9th Consensus on Indications for Tooth Extraction, Tooth Repair, and Oral Implant Placement

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Content

1 Introduction

Traditionally, dentistry has dealt with teeth and oral diseases. Dentistry evolved out of early "tooth fixers" and the profession climbed into the ranks of a subject for universities at the end of the 19th century. It became more and more focused on fixing teeth, simply because there were no other options. From this point of view, preserving teeth in order to create at least fix points made sense.

As an ageing process, people tend to lose their teeth as a result of caries, periodontal disease, trauma, infection, malignancies, or iatrogenic causes [1-4]. According to the literature, by the age of 70 years old, almost 45% of the population is toothless. Holm-Pedersen [5] reported 50% prevalence of tooth loss while in 2021 Casarin et al. [6] reported 47%.
Tooth loss adversely affects the health of oral and para-oral structures, resulting in many consequences, including teeth tilting, drifting, and elongation that have a significant impact on the patient's occlusion and mastication [7-10]. Patients tend to change their masticatory function under the influence of tooth loss from bilateral masticatory chewing into unilateral or anterior unilateral masticatory habits, a consequence that necessitates correction through prosthetic rehabilitation with several prosthetic treatments, including full dentures [11, 12].

Disregarding a bilateral and equal function of the masticatory system has negative long-term effects that only a few professionals understand in depth. The bone in both jaws will develop an unsymmetrical pattern of mineralization and an unsymmetrical elasticity.
In cases of anterior chewing patterns, both the upper and lower frontal groups tend to elongate. On non-chewing sides, teeth tend to elongate, while on chewing sides, they intrude; midlines tend to shift towards the chewing side. Crowding tends to happen on the non-chewing side because the underloaded bone will atrophy away and cannot hold (activate) the bone volume [11, 12].

The treatment goal is to create good (normal, bilateral) chewing function. Prof. Motsch from Münster University (Germany) emphasized this concept 50 years ago, summarizing the issue and its resolution in a single sentence. He stated: "With every removed tooth, we move closer to a full denture, and for full dentures, we know how to do things." We would like to add here the following statement: "After the removal of all teeth, we can finally create proper and regular chewing function." Both statements have been true and valid until today.

Until and after the Second World War, forceful tooth removal on young women was practiced in many countries, including Switzerland. Young brides had all of their teeth removed and received full dentures to keep future costs for their husbands and the family low. Memories from this time may influence how people think about radical tooth removal today. Nowadays, the therapy of that time is considered cruel and awkward. In addition, it was not fair to do this only to women.

However, keeping natural teeth can be considered a high-priced option for older patients, owing to the fact that, with age, teeth decay and become mobile, necessitating an expensive dental treatment [13-26]. Therefore, in today's world, an increasing number of patients may find themselves compelled, or even willing, to undergo full extractions in order to opt for modern implants. Every day, dental practitioners see more patients searching desperately for a lasting and affordable solution regarding their masticatory system. This financial dilemma may also influence the selection out of various treatment modalities offered to each patient [24-26]. Financial pressure acts as the main driving force that makes patients opt for a switch from one treatment option to another (i.e. from fixed teeth to modern and easy-to-maintain implant-borne dentitions) [13, 22, 23]. Recent studies show that up to 100% of the patients who experienced fixed Corticobasal® implant-supported bridges would select the same treatment modality (make the same decision again) after years of follow-up [28-30].
On the other hand, from a marketing and financial point of view, dentists (supported by their dental chambers) may not encourage tooth removal as their chances of making money from treating these patients in the future are next to zero. Such consideration solely by dentists and dental chambers are, however, unethical.
Dentists may adhere to the conservative concept emphasized in universities, putting all their effort into treating and maintaining natural teeth, a concept that is at the first glance fundamentally sound. Nevertheless, it may end up in an unwanted edentulism. Dentists must know and consider all possible treatment modalities, engage in a fruitful practical (and not only scientific!) discussion about the benefits / risks ratio with their patients before selecting the appropriate treatment, and take into account the high motivation of patients, particularly in recent years. Moreover, dentists today must consider the option of tooth extraction and subsequent implant rehabilitation using fixed implant-supported prostheses [13, 22, 23].

Unfortunately, the majority of dentists (family dentists) in most countries lack the knowledge and the experience to give such advice to their patients. Hence, they may refuse to include implants (on a larger scale) in their treatment arsenal. Especially if they resort to the means of traditional 2-stage implantology, considering the low effectiveness and limited applicability of the method of osseointegration, they are unable to grant the treatment of their local clients until the end of their life with fixed teeth. Therefore, they often advise against replacing teeth that have an expected survival time of ten or more years with conventional implants, which typically last only seven to ten years. This short lifespan results from various limitations as well as sensitivity to infections and proneness to complications [31-37]. This challenge underscores the significance of developing a new implant technology that boasts high success and survival rates, minimal or no constraints, and manageable complications [28-30, 38-75]. For almost two decades, the Technology of the Corticobasal® Implant has made it possible to use simple and inexpensive single-piece implants, which show even much higher survival rates and allow a good clinical access. These implants have fully overcome the disadvantages of conventional dental implants that were used since the 1990s [11, 38]. They are connected to a few manageable, documented complications, lead to high patient satisfaction, and defi-

nitely improve patients' quality of life [11, 12, 28-30, 38-75].

In addition to the aforementioned considerations and facts, patient perceptions regarding keeping and repairing or extracting their teeth should be considered a priority. (Only) the patients have the right of self-determination regarding their teeth. Patients have to make decisions about their treatment, as discussed previously, there are many acceptable reasons why patients may not decide in favor of their teeth; instead, they request to switch from their questionable and often very incomplete set of natural teeth to implant treatment and, thereby, to fixed implant-supported prostheses. Today, the Technology of the Strategic Implant® makes this switch possible within only a few days.

The International Implant Foundation IF® has highlighted the fact that extensive tooth repair should not be done simply because the tooth is badly decayed and the patient is sitting on the dental chair. Patients must actively choose tooth repair over any other pro-posed treatment method, including tooth extraction and modern implants.

2. Reasons for Tooth Extraction

In general, the reasons for tooth extraction can be categorized into three main reasons, which are:

1. Tooth-substance-derived reasons (the situation of the remaining tooth structure and / or dentition)
2. Implant-technologyderived reasons (the proposed treatment modality of teeth replacement)
3. Patient-derived reasons

2.1. Tooth-Substance-Derived Reasons (The Situation of the Remaining Tooth Structure and / or Dentition)

As highlighted previously, patients have the right of self-determination regarding their teeth. Before making the decision regarding the definitive treatment, the patient should be informed about the following:

- At least the majority of the oral cavity diseases are associated to the presence of teeth, for example, dental decay is associated with teeth. Almost 96% of all dentates have experienced tooth decay in their lifetime [76]. Kamberi et al. [77] conducted a study reporting 72.80% of caries prevalence and linked the increased DMFT (Decayed, Missing, Filled Teeth) index with age. Moreover, Kassebaum et al. [78] observed a shift in the burden of untreated caries from children to adults, identifying three documented pools of prevalence at ages 6, 25, and 70 years
- Periodontal diseases are associated with the periodontium surrounding the tooth; hence, following tooth removal, periodontal disease ends forever. Trindade et al. [79], in a recent systematic review, investigated the prevalence of periodontitis in dentate adults, between 2011 and 2020. The reported incidence was 62%, with a percentage of 23.6% as severe

periodontitis with the highest pool estimation in elderly 79.3%. Several risk factors, including poor oral hygiene, smoking, diabetes, medication, age, hereditary factors, and stress, can increase this percentage [79]. Moreover, for older people, an increase in the percentage of deep pocket and periodontal index scores from 5 to 70% has been reported [15, 80]. Furthermore, studies by Andersson et al. [16], Mojon et al. [17], Budtz-Jørgensen [18, 19], and Mersel et al. [20] have documented a range of 50 - 100% for caries, periodontal diseases, and mucosal disorders among older patients in hospital. Nazir et al. [82] conducted a recent ecological study that included data on periodontal disease from the World Health Organization's data bank, emphasizing the increased incidence of periodontitis in the elderly population, even in high-income countries

- The dentition deteriorates every year as an aging mechanism and there is no way to stop it. Several researchers have reported the adverse effects of ageing on the dentition [14, 16, 21]. These effects include continuous wear and attrition of teeth due to the lack of a physiological turnover mechanism in the enamel tissues; a reduction in light reflection characteristics that compromises the teeth's aesthetics; increased pigmentation and corrosion; changes in dentine quality and quantity; variations in cementum; the possibility of hypercementosis, particularly around over-erupted teeth; reduced salivary secretion; and even xerostomia, which has a negative impact on the dentition's health [21]
- The association between oral microbes and the pathogenesis of systemic diseases has been proposed by Miller [83] since 1891. Scannapieco FA [84] and Terpenning et al. [85] considered the relationship between oral bacteria and respiratory infection and pneumonia, while Madianos et al. [86], Wu et al. [87], and Joshipura et al. [88] reported the possible association between periodontal diseases and coronary disease, cerebrovascular disease, and ischemic stroke, respectively. Andersson et al. [16] conducted a study on 161 newly admitted elderly patients in rehabilitation care, and found that 71% of these patients had oral health problems, with 30% of these problems significantly associated with the presence of respiratory disease
- Development or promotion of periodontal diseases due to the use of composites and bonding systems as a result of the uncontrolled, strong adhesion of these materials to root surfaces [89, 90]
- The necessity of root canal treatments as a result of the use of composite materials and subsequent pulp irritation in general [91-93].
- The toxic effects of root-canal-treated teeth in general must be considered and explained by the dentist before and after (during the later years again and again) such interventions [94-96]. Research highlights the toxic effects that accumulate in the human body over the years while the defense systems of the body might deteriorate. The dentist

must keep in mind that the patient's general health may have deteriorated and that the patient might now have good reasons to overthink his earlier permission to get a root canal done. In view of the present health situation, the patient might change their mind and try to avoid the risk and the burden. This is especially true because, after removing the root-canal-treated tooth, the origin of the toxic attack is fully and immediately removed.

- Compromised teeth will have a shortened lifespan after (and due to) reconstruction [11]
- Failure to provide successful teeth / dentition treatment, or reconstructions incorporated at the wrong or unfavorable angle to the plane of Campers, may result in the development of unequal chewing patterns (unilateral or anterior pattern of chewing) with unequal and unnatural usage of masticatory muscles. This is associated with many adverse effects, including changes in the distribution of the mineralization of the jawbones and subsequent outbreak of periodontal diseases, or at least reduced chewing possibilities [11, 12]
- Effects of creating non-adequate crowns and bridges or leaving such work pieces in the oral cavity, which lead to an unequal AFMP and / or unequal APPI (e.g., due to natural adaptation of the dentition, like elongations, tilting, or rotations of "good teeth") [11, 12].
- Keeping teeth in the oral cavity in general is by far more indicated in growing individuals and young adults. Only with the help of teeth in function can a sufficient formation of jawbone be reached. This indication for keeping teeth fades away around the age of 30

2.2. Implant-Technology-Derived Reasons (The Proposed Treatment Modality of Teeth Replacement)

Nowadays, implant treatment has become the gold standard treatment option for teeth replacement, ***hence, the indication for tooth removal with the plan to install oral implants subsequently depends on the type of implant as well as the treatment method chosen by the implantologist. Regarding this point there are large differences between osseointegrating and osseofixated implants.***

2.2.1. The Method of Osseointegration

This paragraph discusses implant treatments and the use of osseointegrated implants (also known as conventional implants, two-piece implants, and 2-stage implants).

Although these implants have been on the market for approximately 30 years, no developments have led to improving their daily use. The treatment

aim is to rigidly ankylose the implant bodies into the bone. The result of this process is called "osseointegration". Although ankylosis is a pathological state for teeth (and in fact, it alters the properties of the surrounding bone), this ankylosed state is suddenly the "accepted treatment aim" for "osseointegrated" implants. Additionally, all of these implants exhibit the same limitations:

- They are installed and require abundant amounts of bone to have satisfactory primary stability; hence, in compromised ridge support areas, bone augmentations are mandatory with its susceptible risks factors [97-100]
- Reported periimplantitis that develops frequently around conventional rough surface implants and results in implant loss [31,32]. Literature reports that the incidence rate of periimplantitis varies between 5% and 95% of the cases. Experience tells us that the results of the previously mentioned study are very realistic. They show in a retrospective study that, as a result of the use of a mix of 2-stage implants (conventional implants designed for the method of osseointegration), after an observation time of 6.25 years (+/- 3.6 years), only around 22% of the implant sites are healthy and can be counted as successful
- In a systematic review involving 57 studies, the prevalence of periimplantitis at implant level was found to range from 1.1% to 85.0% [31], with an incidence ranging from 0.4% within three years to 43.9% within five years. While Derks et al. [32] documented that the onset of periimplantitis occurred early, and 52% and 66% of implants presented with bone loss of >0.5 mm at years two and three respectively. A total of 70% and 81% of subjects presented with ≥1 implants with bone loss of >0.5 mm at years two and three respectively
- The methodological heterogeneity in reporting the periimplant biological complications in different studies, which restricted attempts to estimate the real prevalence of periimplantitis, highlights the need for developing a specific case definition for the classification and documentation of periodontal and periimplant diseases (2017), as stated by Cosgarea et al. [33] and Scarano et al. [34]
- Several biomechanical / technical complications have been reported in the literature with this system [36, 37], with a percentage of 44.41% [36], including screw fracture / screw loosening (2-45%), and chipping or fracture of the veneering material (33.3% at five years and 66.6% at ten years) [37], as well as a high incidence of periimplantitis, with a growing incidence over time. As soon as the state of ankylosis is reached, the bone around the implants lacks sufficient loading and the necessary elastic deformation. Hence disuse atrophy (combined with the stress shielding effect which appears through the overly stiff 2-stage implant compared to the elasticity of the bone) starts after "osseointegration",

such atrophy and consequent space may facilitate bacterial colonization and then periimplantitis
- A recent study by Bardis et al. [37] in 2023 revealed a 28.70% incidence of technical complications, with a 4.14 increase in incidence in patients over 60 years old, underscoring the use of single-piece implants like Corticobasal® implants in this age group. These findings are in line with a recommendation by many American lawyers (dealing with malpractice cases) to their dentist clients: for conventional implants, an average time of usage of seven to eight years should be promised (granted) for the patients, but not more, although single implants will last much longer

Thus, the treatment modality that includes tooth removal with the intention of replacing teeth with osseointegrated implants must be considered unethical if the teeth that are to be removed would last longer than seven to eight or even ten years. In fact, conventional dental implants must be considered rather temporary implants (in comparison to the life expectation of the treated patients).

Even if tooth removal is requested by the patient, as an individual's sole preference, the patient must be informed about all the risks and complications associated with it, including the shorter time of function of osseointegrated implants compared to natural teeth. Thus, 2-stage implantology should primarily focus on replacing single or a few already lost teeth.

Why May a Patient not Accept Conventional 2-Stage Implants Today?

Patients typically reject the use of 2-stage implants for the following reasons:

- The long, undesired healing times associated with conventional 2-stage implants and the use of transitional prostheses meanwhile upset the patients who rather opt for immediate loading protocols [21]. An observation that in line with Razak et al. [21] who stated that the number of systemic diseases, local factors, the patient's prior experience with dentures, their level of cooperation, financial resources, and the biological and technical quality of prosthetic materials influence the prosthetic treatment selection and prognosis in geriatric patients
- As a consequence of ageing, most of the patients over the age of 50 do not provide enough bone to hold conventional dental implants without bone grafting, or "bone augmentation" [97-100], a procedure that may be governed by many considerable complications [11, 43, 50, 100]. Hence, patients may refuse implants for this reason and prefer to live on with severely compromised teeth instead
- The patient's medical status may lead to patient deselection. Diabetes mellitus and other medical conditions are considered relative contrain-

dications for conventional implant treatment, and their association with a bone grafting procedure increases this risk [11, 100-102]

- The patient's habits, i.e., smoking, are undoubtedly a severe risk factor for the success of bone augmentations, because smoking prohibits wound closure [29, 97, 102]. Typically, implantologists exclude smokers from such augmentations and hence, they are often excluded from (conventional) implant treatment. In contrast, Corticobasal® implants have revealed a high success and survival rates with no differences bet-ween smokers and non-smokers [11, 29]
- Placement of 2-stage implants with the intention of improving aesthetics is, in the long term, in any case a doubtful approach
- Placement of conventional 2-stage implants with the intention of stopping periodontal disease and thereby creating stability in the masticatory system is a doubtful approach from the beginning [93, 103-106]. As according to the literature, a well-documented association between periodontitis and the incidence of periimplantitis has been reported [104-106] unlike Corticobasal® implants [11, 29]
- The 2-stage implants require expensive professional aftercare, and nevertheless, many of them require replacement after only a few years due to technical complications
- Bone augmentations and sinus lifts should not be considered any more since a safer treatment (without the risks that are associated with bone augmentation) is available today (i.e. Corticobasal® implants)
- Prior to implant placement, patients should be informed about the suspected complications and that the life expectancy of these implants is around seven to eight years. Under these circumstances, as discussed previously, the indication for preserving teeth is given in many cases, especially if the natural dentition will probably survive longer than the 2- stage implants
- Conventional implants should not be placed in jaws where generalized bone loss is taking place (i.e. while a progressing periodontal disease is ongoing) because the whole jawbone can be expected to be under strong and constant remodeling, which will not stop soon after the implants are placed and compromise the implant's primary stability

A discussion regarding the real-life success rate of conventional 2-stage implants is presently not done, real-life figures are kept in the dark or they do not exist. Typically, even "scientific" publications show only the number of implants placed and consider only the patient selected for the treatment; deselected cases are not disclosed, despite the fact that these patients wanted implant treatment. This process of deselection is called "patient selection" [107-110]. This process is typically done on a larger scale (more than 10% of the cases), but the resulting statistics cannot be used to assess the effectiveness and applicability of the Method of Osseointegration or the implant system under investigation. **All presently known and published studies, which are done on conventional oral**

implants, violate the "Intent to Treat (ITT)" principle, which is one of the central pillars of epidemiology and medical reporting [110, 111].

Deselected patients typically remain untreated. If the method of osseointegration is chosen by the treatment provider, the estimated percentage of deselected patients may reach a percentage between 20% and 60%. Moreover, the amount of deselection increases with the age of the patient, the deteriorating medical status of the patient, and the increase in jawbone atrophy. This fact alone shows that osseointegrated implants may not be useful for most elderly patients.

2.2.2. The Method of Osseofixation

Osseofixation has been developed in the field of traumatology and orthopedic surgery since 1975, when the anchorage and penetration of the second cortical had become state of the art worldwide [11, 38]. This fact has not changed, although other devices had been invented using other method of fixation, i.e. compressive trauma-implant devices.

Historically, the first screw implants that could be considered as bicortical devices were introduced into our profession in the 1950s. In 1988, Grafelmann (Germany) filed his patent for the "Bicortical" screw, but in the clinical reality, he and his followers did not use this screw in a bicortical manner. The assortment of these screws on the market (at that time marketed by Oraltronics company, Germany) did not provide implants in lengths which would allow to reach the second cortical. Hence, the use of these implants in the technology as defined in oral traumatology was not possible [11, 38].

Today, Corticobasal® implants are manufactured in all necessary lengths (i.e. up to 38 mm) and for longer distances, zygomatic implants in up to 70 mm length are available [11, 38]. Since the middle of the first decade of this century, the method of oral osseofixation (for the fixation of bridges) has spread wide widely in most countries all around the world [11, 28-30, 38-75]. This method works by anchoring cortical and basal implants into the second or third cortical, targeting the highly-mineralized areas of bone, and most importantly, eliminating the need for bone augmentation [11, 38, 112]. These treatment plans are set up according to an immediate functional loading protocol. Therefore, in some cases teeth should be removed to establish a more stable BIPS®, enabling a uniform implant distribution, facilitating the usage of resorption-stable and highly mineralized bone areas, to arrange improved biomechanical masticatory load distribution, and a standardized masticatory function [11, 38, 112].

Because of their smooth surface, no periimplantitis is associated with these implants, an advantage that is critical for long-term implant success and survival [11, 28-30, 38-75]. Moreover, the excellent biomechanical force distribution reduces the biomechanical complication rate and increases the lifespan of the implants. Hence, we can assume that such implants can last "forever" when placed with a regular follow-up schedule and highlight them as an ideal rehabilitated option for tooth replacement (Table 1).

A comparison between conventional implants utilizing the method of osseointegration and osseofixated implants has been outlined below [11, 12, 112]:

Table 1: *Shows the major differences between the Method of Osseointegration and the Method of Osseofixation regarding permanent and temporary contraindications as well as the patient's reason(s) for not accepting the treatment and opting for alternative treatments like endodontic and periodontal*

	Method of Osseointegration Conventional Oral Implants (COI)	**Method of Osseofixation**
Implant's contraindications, which may lead to the deselection of the patient by the treatment provider	• Patient's medical condition: unfavorable medical conditions (diabetics, hypertension, various medications, oral IV bisphosphonate treatment, etc.) • Patients' habit: smoking • Patient's local factors associated with edentulous spaces: Insufficient bone supply and unfavorable conditions for bone augmentation • Patient financial status, especially when bone augmentation is mandatory	Not applicable
Relative / temporary medical contraindications for oral implant treatment that will lead to the patient's temporary postponement by the treatment provider	IV bisphosphonate treatment. Periodontal infections, cysts in the bone, infections in the bone, and recent radiation therapy	IV bisphosphonate treatment, recent radiation therapy
Reasons for the patient's refusal to undergo oral implant treatment	• Long duration of treatment • The cost of implant treatment is significantly high • The risks associated with bone augmentation are high • Additional costs of bone augmentation • Fear of repeated pain during multi-step surgical protocols • The unwillingness to wear an intermediate removable denture or to be without teeth for some time is a common issue • There is a fear of experiencing periimplantitis, which can lead to pain, infections, and eventually the loss of large amounts of bone and implants	Despite the relatively lower treatment costs, some patients still have to postpone treatment for financial reasons. This shows that further developments in the effective handling and application of the method in the local clinics are necessary.

This consensus document governs all tooth extractions and subsequent treatments using the Method of Osseofixation. As previously discussed, patients have a wide range of reasons for either keeping their teeth in or preferring to have them removed and replaced with implant-based dentition.

The following pragmatic way of thinking guides this decision:

- Is the change to an implant-based solution possible in a short amount of time and is the result reliable?
- Is the treatment within the given financial affordability?

In oral implant cases, the following situations may indicate or emphasize the direction of tooth removal:

- Wisdom teeth should be removed from patients receiving dental implants. The ancient idea of keeping wisdom teeth as an anchor of last resort does not reflect today's knowledge and today's possibilities in oral implantology [11, 12, 38, 113]. Erupted wisdom teeth tend to elongate (with the bone), and hence, they create an increase in the vertical dimension of the whole tooth arch (especially in the mandible). The newly formed bone is, however, not stable, and as soon as it collapses, patients develop the signs of periodontitis. Elongated wisdom teeth carry the risk of unwanted and uncontrolled early contacts which might develop over time [11, 12, 38]
- Elongated teeth (with or without elongation of the alveolar bone) should be removed if they block the possibility of rehabilitating the tooth arches with an acceptable AFMP and APPI on both sides. Furthermore, their bony bed has to be considered potentially unstable. In all cases, vertical bone reduction should be performed for a successful outcome [11, 12]
- Periodontally involved teeth with an attachment loss of 20% (of the root surface) or more should be removed
- Mobile teeth (Grade I and above) should be removed; hence, tooth mobility cannot be treated in general, and it prevents a pain-free mastication and a stable occlusion and prosthesis [11]
- Teeth that may require a second or third crown should be removed to avoid short-term treatment results; if they are lost, a partial re-treatment will become necessary and the bilateral mastication is endangered
- Teeth whose position in the jawbone prevents resorption-stable bone areas from being reached and / or used for cortical anchoring of implants should be removed (this applies also to single second molars, all wisdom teeth, as well as to impacted upper canines, etc.)
- Teeth that the patient (for any reason) wishes to extract can be removed. Experience shows patients requesting tooth removal usually have good reasons for this. They themselves have made bad experiences with their teeth, experiences that they typically cannot explain to their

dentists that may hinder patient's satisfaction later [14, 22]

- Natural teeth are often positioned in the oral cavity in such a way that the transition zone to the mucous membrane becomes visible when the lip moves (when laughing, talking, or smiling), compromising the patient's look and the aesthetic outcome of the prosthetic treatment. In such cases, the bone level has to be corrected in order to achieve an acceptable aesthetic result. This vertical bone reduction demands the removal of these teeth in any case [51, 52]
- Removal of ugly and severely restored teeth is indicated for an aesthetic successful outcome upon the patient's request. In such cases, soft and hard tissue should typically also be corrected [51, 52]
- If the sum of the necessary dental treatments seems unbearable or unaffordable for the patient, teeth can be extracted, as this avoids psychological and financial suffering for the patient [14, 22, 23-26]. If a severely pre-damaged dentition is given, a complete removal of all teeth and the placement of Corticobasal® implants is, in general, the cheaper solution with a better long-term perspective
- With regard to the follow-up costs of a dental treatment ("re-dentistry"), especially if the expected lifespan of some teeth is less than six to eight years, it should be urgently proposed that the teeth be removed and that no investments (neither through private nor through insurances) are being made into those teeth. Patients who make such decisions are fully sane, and their request demonstrates that they are able to calculate and estimate future costs and developments, as well as the risks associated with such teeth
- Root-canal-treated teeth should be removed because those teeth are potentially the source of a continuous intoxication of the patient's body from these teeth [94-96]
- To avoid unstable removable dentures, the treatment plan may include the removal of additional teeth (healthy teeth, not mentioned in this list) in order to install a standard solution with high predictability (a standard segment on implants, a circular bridge, full mouth restoration). Even middle-aged male and female patients may request (for various reasons) the removal of potentially salvageable teeth. Such reasons may be that their teeth and / or the masticatory system are heavily affected by caries and other destructions already early in age, or even healthy teeth, which could restrict their access to fixed restoration treatments
- Extractions are indicated to allow the creation of a cross-arch stabilization on implants with its advantages [11, 12, 29, 30, 67, 112]; it is of great significance not to interrupt the stabilizing splining (cross-arch stabilization) by teeth that are not included in the prosthetic construction
- Extraction is indicated when the existing dental arch does not allow for proper restoration of the masticatory system because the occlusal plane is not parallel to the Camper plane, or because the curves of

Spee are not the same on both sides, or because the APPI is different on both sides, or because the anterior groups of teeth cannot be separated from each other during biting or chewing without excessive bite elevation [11, 12]

- In order to achieve a faster treatment result, extractions are generally indicated if the patient expresses a wish for this immediate treatment variant
- Prophylactic extractions are indicated for teeth without antagonists such as second molars; the elongation of those teeth and subsequently the development of premature contacts between the implant-borne bridge and the tooth must be expected and prevented [11]
- Extraction of healthy yet undesirable teeth, which potentially hinder effective functioning / occlusion. Teeth that are not reaching the occlusal plane due to a wrong inclination in the arch must be removed and somehow prosthetically replaced if the opposite jaw receives implant treatment in immediate loading protocols (Fig. 1)

Fig. 1: The lower second premolar cannot reach the occlusal plane and hence has no chewing function. In order to have the occlusal contact points equally distributed on both sides, this tooth has to be removed. It is replaced by an implant plus crown, or by a tooth-borne bridge.

- Tooth extractions may be indicated for medical reasons and requested to eliminate any tooth that may be associated with risk. Examples: renal transplant or transplants in general, immune-suppressive therapy. As infection-free modern implants do not carry such risks of infection, they might be a good alternative to teeth also in these cases [114-116]
- Patients often plan to switch to an implant-supported denture or bridge at a time when they have sufficient income. As the Strategic Implant® or Cortico-basal® implant provides the principal perspective for life-long stability, these implants are the preferred devices in this situation. Today, many treatment providers themselves offer not only several years of warranty but also a "war-

ranty extension" after the initial period of full warranty (two to five years). This creates a situation where the costs for life-long maintenance of the implant work can be calculated

- Due to the delicate design and smooth surface configuration of Corticobasal® implants, a significant lower demand is placed on the oral hygiene of the patient and the surgical precision of the treatment provider. This is true in comparison to teeth and conventional implants. The cost of renewing such bridges after years is reasonable and can be calculated if production-data from the first bridge is available and modern digital means of production are used
- Studies [117, 118] indicate that zirconium is the most durable bridge material today due to its resistance to abrasion. Simultaneously, dentists need to understand the significance of regular follow-ups and maintenance, and the need for repeated adjustments to the occlusion and masticatory surfaces throughout the bridge's lifespan

The International Implant Foundation IF® supports patients in their rights of self-determination about their desired treatment strategy. While the scientific world still discusses treatment strategies under the aspect of science (although all known publications on 2-stage implants do not fulfill the minimal requirements of medical reporting as pointed out above), the Method of Osseofixation has become the standard of care in many countries of the world. As in conventional oral implantology the highly invasive, expensive and risky "bone augmentation" became State of the Art; the removal of teeth which pose a risk for the overall chewing ability is State of the Art in the Technology of Osseofixation. Both have to be accepted by the patients if they wish to undergo their chosen treatment method prior to the treatment.

Reasons of Teeth Extraction Driven by the Technology of Implant Osseofixation

Since the introduction of the Osseofixation Method into our profession, we have highlighted and added more indications for tooth removal to ensure a successful osseofixation treatment, it is important to consider the following factors during treatment planning:

- Natural teeth and Corticobasal® implants should not be connected in the same BIPS® [11, 12]
- Likewise, connecting elastic designs of Corticobasal® implants with long-term osseointegrated conventional implants are a bad practice, because it leads (due to large differences in the elasticity) to losses of osseofixated implants frequently [11,12]
- A circular bridge is considered the safest prosthetic option in osseofixated technology [11, 12]
- If patients receive unilateral segments on Corticobasal® implants and the other side of the jaw remains equipped with teeth, ***the following disadvantages have to be taken into account:***
  - Patients may have subconscious problems to compute in their

brain the signals that stem from the operated side from muscle receptors, while they continue coming from desmodontal receptors on the non-treated side. It may be difficult to come to a coordinated, bilateral and lateral pattern of chewing. Hence, the circular bridge is the less risky method of treatment

- While tooth segments tend to extrude, freshly placed segments on implants tend to intrude. This is owed to the results of the osteonal remodeling and the fact that at the end of the process of remodeling, less bone (an optimized amount of bone) will be present. As the tooth side and the implant side will potentially move into different directions, unilateral pattern of chewing may result and this condition will require meticulous aftercare

2.3 Patient-Derived Reasons for Tooth Removal

2.3. 1 Several situations may lead the patients to emphasize the direction of tooth removal, such as:

- Patients may not be able to bear the responsibility of cleaning and maintaining their teeth and the associated treatment costs, due to financial constraints especially in old age patients [119]. As a result, these patients often wish to remove all of their teeth, regardless of the quality of individual teeth. The Centers for Disease Control and Prevention report that 40% of people older than 65 years have a physical or cognitive disability that affect their capacity to maintain good oral self-care and negatively impact accessibility and affordability of oral health care as stated by Okoro et al. [120, 121]
- Old patients reaching an age well above the pension age tend to decide that they want to make sure that no more issues with their natural teeth will appear for the rest of their life, they do not want to be sick in bed or in hospital during their old age and have issues with teeth. In this situation, they request removal of all their teeth and if finances allow, they will switch to a new fixed dentition on modern oral implants [119, 120]
- Typically, such patients (in general) lack confidence in the durability of their teeth. Patients are more willing to adapt to the safest treatment plan after learning about the possibility of osseointegration
- Some patients say they wish to make the switch to implants now because they fear that their funds later in life (when they are pensioners) will not be sufficient for this upgrade in chewing possibility and quality of life). For such patients, osseointegrated implants may not be the implants of the first choice
- Some patients consider treatments with dental implants cheaper than continually repairing teeth ("re-dentistry"). Patients that make such decisions are typically fully sane, and their request demonstrates that they

are able to calculate and estimate future costs and developments, as well as the risks associated with such teeth

- Even middle-aged male and female patients may request the removal of potentially salvageable teeth that could restrict their access to fixed and more aesthetic treatments
- Patients that have unsatisfactory root canal treatments and are typically uninterested in having the same treatment again with a multiple-visit schedule, a long wait, and questionable results, may prefer to remove their teeth instead. Patients might not be interested in more root canal treatments because it becomes known more and more nowadays in the population that leaving necrotic tooth substance inside their body carries a number of risks that are difficult to manage
- Dental implantology, just as dentistry in general, is both a medical discipline and applied cosmetics. Just as, for example, a female patient might opt for reducing (or increasing) the size of her breasts. Many patients carry their wish for different (more beautiful, more round, smaller, larger) teeth with them all their life [51, 52]. For them, the existing dentition is a heavy burden. The possibilities of modern dental implantology to influence aesthetics are much better than if only work on teeth is done

2.3. 2 Aesthetic Indications for Tooth Removal

- With the increase in aesthetic demand by the patients, vertical bone excess associated with increased visibility of the natural teeth may not bother the patient too much as long as patients are young and their teeth are in good condition. However, if the patient's teeth and / or gums suffer damage (Fig. 2), removing several teeth is necessary to improve aesthetics, and considering the chewing plane and other functional guidelines (Fig. 2)

Fig. 2: Left: *Only removing all teeth and reducing the bone vertically will allow chan-*

ging the appearance of the patient significantly in the desired manner. Right: three days' post-operative view.

- A significant improvement in aesthetics is possible with vertical bone reduction in the visible zone combined with tooth removal. The ability to position dental arches independently of the jawbone in an aesthetically and functionally desired position enables significant improvements in aesthetics, even with fixed restorations [51, 52]

3. Personal Decisions of Patients to Remove Their Teeth

As discussed previously, considering the tendency of patients to reach a higher age, the willingness of patients to get their natural teeth been treated is being significantly reduced. Many patients understand that they will lose most of their teeth anyway in due course, and the chances of reaching the end of their lives with those teeth (in an acceptable functional status) are, for most patients, close to zero.

Patients frequently express to the treatment provider their desire to have teeth removed in order to "look better for some other person" and to improve their current relationships. Whether the treatment provider will accept this explanation depends on the situation.

2.3.3 Consideration of the Patient's Psychological Components

A patient's psychologically based request to remove their teeth should be of great concern to the treatment provider to improve the patient's satisfaction with the treatment outcome provided.

A study done in 1987 on the average patients in the Federal Republic of Germany revealed that 25% of the populations were expressing views that did not reflect "normality". 12.5% of the population was considered worthy for immediate psychologic or psychiatric treatment. The same study was repeated 2017: the second study showed that the "non-normals" had reached 50% of the population, while the percentage of those requiring immediate treatment as before mentioned had reached 25%. All the people with compromised views and attitudes were hidden is the population. Moreover, this was the result from before the pandemic.

Hence, it is difficult to estimate "how normal" patients are in reality, and what this term means today, as the population seems less "streamlined" through religious and political influences like never before. We can expect dramatic changes in society due to this.
By means of modern mass media and maybe by modern technical means, the attitude and opinions are easy to manipulate today.

Note that also pandemic-derived sicknesses, e.g. "long-covid" lead to (lasting) diminished brain function.

3. The Informed Consent to Treat and Keep a Tooth Inside the Oral Cavity

While lengthy "informed consent documents" must be signed by patients if they request implants, (the same should be requested in cases of extensive teeth repairs) it became unfashionable to request the same if dentists would like to treat teeth. In today's situation, with all the possibilities of modern oral implants (e.g., considering the possibilities of the Method of Osseofixation), the assumption of a dentist to keep treating a tooth, which is in any case a "good thing to do," should not be insisted on. In many circumstances, it can even be a wrong decision. Such an assumption would mean that dentists could continue treating teeth without explaining the negative side effects, and financial consequences (that had been discussed previously in detail).

The dentists should discuss all of the treatment options, advantages, disadvantages, and limitations, and it is up to the patients to decide whether they want to repair their questionable teeth or have them extracted and have a fixed implant-supported prosthesis (or dentures).

This chapter of the 9th consensus document can be summarized as follows: Neither the fact that a tooth is decayed or otherwise in need for repair, nor the fact that the dentist who plans to treat this has a license to do this work on the tooth, nor the perspective that a health insurance might pay this repair fully or partly, gives any justification or indication to repair or work on this tooth. It is only the patient's explicit wish that gives the indication, and this wish can be communicated only after a full information about other methods of treatment, which will avoid future costs with the tooth, including frequent re-treatments.

The International Implant Foundation IF® expresses severe doubts that the average dentist in most countries will be in a position to give correct explanations about modern implantology to the patient. Most dentists will be additionally unable to do such modern implant treatments themselves. Maintaining a tooth is not the same as maintaining or restoring the masticatory function. The primary treatment aim should be to maintain the masticatory function.

It must be mentioned here that that an equal bilateral pattern of mastication is much easier to achieve by incorporating full dentures compared to incorporating partial dentures fixed to teeth.

Hence, partial dentures hardly ever reach the aim of a bilateral equal masticatory function [11, 12].

The technology of Osseofixation offers numerous advantages over conventional implant treatments, such as neither second stage nor healing phase, fewer appointments, and the elimination of bone grafting and its potential risks.

4. The Influence of Health Insurances

As discussed previously, the decision to treat teeth should not be based solely on the fact that private or national health insurance covers this type of treatment. Moreover, the possibility of performing a conventional dental treatment does not imply that national or private dental health insurance must pay for it.

These days, immediate loading treatment using Corticobasal® implants can be viewed as a perspective that offers a more effective, long-lasting, and consequently cheaper solution compared to many treatments on natural teeth.

Keeping teeth could be even considered a luxury for "the rich". To keep and maintain pretreated and damaged teeth in such a situation may be within the financial reach of single individuals with sufficient funds. However, national or private insurances should not be forced to support such "whatever-it-costs treatments" on teeth, as today a reliable (implant) alternative is available. The International Implant Foundation IF® recommends that insurers for health strongly revise their present principles of paying for oral treatments and instead support their clients in their efforts to seek a non-tooth-borne durable solution to maintain a fixed dentition.

5. The Method of Osseofixation Makes it Easy to Decide Whether to Keep Teeth In or Not

Previously, cases with progressive bone loss due to periodontal diseases were challenging. Early extractions could prevent the acceleration of this bone loss and make it easier to install conventional oral implants. However, after the Method of Osseofixation was introduced on the world market and became widely available, dentists and periodontologists were free in their attempts to keep teeth in the mouth (whatever it took), although this led to bone loss. Osseofixated implants require much less bone for their installation, and they nevertheless work within immediate functional protocols. Prolonged periodontal treatments will thereby not complicate the later implant treatment [29].

6. The Problem of Underqualified dentists on the Market of Dentistry and the Influence of the Dental Unions

Dentists without knowledge and experience about modern implants are largely underqualified to work in the market segment of adult patients. They must base their work on what they have learned at universities (often long ago) and apply this knowledge on an ageing dentition with a limited life expectation. Doubts must be raised if this reflects the desires of today's geriatric patients at all. On the other hand, dentists that follow this kind

of treatment plans are protected and supported in many countries by strong unions[1].
These unions also ensure that under-qualified dentists remain in office, as long as they follow the rules of the dental unions (chambers)[2].
It must be outlined here with emphasis that treatment providers that have sufficient experience and knowledge about the possibilities of modern implantology are able to decide with scientific and practice precision which solutions are best for the patients as we should concentrate on "doing the right job" rather than "doing the job right".
What is true for all humans is also true for dental treatment providers: They see only what they know.

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1 The designations of these unions are different in many countries: In most EU countries, these unions are named "chambers," whereas in Switzerland, the designation "Zahnärztegesellschaft" (SSO) was chosen. In quite a few states, such dental unions (chambers) have received different amounts of power from the states in which they work. This was presumably done in order to avoid costs and efforts for the states itself. As a rule, all dentists in a country must be a registered member of such a chamber and pay a fee. An exception is Switzerland, where the union can refuse to register dentists to their union. Hence it became an unfair habit to outlaw single dentists, mainly foreigners, and also such dentists (for example) which prefer to run their clinic as a legal entity (e.g. as an Aktiengesellschaft or a GmbH) and not as a private clinic. This example shows that in Switzerland, the unions were able to push through fully illegal demands simply by exerting strong power on their members or by refusing members.
Decision-makers in the states probably thought that these unions were represented by highly qualified dentists. Reality shows, however, that in fact, most top managers of such unions are more or less miserable dentists, and that is why they have chosen to resort to some kind of paperwork. These unions in all countries have one thing in common: they block any progress and will block anything that reduces the income of their members, and very often, they are funded directly or indirectly by manufacturers of medical devices and serve as a proxy organization for sales and blended education.
The situation of the Swiss dentists and their union is a good example of a country in which an unbelievable illegal pressure is exerted on the members and the dentists as such. The SSO charges an unreasonable high membership (around 3000 Euro per year and per dentist), and as they have the state-given power to negotiate with insurances, they agreed with the insurances on the tariff for single dental works. After that, they trademarked this tariff and charge a special license fee for using the SSO-negotiated tariff "Dentotar" of around 1000 CHF per year and per clinic (or per user). This brings the membership fee further up to about 4000 Euro per year. For licensing the use of the name of the tariff alone the SSO collects from 3.500 registered dentists about 3.5 million CHF per year.
As with any other union, the main goal of dental unions (chambers) is to maximize profit for their members and for the union itself. Hence, the unions in the dental field are advocating that natural teeth must be preserved, whatever it costs. It is easy for these organizations to set up such "rules," as they do not have to pay for them; they only earn them. In none of the states, this directive has ever become a law, but dental unions pretend that it is a law-like rule.
This shows that dental unions (chambers) do not represent the interests of the patients, but their own interests. Who exactly represents the interests of the patients (except for the International Implant Foundation IF®) must be questioned. In general: it does not reflect the principle of a democratic state if non-elected (non-controlled) persons or institutions are given executive and legislative-like powers. The same is true for professors and other workers of universities, which often act predominately under the influence of third-party funding. The dependencies are hidden to the general public. Dentistry and especially oral implantology (where most money is earned) are disciplines whose development suffers tremendously under such influences. In addition, at the same time patients are suffering.
2 Albert Einstein explained the situation in one short sentence: "To be a good member of a flock of sheep, you first of all have to be a sheep"

7. Conclusions

1. The appearance of Corticobasal® implants in the markets around the world has put the trained implantologist (for the Technology of Osseofixation) in a much more competitive position compared to conventional dentists and conventional (2-stage) implantologists
2. The gap of knowledge and understanding between dentists and implantologists who are trained to apply modern methods of implantology has become unimaginably large today
3. The Method of Osseointegration, due to the limited life expectancy of the devices used, cannot provide a justification for the extraction of compromised teeth, which can be expected to last around seven to ten years and more

   Hence, the Method of Osseofixation seems to be not (or at least much less) associated with problems (e.g., periimplantitis) that may result in implant loss and limit the implant lifespan for a specific amount of time. Practitioners trained for the Method of Osseofixation can consider the removal of questionable teeth even in younger patients and under by far more indications, as long as the extractions are requested by the patients. Many patients will opt for tooth removal and replacement by implants using the Method of Osseofixation, while they will rather keep their teeth if they are offered only a treatment using the outdated Method of Osseointegration
4. Both placing an implant and repairing or saving a tooth are elective interventions that require the informed consent of the patient. Many technologies used today for repairing teeth contain dangerous components, which the patient has to accept knowingly. A large variety of aspects must be openly explained by the treatment provider in order that the patient can consider them
5. The patient's request for the removal of all teeth must be respected, and patients who request teeth removal and replacement with implants should be treated with the standard modern implant technology. Often, this will mean that patients must be referred (even by dentists who consider themselves to be implantologists to a more qualified implantologist
6. Patients in general have to be informed that:
   - The situation of their dentition is going to get worse every year, and there are no means to stop this decay
   - Saving a tooth in compromised dentitions often does not contribute at all to maintaining a natural function and chewing ability. In medium- and long-term perspective, natural teeth are not reliable components of the masticatory system of elder patients
   - The "green light" to repair or even "save a tooth whatever it costs" or to remove teeth can be given only by the patient and must be actively given and the permission must be signed. It is an individual, non-transferable right to give such permissions and dentist cannot assume "automatically" that a patient agrees to the tooth repair

- As soon as the breakdown of the masticatory system has started, system-level solutions are required. Manipulations on single teeth (the domain of traditional dentistry) may help temporarily, but they are typically rather manifesting wrong developments. Such repairs are not solving problems (in adults) at system level

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