Integrative oral medicine meets aesthetic dentistry: Mission possible

Practice

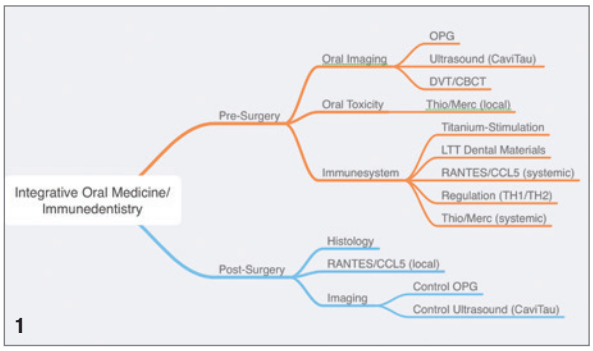
Drs Fabian Schick, Johann Lechner & Florian Notter, Germany

Introduction

Modern dental treatment concepts face a growing number of difficulties. Aesthetics, biocompatibility, and immunological release for the purpose of enhancing health are all factors that are increasingly important in addition to sustainability and functionality.

This article aims to demonstrate how bioinert materials and biological-functional regeneration-based integrative dental treatment concepts are progressively becoming promising superior treatment options that can even exceed the highest aesthetic demands. Sustainable, functional, and immunologically ideal results can all be accomplished simultaneously using minimally invasive and defect-oriented surgical procedures and protocols to optimise healing and regeneration of oral hard and soft tissues.

There is research on whether long-term immunological stress and dysregulation can cause chronic fatigue.[1] But it is not always clear where this persistent dysregulation and immunological stress comes from. Hence, views that chronic diseases also have an oral origin are becoming more frequent:



"We now know that many chronic diseases originate in the oral cavity," says Prof. Zeltner, Chairman WHO, 2022.[2]

Question

This case study demonstrates that the aesthetic restoration of a patient with a high smile line and immunological release by removal of chronic inflammatory lesions in the oral cavity are not at all incompatible.

Can immunologic stress occur in the oral cavity even when there are no acute symptoms? Can a disorder with

Fig. 1: Diagnostic scheme Integrative Oral Medicine/Immunedentistry. **Fig. 2:** Preoperative orthopantomograph (OPG) transalveolar ultrasound sonography.

an unknown etiology like chronic fatigue arise because of this continuous stress and the dysregulation it causes?

Material and methods

A middle-aged patient with a prominent smile line and strong aesthetic expectations comes to see us at the beginning of 2021. She inquires about the clarification of chronic inflammatory lesions in the oral and maxillofacial region as she suffers from chronic fatigue. We perform complete oral imaging, toxicological, and immunological tests in accordance with a standardised diagnostic system, after which we develop an individual treatment plan. The primary goal is to identify osteoimmunological chronic inflammatory lesions in the oral and maxillofacial region. Secondarily, we want to release and stabilise autologous immunological regulation through the removal of chronic stress. An overall health symptom such as chronic fatigue is also to be achieved through immunological release and the interdisciplinary connection can be brought up.

Oral imaging

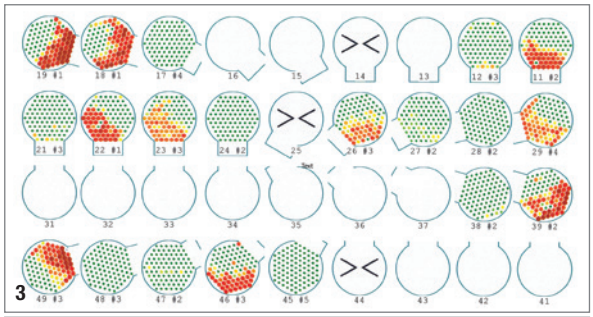
Prosthetically insufficiently restored teeth, metal-containing crowns, endodontically treated teeth 11, 23, 26, missing tooth 22. Possible apical osteolysis 21. No signs of other acute or chronic inflammatory lesions.

Transalveolar ultrasound sonography

Areas of lower bone density (red) and higher bone density (green) were visible using transalveolar bone densitometry and ultrasonography. Red areas surrounding root-treated teeth and in toothless bone areas indicate osteolytic degeneration of the bone, which is expected to have increased RANTES/CCL5 cytokine expression.[3] Hence, red bone areas indicate immunologic stresses such as unformed dental germs, endodontically treated teeth with increased expression of toxins such as thioethers and mercaptans, and improperly healed wounds. A three-dimensional CBCT/DVT is then performed if it is suspected that the relevant areas contain chronic inflammatory lesions.

Numerical evaluation of TAU measurement of bone density in CTU

A quantitative and qualitative evaluation of the osteolytic bone regions is required for individualised treatment planning. For this goal, the authors have created a method to evaluate each odonton's transalveolar ultrasound examination (TAU). The darker levels of each individual sensor field are analysed and evaluated for this purpose; this grade can, for example, support in the therapeutic decision of immediate implantation after removal of the osteolytic areas or delayed implantation. This prevents osteoimmunological stress and results in a problem-free osseointegration. A



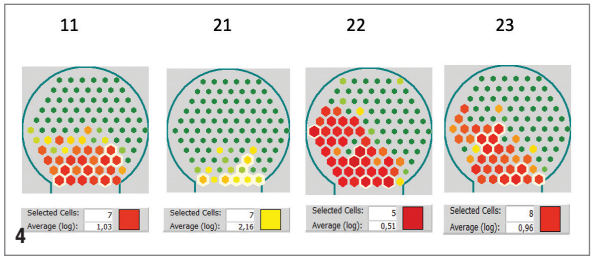


Fig. 3: Preoperative transalveolar bone densitometry (TAU), numerical evaluation of TAU measurement of bone density in CTU. **Fig. 4:** Transalveolar bone densitometry (TAU) for tooth region 11-21.

logarithmic average value (Average [log]) of the absorption intensity and, therefore, of the recorded bone density is computed by selecting the darkest sensor fields of the analysed odonton (area 11, 21, 22, 23 in red; Fig. 4).

A CTU of 0.51 for fatty degenerative osteolysis/osteonecrosis (FDOK/FDOJ) is shown in this instance at site 22. In order to enable an excellent biologic-functional regeneration with high bone quality, it was necessary to pay special attention to a complete removal of the osteolytic bone regions before implant drilling 22, extraction 23, and before implant insertion 22, 23. An implant osseointegration result that is sustainable and inflammation-free can be achieved by inserting the implant in healthy bone.[4]

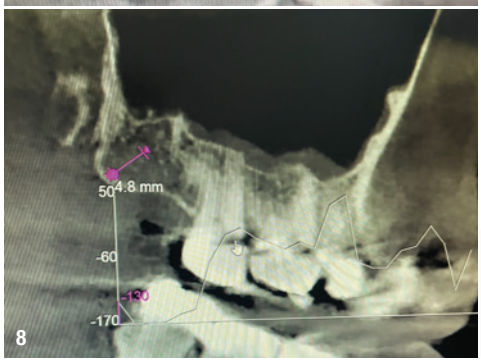
For an overview of CTUs and their interpretation, see the table below:

CTU	Colour	Consistency	Anatomy/ suspicion
0,24	Grey	Hollow Cavity	Fault?
0,23	Dark red	Dissolved/ liquid	Osteolysis
0,62	Light red	Soft/fatty	Osteonecrosis
1,18	Orange	Partially soft	Ostitis
1,68	Yellow-orange	Increasingly soft	Ischemia
1,85	Light yellow	Nerve structure	N. Infraalveolaris
1,96	Light green	Reduced hardness	Healthy Spongiosa
3,98	Green	Dense/solid	Cortical bone/ linea obliqua


5


6


7



8

Three-dimensional radiographic imaging

The findings in ultrasound are validated by significant chronic inflammation apical to the endodontically treated teeth 11, 23, and 26 (post-endodontic inflammation) and decreased Hounsfield values in bone regions with previous extractions.

Toxicological examination

Increased local expression of the toxicologically active bacterial metabolite thioether/mercaptan, which originates from remaining bacteria in endodontically treated teeth and is detected locally on the tooth using paper points that colours a particular test liquid more or less intensely depending on its exposure time.[5]

Immunological examination

Following blood samples showed, that the protein metabolites thioether and mercaptan that are toxicologically active were immunologically sensitised. And therefore, the clinical necessity for the surgical revision of the incompletely healed bone wounds with elevated cytokine expression (FDOK/FDOJ) and removal of the endodontically treated teeth was given.

Clinical image/aesthetic planning

Special consideration was also necessary in this case because the patient was also dissatisfied with her smile aesthetics. The aesthetic reconstruction has to include the different length and shade relationships as well as the additional high smile line. Immediate ceramic implants were designed for aesthetic purposes in addition to immunological benefits in order to reliably and sustainably avoid the appearance of metallic margins and to protect as much bone volume as possible.[6] In order to extend the clinical crowns aesthetically and create a harmonious appearance, a minimally invasive gum lift was also planned.

Surgical reconstruction

All chronic inflammatory lesions in the upper jaw were to be surgically removed using minimally invasive and defect-focused techniques especially in the aesthetically critical regions. The periapical ostitides and the chronically inflamed teeth 11, 22, and 23 were carefully removed. Fatty degenerated osteolysis (FDOJ/FDOK) in surrounding bone regions was checked for and carefully removed. The toothless jaw areas underwent the same process. Tissue samples were collected to confirm increased RANTES/CCL5 cytokine expression. When compared to healthy bone tissue, cytokine expressions were found to be 14 times higher.[7]

Clinical Immunology

Reactivity Mercaptans/Thioether			
INFg-stimulated	< 0.1	pg/ml	< 0.2
IL10-stimulated	66.6	pg/ml	< 10

9

Fig. 5: Periradicular osteolysis tooth 11. **Fig. 6:** Periradicular osteolysis tooth 23. **Fig. 7:** Periradicular osteolysis tooth 26. **Fig. 8:** Bone density (HU) measurement in region 18/19. **Fig. 9:** Immunological sensitisation to thioethers/mercaptans.

WE CAN WORK IT OUT.

These implant systems were awarded the CleanImplant “Trusted Quality” seal after an unbiased and peer-reviewed quality assessment.
See what’s new:

TRUSTED QUALITY
CLEAN IMPLANT
CERTIFIED • PEER-REVIEWED

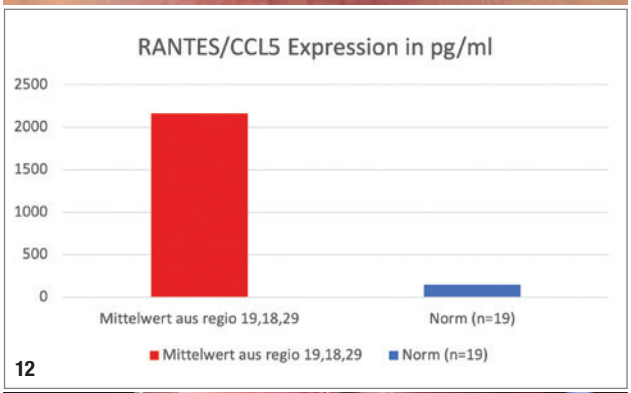
- SuperLine **DENTIUM**
- Astra Tech EV **DENTSPLY SIRONA**
- In-Kone **GLOBAL D**
- Inverta **SOUTHERN IMPLANTS**
- UnicCa **BTI**
- Patent **CHAMPIONS IMPLANTS**
- AnyRidge **MEGAGEN**
- Kontact S **BIOTECH DENTAL**
- ICX-Premium **MEDENTIS MEDICAL**
- Prama **SWEDEN & MARTINA**
- SDS 1.2 **SWISS DENTAL SOLUTIONS**
- whiteSKY **BREDENT MEDICAL**
- (R)Evolution **CHAMPIONS IMPLANTS**
- SDS 2.2 **SWISS DENTAL SOLUTIONS**
- T6 **NUCLEOSS**
- BlueDiamond **MEGAGEN**

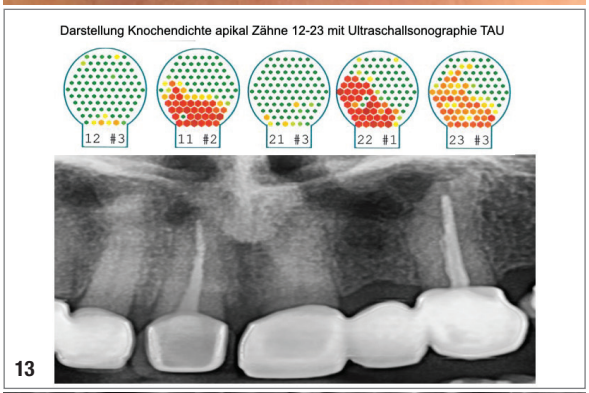
- Find out more. Join in and support the charitable initiative.
- Receive quality information about your implant in use.
- Provide more safety for your patients and avoid negligence claims.
- Win new patients as a CleanImplant Certified Dentist.

Visit us at
EAO BERLIN!
Booth C 06

More information about this non-profit initiative:
www.cleanimplant.com/dentists

CLEAN IMPLANT FOUNDATION





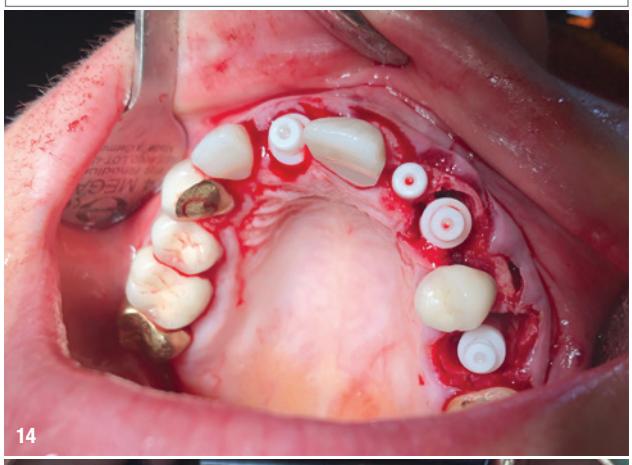


Fig. 10: Initial clinical situation upper jaw front for aesthetic planning. **Fig. 11:** Aesthetic planning of ideal tooth proportions. **Fig. 12:** Postoperative quantification of RANTES/CCL5 from intraoperatively collected tissue sample and comparison with healthy bone tissue.[7] **Fig. 13:** Bone density visualisation apical teeth 12-23 with ultrasound sonography TAU. **Fig. 14:** Intraoperative imaging after implantation 11, 22, 23, 26. **Fig. 15:** Postoperative control image (OPG). **Fig. 16:** Intraoperative image after healing of the implants, removal of metal restorations and preparation for metal-free, ceramic restorations. **Fig. 17:** Metal-free, ceramic restorations.

Biological-functional regeneration

Ozone gas was used to properly clean the bone, which was by this point healthy and free of inflammation.[8] The cavities created after curettage of the osteolytic areas apical to the endodontically treated teeth were filled with autologous blood concentrates (A-PRF), acting as "healing chambers" after disinfection and before implant placement.

It was possible to insert immediate ceramic implants in regions 11, 23, and 26 plus a late implant at site 22 following the removal of fatty degeneration (FDOK) in the correct prosthetic and aesthetic positions. This method enabled a one-stage treatment and preserving the soft tissue and bone that are essential for aesthetic reasons. In position 26, the aggressive, self-tapping thread was compactly anchored in the opposite compacta, enabling the primary stable insertion of the immediate ceramic implant. In order to create closed healing chambers, only autologous blood concentrates (PRF) were put into the gaps and the internal sinus lift.[9–11] To ensure the best possible regeneration of healthy local bone without provoking further immunological foreign body reactions to various bone substitute materials, the flaps on the implant are minimally invasively sutured in the sense of a tentpole approach. After that, liquid blood concentrate (I-PRF) was injected to all wound areas to deliver a significant quantity and concentration of growth factors at the start of the healing process.

Moreover, perioperative care was made to guarantee sufficient vitamin D levels for ideal bone metabolism and recovery.[12]

Prosthetic restoration

A stability check (periotest) was performed to evaluate the osseointegration following a three-month healing period. In order to improve the aesthetic outcome prior to the final prosthetic restoration, an electrosurgical gum lift of 1 to 2 mm was also performed in the maxillary anterior region. The inadequate metal-containing restorations were taken out four weeks after, and the final full-ceramic crowns were prepared. For the restorations, only full-ceramic materials were used. To prevent any immunological-allergological stress caused on by composite components, a conventional cement was used for cementation. In to achieve bilateral stability, implants 22 and 23 were connected to one another. Of course, there was no prosthetic connection between implants and teeth. Impressive features of the metal-free ceramic implants are their excellent soft-tissue compatibility and bacterial-sealing closure that creates inflammation-free soft tissues.

Immunological-health development

The patient's chronic fatigue was improved by removing immunological stress. Vitality has increased after the surgical and prosthetic intervention, and the patient is really happy with the aesthetic outcome.

Fig. 18: Upper anterior after healing and preparations of the implants for metal-free, ceramic restorations. **Fig. 19:** All-ceramic prosthetic restoration. **Fig. 20:** Aesthetic situation before treatment. **Fig. 21:** Aesthetic situation after treatment.

22

Fig. 22: Control image after prosthetic restoration and complete healing of the ceramic implants.

Discussion

In order to achieve immunological release and stabilise autologous immune regulation, integrative oral medicine attempts to eliminate chronic stress and chronic inflammatory lesions from the body, even in subacute states. When chronic stress can be seen as a root cause for chronic diseases,[1,13] the question arises whether this chronic stress can also originate in the oral cavity. But, even in the absence of pain or other symptoms, how can chronic stress in the oral and maxillary region be detected and identified? Can materials that are incompatible with the patient, endodontically treated teeth, and fatty degenerative bone regions (FDOJ/FDOK) cause immunological stress in the oral and maxillary region? In a previous article, the authors attempted to clarify these relationships using a systematic diagnostic approach.[14] Despite the use of advanced techniques, endodontic treatments frequently result in residual bacteria in the root canals.[15–18]

An immunological sensitisation to bacterial metabolites thioethers/mercaptans was detected and these were also measured in increased concentrations locally on the tooth. These toxic sulfur compounds might also block ATP from being generated at the mitochondrial membrane.[5] Furthermore, fatty degenerative osteolytic bone areas (FDOJ/FDOK) were detected, which included significant quantities of the proinflammatory cytokine RANTES/CCL5, by transalveolar bone densitometry with ultrasound (TAU). They are also hypothesised to be the origin of systemic endogenous regulatory issues.[7,14,19] Both, it has been able to improve the aesthetic problem using a minimally invasive technique and a defect-oriented approach.

As a conclusion, ceramic implants are highly recommended in terms of aesthetic and integrative immunological treatment concepts. So, rather from being seen as in conflict to established, well-researched therapy concepts, the treatment concepts of integrative oral medicine as they are presented here should be seen as a development and further evolution of those philosophies.

Summary

This case study demonstrates how to identify and treat chronic stress in the oral cavity of a patient suffering from chronic fatigue as well as how to recover and regenerate the affected areas in an aesthetic and functional way. By using minimally invasive techniques and biological-functional regeneration, the patient's condition could be drastically improved on both an immunological and an aesthetic level. Hence, integrative-complementary techniques can be con-sidered as a development and addition to well-established and efficient therapy methods in immunological and aesthetic regeneration. Since chronic stress is thought to be the root cause of chronic autoimmune diseases,[1,13,14] the elimination of immunological stress generating dysregulation from the oral and maxillofacial region may be related to chronic disorders.

Chronic fatigue in a patient has reportedly been remarkably improved by removing immunologic stress. To gather evidence, additional large-scale research on chronic fatigue needs to be done with parameters that could be consistently replicated. Hence, a suggestion for general therapy for chronic fatigue should not be made here. Immunological considerations and prosthetic-aesthetic requirements should be more closely combined in this context.

Literature

contact

Dr Fabian Schick
Specialist for Biological Dentistry and Ceramic Implants (ISMI/IAOCI)
drfabischick@outlook.de
www.dr-lechner.de

Dr Fabian Schick

CaviTAU®
TRANSALVEOLAR ULTRASOUND SONOGRAPHY

State-of-the-art ultrasound technology without radiation exposure.

Ensuring your implant success and the health of your patients.

The feeling when the implant is in place and my patient is happy: INCREDIBLE!

- Gentle and safe examination method
- Precise measurement of jawbone density
- Localisation of chronic inflammation in the jawbone

MORE INFORMATION:
www.cavitau.de

CONTACT:
info@cavitau.de

Order under:
shop.cavitau.de

MADE IN GERMANY