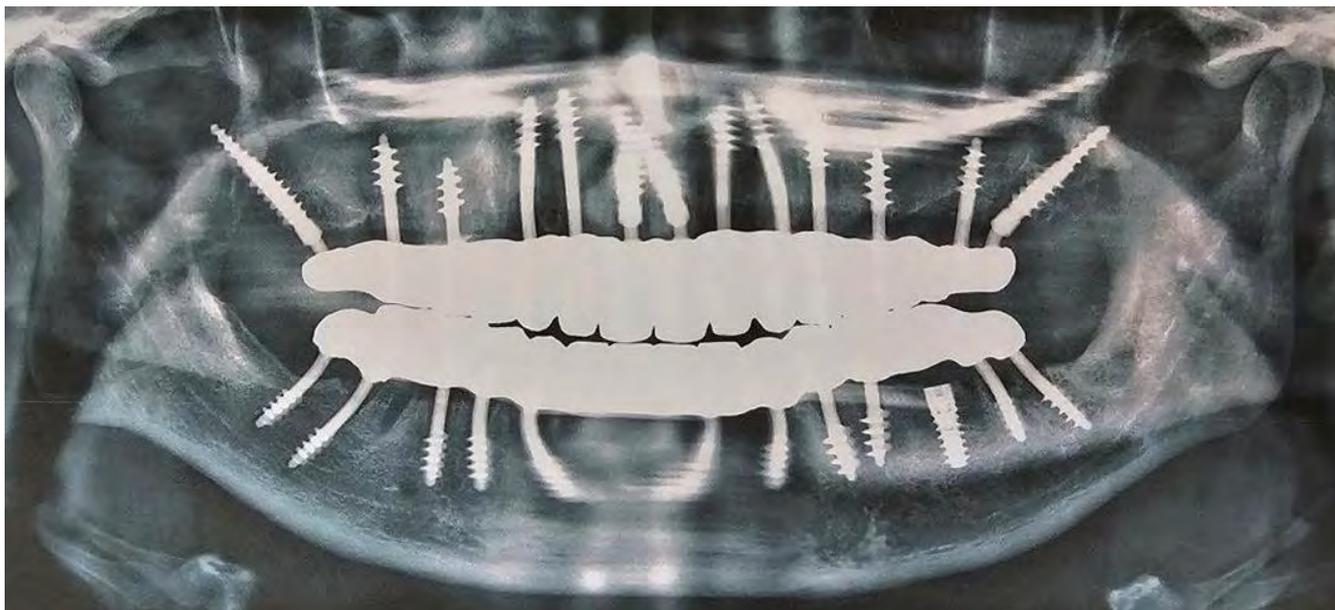
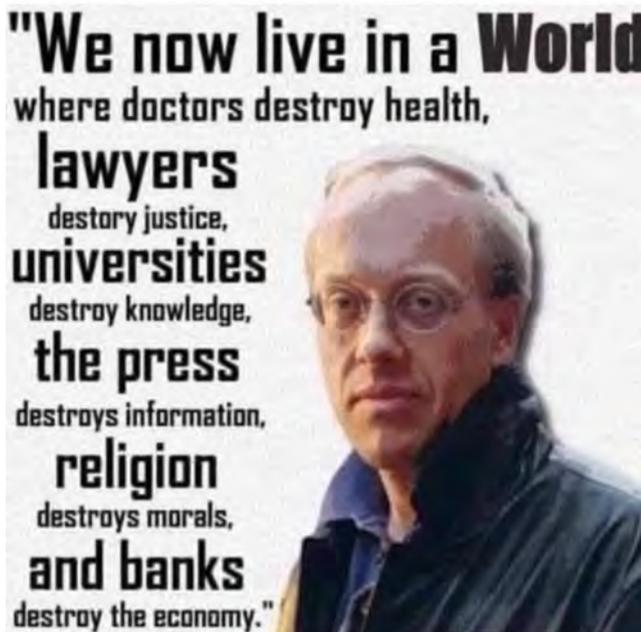


Fig. 4: The post-operative panoramic image shows the 13 implants in the upper jaw and 11 in the lower jaw, all of which are of the “Strategic Implant®” brand (BECES® and BECES® EX, manufacturer Simpladent® GmbH, Dorfplatz 11, 8737 Gommiswald, Switzerland, www.simpladent-implants.com). A pre-existing 2-phase implant was left in place without being incorporated into the new construction (due to the low elasticity of this type of implant). This implant could be left in place because it did not occupy a “strategic implant position”.



Quote by Chris Hedges

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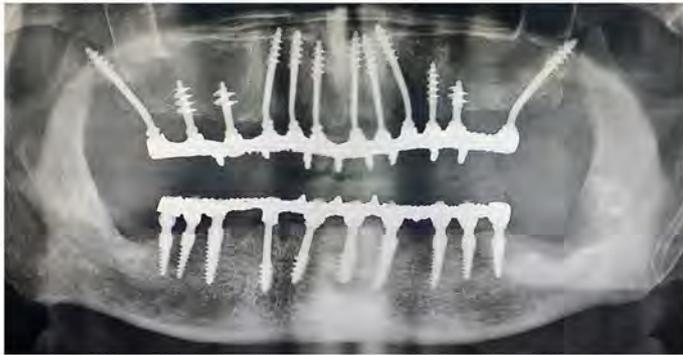
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Since 2006, the International Implant Foundation (IF[®]) in Munich, Germany, has been at the forefront of implantology, advancing the field through innovative research and education. Our mission is to provide world-class implantology training for dentists, to support research and continuous exchange of knowledge & experience between professionals, and to inform the general public about the possibilities of modern oral implantology

16 Advantages of Osseofixation

Patients will hold you as their treatment provider, because you offer these advantages to them:

1 | Saves costs by 30-40%



9 | Aesthetic solutions for all patients



2 | Reduces treatment time by 98%



10 | Uninterrupted intra-bony perfusion



3 | Efficient workflow saves chair-time



11 | Easy long-term maintenance



4 | Immediate functional loading



12 | No peri-implantitis



5 | Low complication rate



13 | No patient selection



6 | Simple straight forward treatment



14 | Put more implants



7 | Immediate implant placement



15 | Start treatment immediately



8 | Preserves bone elasticity



16 | Cost-effective implants



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A valid dental degree is required to enroll in our Corticobasal[®] implantology training program.

Who Should Attend

- Dentists and oral/maxillofacial surgeons interested in immediate functional loading
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- Instructions from experienced implantologists
 - Learn how to work without bone augmentation
 - Avoid peri-implantitis simply by choosing the right implant
 - Immediate implant placement
 - How to solve cases at all stages of atrophy
-

Course Duration

- A full & intense 7-day training program for modern implantology and directly associated subjects.
 - Become a certified implantologist in just one week.
-

Conventional Implantology



1 Inspection Diagnostic procedures Treatment plan

2a **Surgery 1**
Tooth removal

2b **Surgery 2**
Bone augmentation/sinus-lifting
(necessary in up to 80% of the cases)

2c **Surgery 3**
Implant placement
(adequate bone healing provided)

2d **Surgery 4**
Placement of gingiva former

2e Impression taking

3 Trying of the bridge frame
(5-10 days after impression taking)

4 Delivery of bridge (4-24 months after implant placement)

Total

Treatment duration: 4 - 24 Months
Number of appointments: 7 - 12

Strategic Implant®



Inspection
Diagnostic procedures
Treatment plan

1

Removal of teeth, Implant placement, Impression & Bite taking

2

**Step 1 and 2 may be done in the same (first) appointment.*

Trying of a sample bridge and aesthetic & functional corrections (if required) **0 - 1 days** after implant placement

3

Delivery of bridge (**1 - 3 days** after implant placement)

4

Control of occlusion and mastication

5

Total

Treatment duration: 2 - 4 Days
Number of appointments: 4 - 5

AIOW TEACHERS



Prof. Dr. Stefan Ihde

Surgical & Prosthetic Specialist and
1st Class IF[®] Teacher



Prof. Dr. Vitomir Konstantinović

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Surgery and Implantology,
Director of the Clinic for Max-
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DT Sanela Lazinica

Dentist technician and specialized IF[®] teacher for the work on the Strategic Implant[®]



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And Impressions from the course



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A world map in white silhouette on a dark blue background. A light blue circle with the letters 'SRB' in white is positioned over the Balkan region, specifically over Serbia.

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