10-YEAR STUDY CHAMPIONS (R)EVOLUTION®

30/03/2022

The aim of this retrospective study was to quantify the survival rate of endosseous implants of the CHAMPIONS (R)Evolution® type under normal practice conditions in a defined time frame (01/09/2011–01/09/2021) compared to the researched study population of the same subject. Hypothetically, comparability is possible.

Material and methods

The prerequisites and practice conditions are presented, and functional capacity definitions in situ are developed. They are defined based on the results of the 3rd ITI Consensus Conference –August 2003. Using the EXCEL software program, they are evaluated concerning patients and implants.

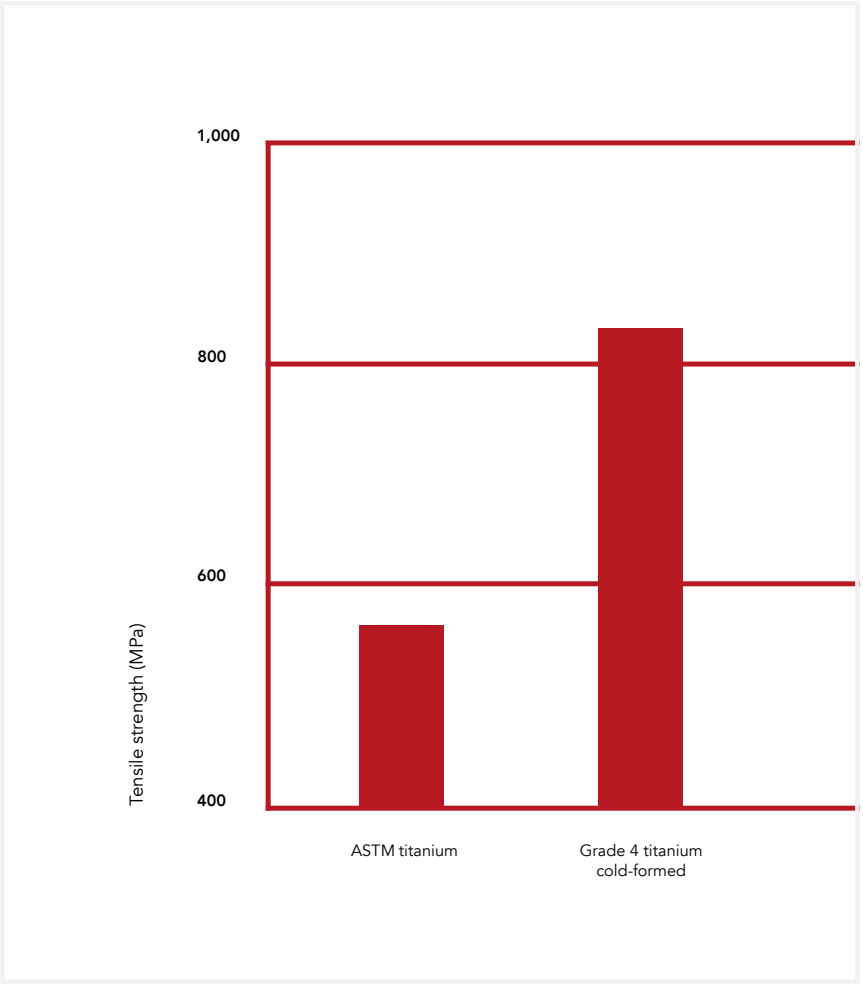
In this study 13,834 Champions (R)Evolution implants were placed in 4,192 patients. Functional capacity in situ, peridodontal probe measurements and radiological checks were ideally examined after an observation time of 1 year, 2 years, 5 years, and 10 years.

The national and international literature search was performed via DIMDI and PUBMED according to topic.

Product and service quality, constant innovation, a good price/performance ratio, and sustainability are the four pillars of a successful implant system. Currently, with this 10-year study, the German company Champions-Implants GmbH, with its own full production in Baden-Württemberg, Germany, has now managed to underpin its sustainability and clinical success with this study.

In addition to the titanium one-piece implants available since 2006, the two-piece CHAMPIONS (R)Evolution system has conquered hearts of many implantologists and prosthodontists in Europe since 2011 with over half a million implants sold.

Thus, this innovative, high-quality CHAMPIONS (R)Evolution system, which is "Made in Germany", has been an established implant system at the leading edge.



With the introduction of the system in September 2011, an implant study was started, which was conducted in 4 Implantology dental practices in Europe until September 2021. The aim of this study was to determine the sustainability of this system over 10 years and also to scientifically substantiate its success.

Short introduction to the CHAMPIONS (R)Evolution system, which was designed by Dr. Armin Nedjat based on his previous implant developments ("Classic", "New Art", and Ball-Head) and designs from 2006:

Material

Like all titanium one-piece CHAMPIONS implant systems, the CHAMPIONS (R)Evolution implant is made from cold-formed ASTM grade 4 titanium, consisting of 99 % pure titanium, which is unlike grade 5 titanium (Ti-6Al-4V), containing 6 % aluminium and 4 % vanadium.

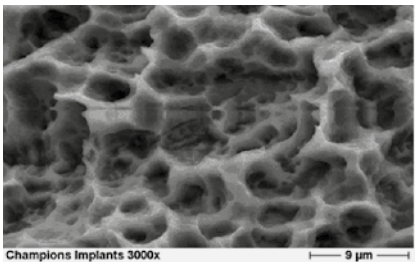
Implant Design

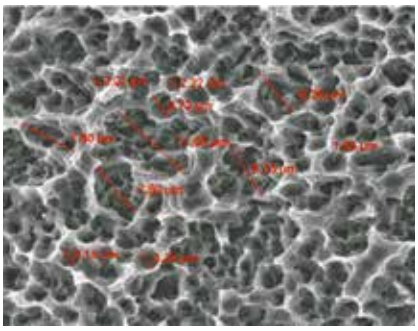
The main features of the CHAMPIONS (R)Evolution implant are its crestal micro-thread, the internal double cone with integrated Hexadapter (unchanged since 2011 and sufficiently long) and the Shuttle with the mounted Screw ex works, which connects the Shuttle to the implant.

The self-tapping compression thread has a very clean micro-rough surface structure (final testing by CleanImplant). The "implant finishing" is done with irradiation with Al_2O_3 particles and three etching acids afterwards, so that the microrough surface is created in a standardized way. CHAMPIONS is also well positioned with regard to the new MDR.

The Shuttle and Abutment connection with the ideal 9.5° cone prevents bacterial penetration so that the „Zipprich's brine effect" (University of Frankfurt) does not come into play. In 2012, studies conducted by Zipprich showed that the CHAMPIONS (R)Evolution implant had only a maximum micro-gap of 0.6 µm even with a diameter of 3.5 mm (the smallest bacterium size is about 2 µm), while no micro-cap could be verified at all with the larger implant diameters of 4.0, 4.5 and 5.5 mm.

Due to the inner cone and the fact that only one prosthetic platform is available for all implant diameters, which leads to the so-called platform switching effect in the CHAMPIONS (R)Evolution. Platform switching generally means that the implant shoulder is wider than the abutment emergence profile. With an implant with platform switching such as that of the CHAMPIONS (R)Evolution, bone even grows over the implant shoulder and enhances an increase in the stability of the soft tissue cuff, which provides a perfect solution for a periimplantitis prophylaxis.





Shuttle

Currently, the revolutionary so-called Shuttle of the CHAMPIONS (R)Evolution has been a great innovation. It is factory-fitted with a Screw in the implant inner cone, which is also used later for the abutment to fit the denture. The Shuttle fulfills 4 functions. As a rule the Shuttle ensures that the inside of the implant remains sterile until the end of the prosthetic procedure and that the implant inner threads and the implant wall are protected to the maximum during surgery and during various prosthetic processes because they cannot be damaged.

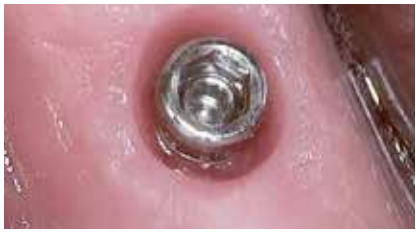
First of all, the Shuttle serves, figuratively speaking, as a "carrier rocket" to bring the "spaceship" (i. e., the implant) safely into the "orbit" (i.e. into the bone) and to keep the inside of the implant sterile without deforming the "thin" outer wall.

Since titanium is a relatively soft metal and the titanium wall at the cone connection is only 0.4 mm for a 3.5 mm implant diameter, the Shuttle is a unique tool for avoiding later prosthetic screw loosening since deformation of the thin wall during insertion is excluded. It also serves as the first and only healing abutment since it already has a height and diameter of 3.5 mm. However, the Shuttle can still be fitted with a PEEK Gingiva-Clix (preferably after the healing time) for an optimum emergence profile or with two easily prepared PEEK Provi-Clix with different angles directly after implantation with immediate loading. For both Clix, it is not necessary to loosen the Screw or even remove the Shuttle – they are simply set on the Shuttle while the inside of the the implant remains sterile.

There are 6 different Gingiva-Clix allowing for optimum shaping of an emergence profile.

Shuttle has
4 functions
all-in-one

- Insertion Aid
- Surgical Cover Screw
- Healing Abutment
- Impression tool



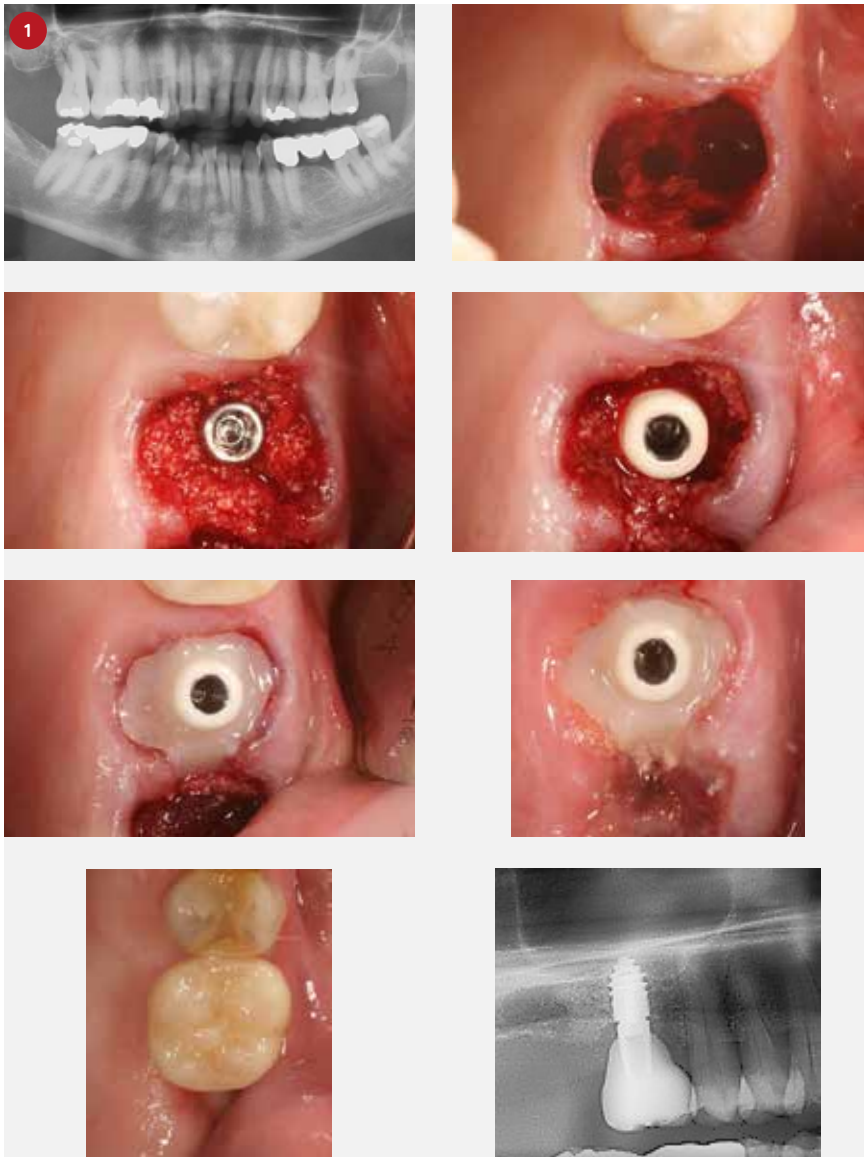
Transmucosal impression with a conventional spoon with a Metal Impression Coping (a) and PEEK Coping or with the Impression Coping, Win! PEEK (b)

Of course, one of the main advantages of the Shuttle is the exact, safe and "closed impression" with the Shuttle and with the help of the Impression Copings, Win! PEEK. Another possibility is also to use metallic Impression Coping (also through the Shuttle, but with removal of the Screw) and the "open impression" in the implant itself (after removal of the Shuttle and the Screw).

In both cases, a Laboratory Analog for the CHAMPIONS (R)Evolution and a Laboratory Shuttle screwed over it must be mounted to obtain a master cast.

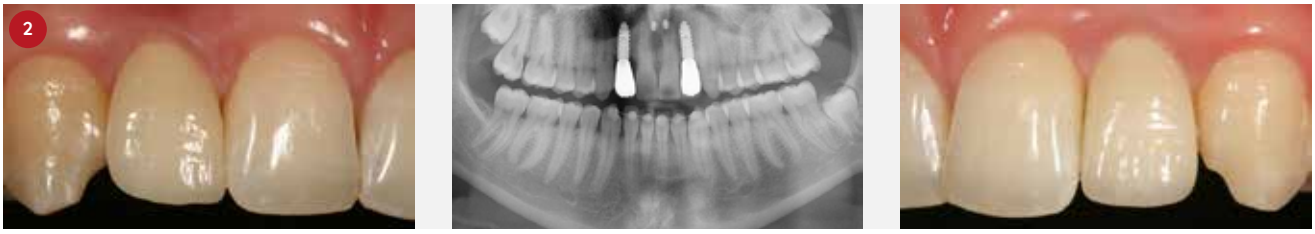
Indication, Lengths, and Diameters

The indication range of the CHAMPIONS (R)Evolution implant includes delayed as well as immediate implantation in all jaw regions. Tried and tested, this high-quality „Made in Germany" is easy-to-use and optimizes the dental workflow of Implantology practices. CHAMPIONS (R)Evolution implants are available in the lengths of 6.5 – 8 – 10 – 12 – 14 – 16 mm and in the diameters of 3.5 – 4.0 – 4.5 and 5.5 mm. Thus, sinus lifts (IDS) and augmentation-accompanying measures are also possible.



Case report 1: immediate implantation in site 16 with Champions (R)Evolution implants of Ø 4.5 mm and a length of 8 mm; use of Smart Grinder; Internal Direct Sinus Lift (IDS).

Case report 2: delayed implantation 12 +22 (CHAMPIONS (R)Evolution).



There is only one prosthetic platform for each CHAMPIONS (R)Evolution diameter, which facilitates (r)evolutionary work in the dental laboratory and in the Champions practices.

Since 2011, all implant abutments have been kept sterile when packaged since 2011 and can therefore be used directly in the mouth. The standard abutments are available in gingiva heights GH: 1 – 2 – 3 – 4 – 5 mm and angles of 0° – 15° – 22.5° – 30°. The standard Abutments are available in gingival heights of GH : 1 – 2 – 3 – 4 – 5 mm and angles of 0° – 15° – 22.5° – 30°.

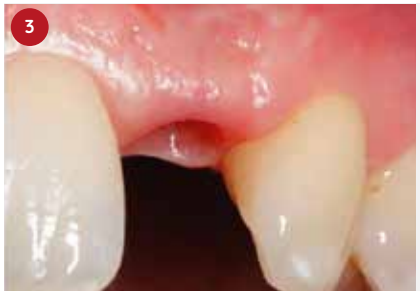
Abutments Massive are securely fixed in the mouth, prepared with NEM-drills and water cooling as well as shaped like a natural tooth and then cast.

- The dental laboratory is not aware that it is an implant . → cost-saving
- In addition: no impression with transfer posts and no Laboratory Analogs

The ICAs = Individual Connecting Abutments are an innovative speciality of Champions-Implants GmbH: for the optimized workflow also in the laboratory, 12 common – already sintered – zircon secondary molds are provided industrially. These can be further individually prepared by the dental laboratory and bonded to the titanium base ICA.

Case report 3: ICA-Abutment restoration in site 22

Case report 4: immediate implantation in sites 16–26 and 36, 33, 32, 42, 43, 45 and 46 (CHAMPIONS (R)Evolution) with Hybrid Screws Georgi and Smart Grinder



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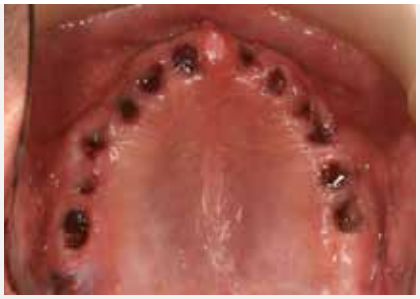
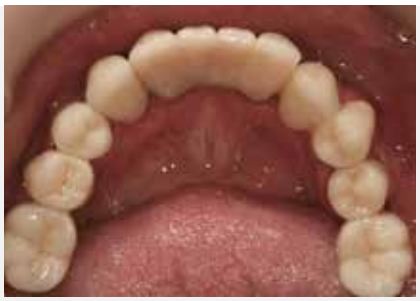
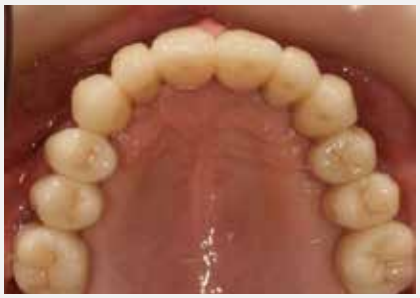
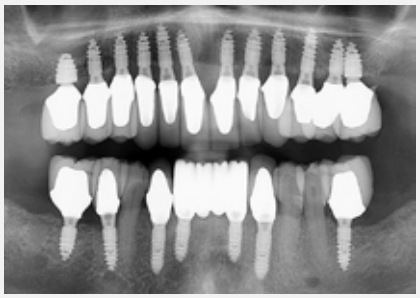
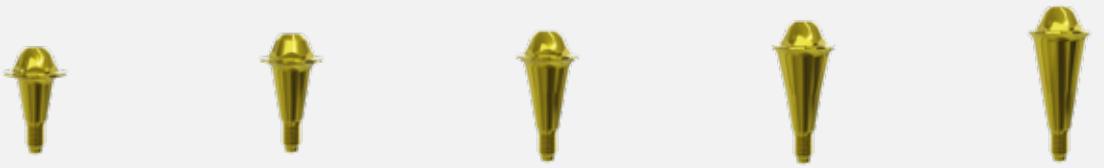







Multi-Unit LOC

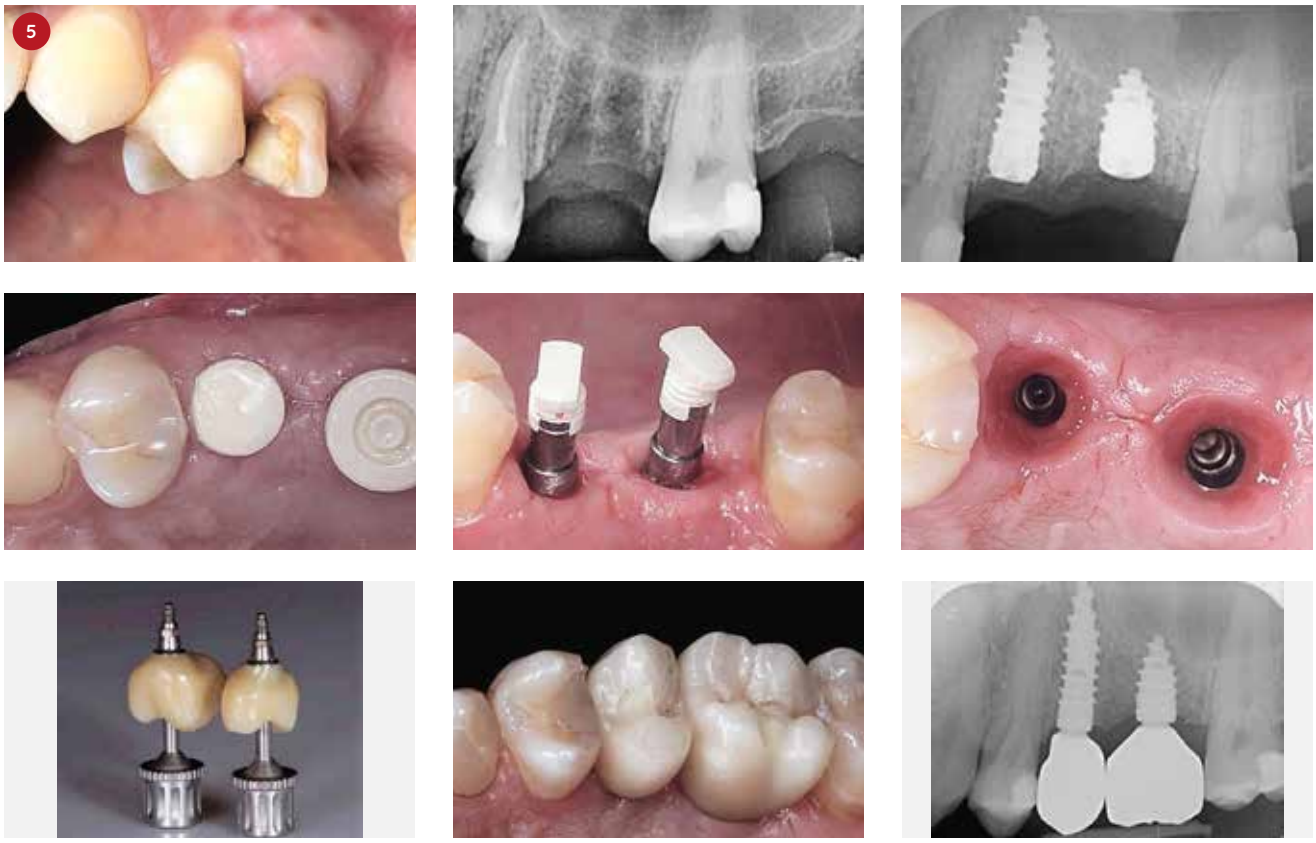

Titanium base


Calcinable


GH1 GH2 GH3 GH4 GH5


GH1 GH2 GH3 GH4 GH5


GH1 GH2 GH3 GH4 GH5



Case report 5: Immediate implantation 25 and delayed immediate implantation in site 26 in surgery and Prosthodontics

Developer of the CHAMPIONS (R)Evolution system & educational background

It was in 1995 that Dr. Armin Nedjat developed the MIMI®-method (Minimally Invasive Implantation Method). Then, he perfected it with his Condensers, which he developed in 2006, and the CHAMPIONS (R)Evolution system, which he developed in 2011.

Dr. Nedjat was nominated for the "German Medical Award" in Berlin 2017 and won the SENSES award for "Best Innovation in Medicine" in Dubai in 2013.

With the CHAMPIONS (R)Evolution implant system, the company Champions-Implants GmbH, the biggest German dental implant company, marked a quantum leap forward in Dental Implantology in 2011.

An unconditionally optimized workflow with high-quality, innovative products has facilitated the daily routine in our dental practices since 2011. Due to the useful design concept, high primary stability can be achieved, especially in case of immediate implantations (extraction and implantation in one session). The time and cost savings in dental practices are considerable, in many cases exceeding 100 %.

From surgery to Prosthodontics, dental practices have a tried and tested, cost-efficient system at their disposal, which is also fully digitally CAD/CAM capable. The main advantages in today's digital age are the ability to network with real Implantology experts in almost all languages and guaranteed product availability in the long-term.

The concept of the „Clinical Implantology & Implant Prosthodontics Curriculum" is based on Prof. Dr. Jean-Pierre Bernard of the University of Geneva. As early as in the 90s he succeeded in teaching Implantology novices skills for incorporating implant treatments into everyday practice through close supervision and clinical training with supervision in each participant's own practice in Switzerland.

In collaboration with the Future Dental Academy GmbH, the VIP-ZM society (Verbund der innovativ-praktizierenden Zahnmediziner/innen e. V. [German society of dentists with innovative practices who share scientific knowledge]) has successfully introduced this one-year Curriculum in Germany since 2017. More than 150 participants have been trained.

GERMAN MEDICAL AWARD©

Prospects of success of implant treatments

Since Greenfield pioneered the cage design of dental implants (Greenfield, 1913), Implantology has been widely disseminated worldwide via the pin implants propagated by Scialom and Pruin (Scialom, 1965; Pruin, 1974) and the blade implants of Linkow (Linkow, 1972). In the 70s, Koch and Kirsch went further with the IMZ system (Kirsch, 1980; Koch, 1976), Schulte with the Tübingen immediate implant (Schulte et al. et al., 1978), and Schröder with his hollow cylinder implants (Schroeder et al., 1976) were a step forward in Implantology. In the mid-1960s, however, Brånemark made important Implantology discoveries. Brånemark and his coworkers worked with a titanium cylinder screw as the basic element (Brånemark et al., 1969). It was Brånemark and his research group who coined the term „osseointegration", the direct connection between the bone and the implant, which they observed while working with machined, covered, unloaded healing screw implants.

In addition, Schroeder discovered functional ankylosis, a phenomenon of bone healing that he observed with additive-roughened titanium hollow cylinder implants that healed with transmucosal loading. Furthermore, Schulte and his coworkers worked on immediate implantation, which has marked another milestone in the evolution of modern scientific Implantology. The implants that are used today are predominantly rotation-symmetric titanium two-piece screws.

Clinically, Implantology has been growing in importance especially in Germany since DGZMK (Deutsche Gesellschaft für Zahn, Mund – und Kieferheilkunde [German society of Dentistry and Oral Medicine]) officially recognized Implantology as scientific discipline in 1982 (Spiekermann, 1994; Tetsch et al., 1990). Since then, the use of implant-retained dentures in Dentistry has attracted a lot of interest from both the public and the scientific community.

In addition to the stabilization of dentures in an edentulous jaw and the avoidance of dentures especially in free-end cases, aesthetically demanding areas such as interdental gap restorations or single-tooth dentures have now been routinely performed. In addition to improving chewing function, the therapeutic focus is now often on preserving or regenerating sufficient bone and soft tissue as well as on the preventive preservation of tooth substance by avoiding the reduction of natural teeth.

In recent years, the Implantology field has become very dynamic. In addition to the wider range of indications through various bone replacement graft materials and the modification of implant surfaces, biological growth factors (platelet rich plasma, bone morphogenetic proteins) have been placed, and immediate restoration with dentures or immediate loading has been performed, accompanied by an increased aesthetic demand. Despite a high clinical reliability and predictability of the therapy result, implant failures are still part of everyday clinical life.

Reasons for implant failures can include: Peri-implant infections, connective tissue encapsulation/ failed osseointegration, implant fracture, screw fracture, coating fracture, and iatrogenic reasons (incorrect position, oncology), titanium oxide intolerance, patient psychoses.

Systematic observational clinical studies have long documented the excellent prognosis of endosseous implants through positive long-term results (Adell et al., 1981). The long-term success of osseointegrated implants is the basis of the implants for the established indications (DGZMK, 2000).

The value of implant-retained dentures has been proven due to the high degree of functional restitution even in difficult anatomical conditions (Neukam and Buser, 1996).

The prognosis of osseointegrated implants, however, partly depends on the patient's state of health. Influences of disorders of bone metabolism, diabetes mellitus, radiotherapy, and nicotine abuse on the overall prognosis of implants have been discussed in literature (Blanchaert, 1998).

For instance, it has been believed that osteoporosis (with a bone quality decrease) could be associated with a limited implant prognosis. Although osteoporosis increases with age and after menopause, Dao et al. have shown that implant failure rates are not related to age and gender. A scientific verification of the literature does not provide a compelling theoretical or practical basis to expect osteoporosis to be a risk factor for osseointegrated dental implants (Dao et al., 1993).

Behneke et al. conducted a study consisting of 35 patients with diabetes mellitus who received 129 interforaminal ITI implants in the mandible. With insulin therapy, increased bone resorption was observed during the healing time. A significantly higher resorption with progressive tendency was observed in patients with the underlying disease persisting for more than 20 years compared to patients with shorter disease duration. Within a 5-year observation time, however, there were no differences in the implant-related success or dwell probability between the patients with diabetes (94.9%) and the control group (91.6%) (Behneke et al., 1998). Diabetes mellitus is therefore not considered as a contraindication for implants. The implant prognosis and potential prognostic factors in the irradiated jaw were investigated in a group of 47 patients with 197 implants by an analysis of the implant survival rate (Kaplan-Meier).

Despite the difficult conditions for tumor patients (compliance, hygiene, soft tissue replacement, osteoplasty), the survival rate was 95% after 1 and 2 years respectively and 72% after 6 years. Compared to a historical group, the survival rate of teeth that were healthy before radiotherapy was significantly lower (1 year: 75%; 5 years: 45%) than the prognosis of endosseous implants (1 year: 95%; 5 years: 72%) (Grötz et al., 1999). Despite the significantly reduced prognosis, endosseous implants are helpful in serving as good rehabilitation of the masticatory function also for irradiated patients. Although florid periodontal disease of the residual dentition is considered as a prognostic factor in implant therapy, prospects for this clinically common problem are supported

by little data. A current study by Mengel et al. (Mengel et al., 2001) comparing partially edentulous patients with generalized chronic periodontitis and those with generalized aggressive periodontitis showed a 100% implant success rate in patients with chronic periodontitis after 5 years. By comparison, after this time, the success rates recorded in patients with aggressive periodontitis were only 88.8% (maxilla: 85.7%; mandible: 93.3%). The authors have concluded that implants are a possible solution for these patients. However, according to the authors, as there are no clinical and microbiological differences between the natural teeth and implants, progression of the disease cannot be ruled out. Thus, aggressive periodontitis of the residual dentition should be considered as a risk factor for implant therapy even under study conditions. Nicotine abuse is also known for negative effects on peri-implant hard and soft tissue. Due to wound and healing disorders, smokers experience 3.7 to 7.5 times more failures already in the early phase (Vockner, 2001). Due to the constituents of tobacco smoke such as nicotine, nitrosamines, polycyclic hydrocarbons, benzanthracene, cyanide, heavy metal, and carbon monoxide, the effectiveness of the infection defense is severely impaired. Smoking increases the risk of peri-implantitis by reducing the immune defense. In a study by De Bruyn (452 implants), the differences in implant failures (9% of smokers, 1% of non-smokers) were statistically significant (De Bruyn and Collaert, 1994). Studies on the influence of nicotine abuse on implant healing and implant prognosis did not show a statistically significant influence of smoking on survival rates of implants in the local bone without additional surgical procedures. Studies on the influence of other systemic diseases on implant prognosis (including collagenosis and arteriosclerosis) are still pending, and in the literature there is only casuistry.

Evaluation of the implant success

Therapy form evaluation includes a realistic evaluation of the long-term success. Although the implant success evaluation according to the criterion in situ or explanted is clear and can also be determined precisely at the time of the event, different authors consider this sole criterion as insufficient for a differentiated therapy comparison due to the lack of clinical parameters.

As a standard statistical method for the time-dependent investigation of the parameter implant failure, the survival time analysis according to Kaplan and Meier (Kaplan and Meier, 1958) is frequently found in the literature. In this evaluation, the dwell probability of an implant is calculated on the basis of the failure rate over time and the number of implants at risk at that time whereby the implant service time and the number of implants at risk are given a considerable weighting.

However, the Kaplan-Meier dwell time analysis only considers the fact whether an implant is still in situ after a certain time or not. The condition of the peri-implant soft and hard tissue parameters is not taken into account. However, more and more authors consider the evaluation of these peri-implant hard and soft tissue parameters (Behneke and Behneke, 1996; Moberg et al., 1999), mostly using a Cutler-Ederer analysis.

Corresponding implant success criteria, which include follow-up variables collected during clinical or radiographic follow-ups, have been postulated by various groups of authors (Albrektsson et al., 1986; Buser et al, 1990; Jahn and d`Hoedt, 1992; Naert et al, 1992; Schnitman and Shulman, 1980; Snauwaert et al, 2000), but a general consensus has not yet been reached.

The average success rates for endosseous implants generally reported in the literature are comparable only to a certain extent due to the use of different implant systems for different indications and because of different evaluation criteria. Data vary between 61% and 98% (Albrektsson et al., 1988; DGZMK, 2000; Dietrich et al., 1993; Richter et al., 1992).

The current analysis of the parameters of a patient group (n = 13,834 implants, 4,192 patients) collected in this study showed implant in situ rate of 95%, which is comparable with the one mentioned in literature or even better, and a Kaplan-Meier dwell prob-

International criteria for endosseous dental implant success

NIH-Conference, Schnitman 1980	Albrektsson et al, 1986	Buser et al, 1990	Jahn, d'Hoedt, 1992	Naert et al, 1992 – Snauwaert et al, 2000
Implant in situ	Implant in situ	Implant in situ	Implant in situ	Implant in situ and implant-retained denture
Loosening degree 0–1	Loosening degree 0	Loosening degree 0–1	Loosening degree 0–1	Periotest value < +8
Radiologic, peri-implant translucency is graduated but does not contribute to the definition of success	Absence of peri-implant radio-translucency	Absence of persisting peri-implant radio-translucency	X-rays may not demonstrate any evidence of a bilateral, continuous gap with a width > 0.5 mm in the implant	No peri-implant radio-translucency
Vertical bone loss is not bigger than 1/3 of the vertical implant length	Vertical bone loss < 0.2 mm/annually following the implant's first year of service		The angular bone defect (mean value of the mesial and distal measurement in the X-rays) may not exceed 3/10 of the constructive-endosseous implant section	
Gingivitis accessible to therapy + absence of signs of inflammation	No signs of an infection	No peri-implant infection with putrid secretion	Sulcus depth may not exceed 4 mm for 2 consecutive controls	No implant fracture
No injuries of nerves, teeth, maxillary sinus, or floor of the nasal passage	No injury of nerves	No persisting discomfort such as pain, foreign body sensation, and/or dysesthesia	Subjective evaluation of the implant may not be worse than „3" (German school grade system)	No implant-induced pain, infections, or paresthesia

ability of 96.5% after 6 years. However, substantial differences are found in the resulting implant success rate depending on the success criterion used: According to definition of success of Naert et al., the success rate resulted in almost 98 %; with criteria according to Albrektsson et al. and Buser et al., the success rate resulted in 97.5 %.

The NIH criteria limit annual bone loss and also rate 97.5 % as success while Jahn and d'Hoedt see only 95 % as success.

An important innovation of the success criterion according to Jahn and d'Hoedt (Jahn and d`Hoedt, 1992) is the inclusion of patient evaluation of the implant according to the German school grade system. For the first time, an only sufficient or even worse evaluation of the implant success by the patient leads to the evaluation of the implant as a failure, which is reflected in the significantly reduced success rate.

In the follow-up examination of the patient group already mentioned above, the patient degree of satisfaction was analyzed on the basis of a 6-grade scale of the German school grade system (6 = dissatisfied, 1 = extremely satisfied); patient degree of satisfaction with implant surgery (MIMI) results was described as good or very satisfactory in 98 % of the patients.

95 % were very satisfied with the denture and 97 % with the total success of the treatment. 98.5 % of the patients would be willing to undergo the surgery again if indicated.

99 % would recommend the surgery to others. After comparing clinically collected parameters with subjective evaluations of the patients, the Spearman correlation analysis evaluated no statistically significant correlations.

Despite a large number of cases (n = 4,192 patients), the expected influence of clinical parameters on patient satisfaction did not show to be significant.

Only recently has the esthetic success of the restoration been analyzed more and more as a criterion for implant success. Particularly when evaluating immediate loading concepts, it is necessary to make trade-offs in the relevant esthetic zone between early loading and calculable esthetic results with time-tiered forms of therapy. However, the evaluation seems difficult, although this point seems to be integrated in the subjective satisfaction of the patients with the implant restoration, which, however, is overlaid by the different expectations. As early as 1994, the Federal Ministry of Health pointed to patient satisfaction as an essential part of the outcome quality (Anderson, 1998; (BMFG), 1994). In recent years, patient satisfaction has become increasingly important, especially in the context of quality assurance (Leimkühler, 1996).

While as a rule the objective performance is the same for all patients, the subjectively perceived performance can vary individually (Homburg and Rudolph, 1995; Jacob and Bengel, 2000).

Patient satisfaction at the end of treatment plays a significant role in the evaluation of the quality of medical interventions and will continue to gain in importance in the future.

The implant survival probability of which the only success criterion is the implant remaining still in situ at the time of examination regardless of possible complications was analyzed according to the method of Kaplan-Meier (1958). To determine the implant success, a wide scope of success criteria according to Albrektsson et al. (1986, Chart page 11) were used.

Wide scope of success criteria according to Albrektsson et al. (1986)
- Implant in situ
- Clear percussion sound
- Loosening degree 0–1
- Sulcus probing depths < 4 mm
- Absence of Bleeding On Probing
- Absence of clinical signs of infection
- Mean annual bone loss
  < 0.2 mm following the first year
- Subjective satisfaction with implant and dentures, no discomfort

Peri-implant pocket depths greater than 3 mm and up to a depth of 5 mm were recorded as peri-implant mucositis. Pocket depths greater than 5 mm met the criteria for periimplantitis and were therefore also a failure (Dvorak et al. 2011, Schmidlin et al. 2010, Zetterqvist et al. 2010, Gatti et al. 2008, Brägger et al. 2005).

Furthermore, failure was defined in the presence of the following examination findings: deep percussion sound associated with a loosening degree; positive Bleeding on Probing (BoP); clinical signs of infection such as redness, swelling, or pus discharge; a mean annual bone loss of more than 0.2 mm after the first postoperative year in combination with recession, pain, neuropathy, or dissatisfaction with the prosthodontic restoration as well as implant or abutment fractures.

MIMI Nomenclature and Classification

In the end of 2021, the MIMI nomenclature of 2006 was subdivided by Nedjat to now 6 classes. In this study, cases were included in the following classes: MIMI 0 (immediate implantation), MIMI I (delayed implantation), MIMI II (horizontal distraction of narrow ridges without raising a mucoperiosteal flap), and MIMI VI (Internal Direct Sinus Lift, IDS). In 2011–2017, the French Matribone augmentation material (Biomup, a collagen/beta-tricalcium phosphate) was used. Since 2017 Ethoss and/or the autologous, particulate dentin (Smart Grinder, Kometabio) has been used.

MIMI® NOMENCLATURE

according to Dr. Armin Nedjat

MIMI 0: Immediate implantation
(also with the Socket Shield (PET-) technique and
Smart Grinder procedure to process extracted teeth
for grafting of autologous dentin)

MIMI I: Delayed implantation

MIMI II: Horizontal distraction

MIMI III: Vertical distraction

MIMI IV: Horizontal and vertical distraction

MIMI V: Indirect Sinus Lift (according to Summers)

MIMI VI: Internal Direct Sinus Lift (IDS according to Nedjat)

Overview of patient gender distribution and number of placed and restored CHAMPIONS (R)Evolution implants with dentures

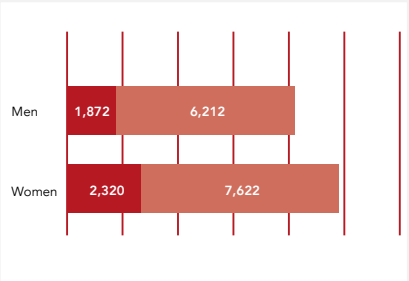
In this scientific study, 13,834 Champions (R)Evolution implants were placed.

Of the patients 2,320 were women (55.34 %) with a total of 7,622 implants and 1,872 men (44.66 %) with 6,212 implants.

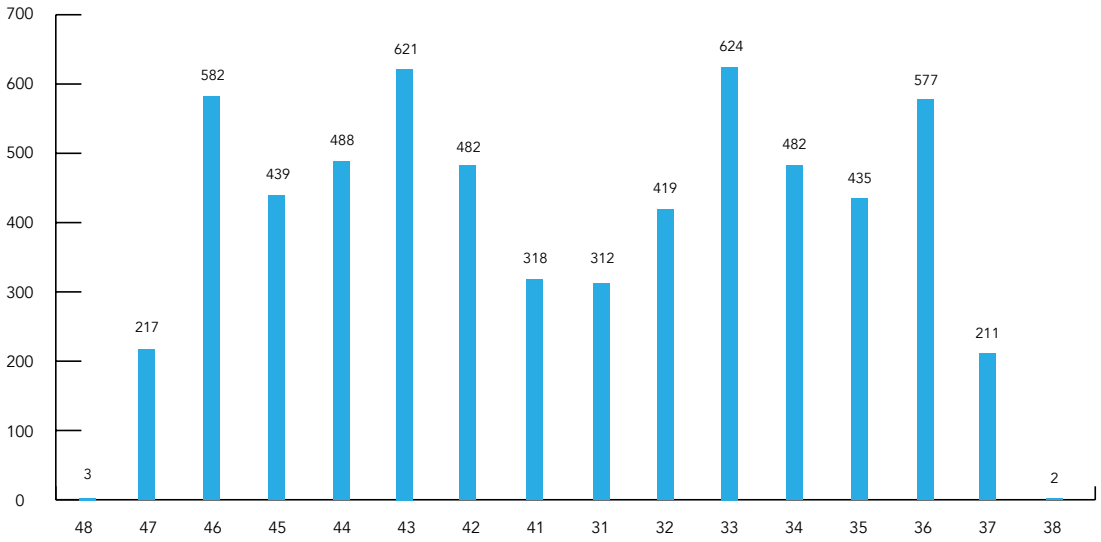
- Practice 1 (in Austria) placed a total of 3,117 CHAMPIONS (R)Evolution implants
- Practice 2 (in Germany) placed a total of 5,884 CHAMPIONS (R)Evolution implants
- Practice 3 (in France) placed a total of 2,406 CHAMPIONS (R)Evolution implants
- Practice 4 (in Poland) placed a total of 2,427 CHAMPIONS (R)Evolution implants

The mean age of the patients was 50.4 years at the time of implantation. Women received 3.26 implants on average and men 3.32 implants on average.

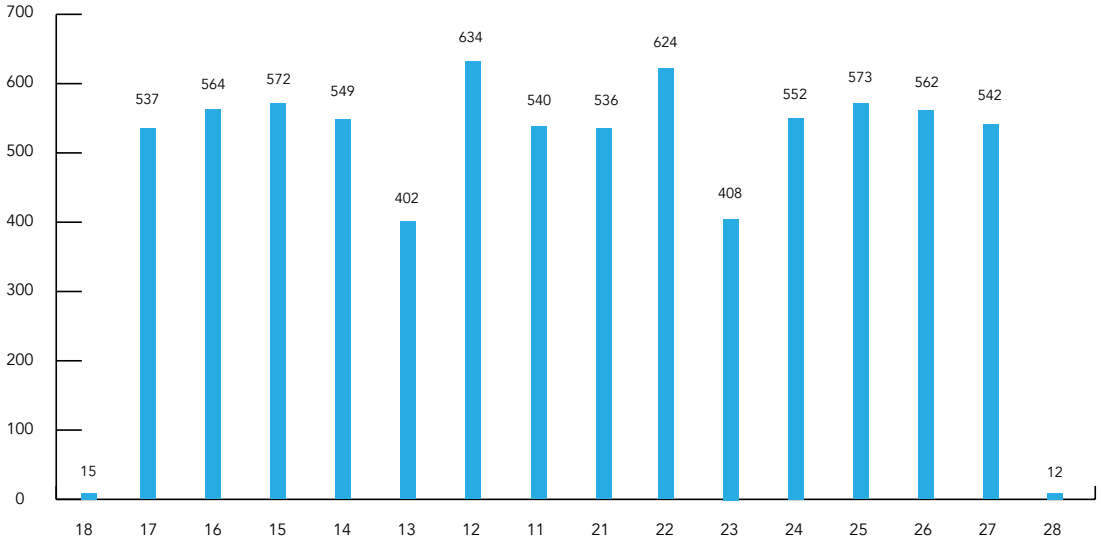
A total of 7,622 implants (55.1 %) were placed in the maxilla. A total of 6,212 implants (44.9 %) were placed in the mandible.

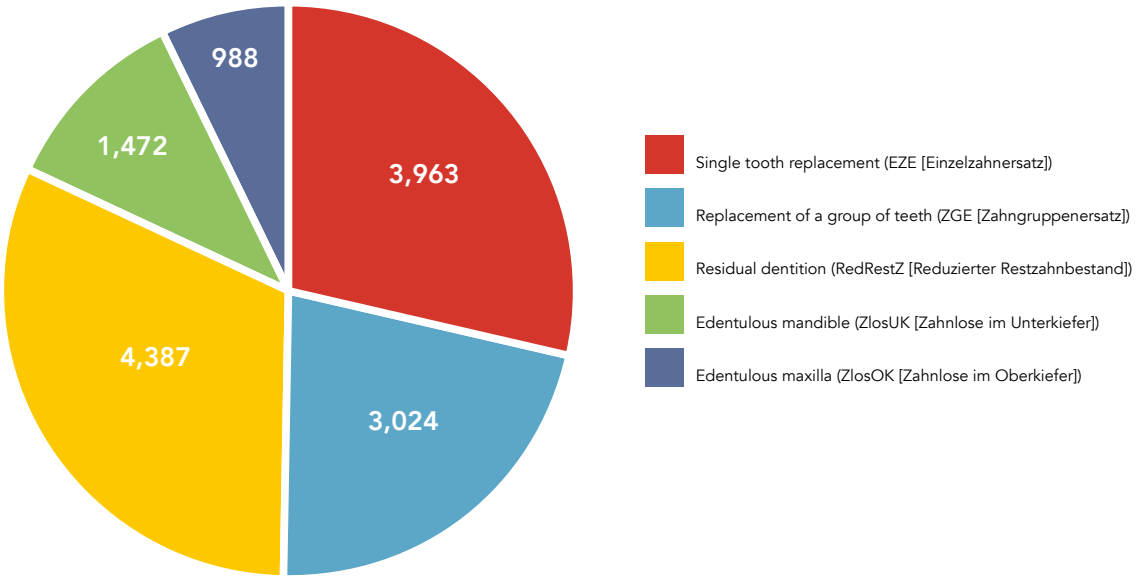


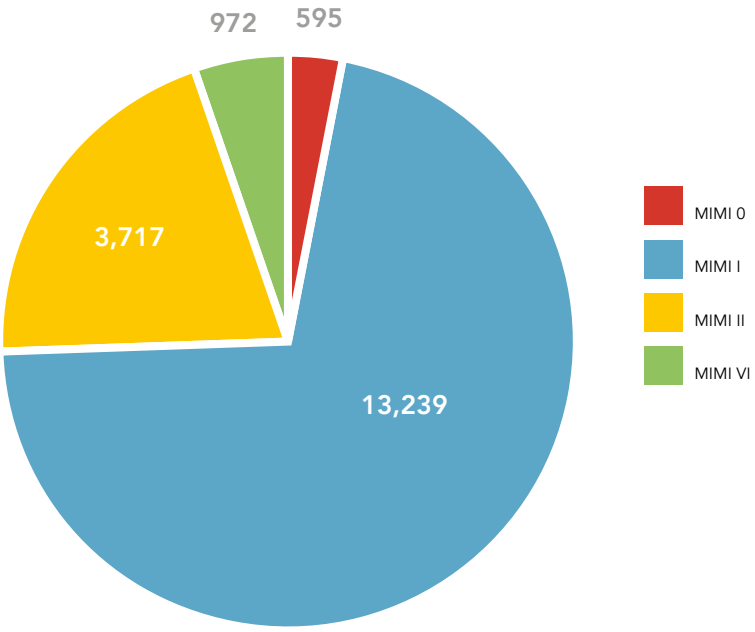
Distribution of 6,212 implants in the mandible according to the jaw region



Distribution of 7,622 implants in the maxilla according to the jaw region







Distribution of all placed implants in the MIMI-classes

- Of a total of 13,834 implants there were 595 (4.3%) immediate implants (MIMI 0), i.e. tooth extraction and implantation in the same session.
- Most implants (95.70%) were delayed implants (MIMI I, from the 4th week post extraction).
- For delayed implantation, the horizontal, flapless distraction (MIMI II) was performed because of 28.08% preoperative soft tissue and hart tissue resorptions.
- Of 3,350 placed implants in the maxilla in the sites 15–17 and 25–27, 972 (28%) were performed with IDS (MIMI VI).

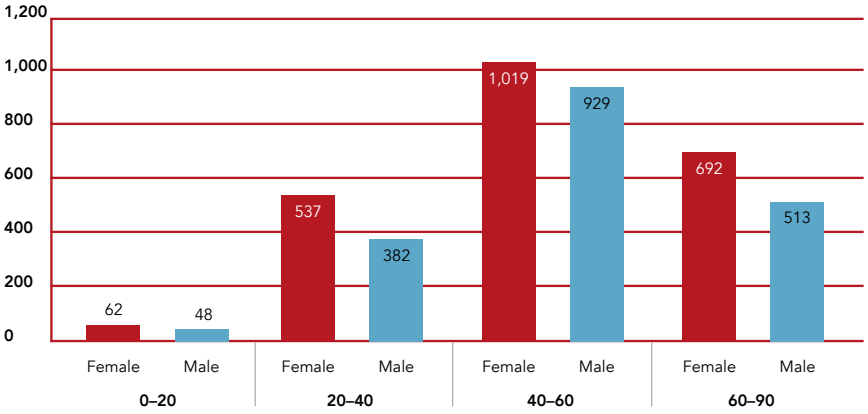
Study population

Of the 4,192 patients who participated in the CIPC curriculum from 2011 to 2021 in the 4 clinics or under my supervision (Practice 2) and who received a total of 13,834 Champions (R)Evolution implants, 3,854 patients and 12,726 implants received follow-up care, and almost complete data was collected. This corresponds to a follow-up rate of 91.99%.

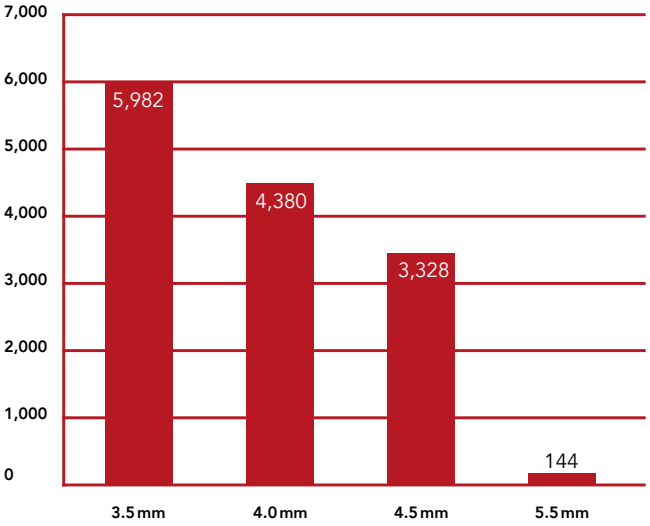
74 patients did not report back to their respective practices, 223 were unwilling to undergo a dental professional cleaning and follow-up visits due to their old age, serious illnesses, or personal reasons,17 moved away unknown, and 24 died in the meantime.

The age groups were grouped together in 20-year increments (with the exception of the last age group: 60–90 years), starting with the group of 0-20 year-old patients. The youngest patient was 18 years old at the time of implant placement, the oldest was 86 years.

Age and gender distribution



Diameter of the placed and restored implants



Detailed chart with implant diameter, divided according to respective lengths

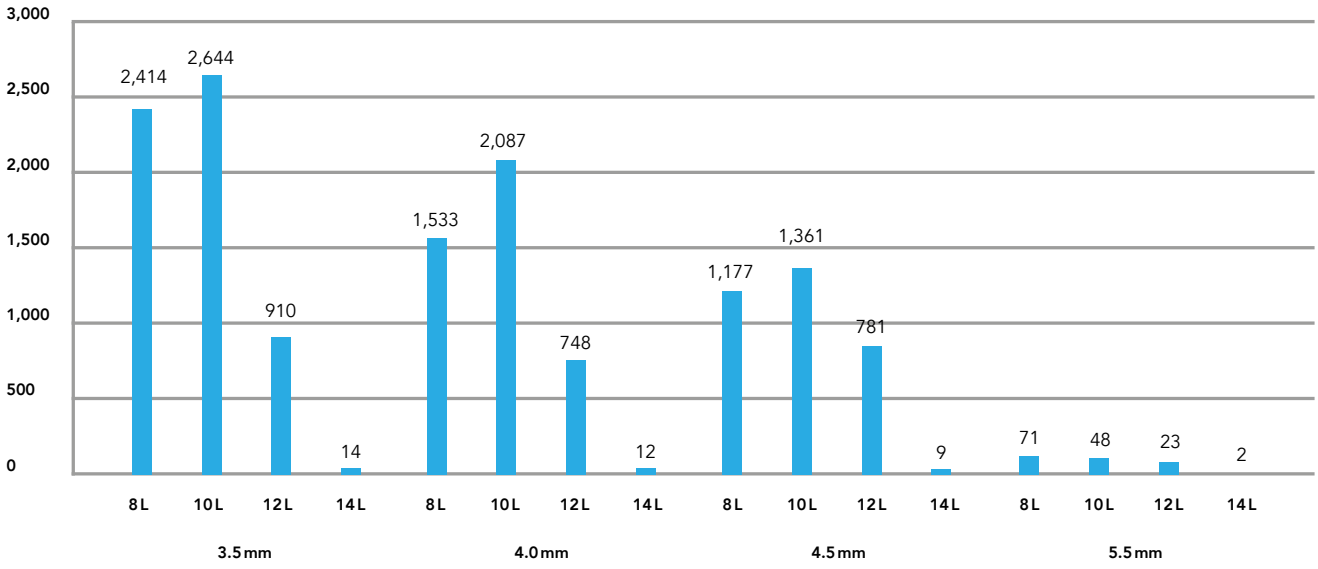
Influenced by "the guideline" of Prof. Dr. Jean-Pierre Bernard at the beginning of the study in 2011, short implants (< 12 mm in length) with reduced implant diameters should be placed.

The other two guidelines for the treatment teams were that – if possible – the implants should be inserted 1–2 mm in the subcrestal position and that diameter-reduced (ø 3.5 mm) implants with a primary stability between 20–40 Ncm should be placed.

In addition to demographic data, the following parameters were collected:

- Implant position
- MIMI-Nomenclature class 0–6
- Implant length and implant diameter
- Time of implantation
- Primary stability in Ncm
- Equicrestal, subcrestal, and supracrestal insertion
- Augmentation: yes/no?
- Indication class [single-tooth dentures (Einzelzahnersatz [EZE]), replacement of a group of teeth (Zahngruppenersatz [ZGE]), residual dentition (reduziertes Restgebiss [RRG]), edentulous maxilla (zahnloser Oberkiefer [ZOK]), edentulous mandible (zahnloser Unterkiefer [ZUK])
- Day of the restoration with the superstructure
- Type of superstructure
- Bone loss and tissue loss in mm
- Complications
- Day of the implant failure
- Reason for loss
- Recovery of stability after "tightening" in case of loosening of the implant within the first 4 weeks after surgery ("Erni-Test")
- Day of the last check-up

The data material was recorded in charts and statistically processed concerning individual questions.



Requirements for practices for studies of implantation and dentures:

- After insertion, each implant should have an attached gingiva of a minimum width of 1 mm in the vestibular position.
- Each implant with the Shuttle should end in a supragingival position at a maximum of 1 mm.[X1]
- Each implant should achieve minimum primary stability at 20 Ncm.
- In the D1/ D2 bone there should be a "crestal relief" of 1–2mm.
- As a rule implants can be immediately restored/immediately loaded if 4 implants/teeth are attached/splinted with a passively fitted temporary denture or the final superstructure.
- If possible, short implants of 8 mm and 10 mm should be placed.
- The primary goal is to place an implant diameter of only 3.5 mm and of only 4.0 mm for single molar implants
- Until you fit the superstructure, you should wait 3 months for an immediate implantation (MIMI 0) and MIMI-II (horizontal distraction), 4 months for MIMI-VI (Internal Direct Sinus Lift), and 2 months for a "classical" delayed implantation (MIMI I).
- Crowns should be fitted with phosphate cement or Relyx Unicem (3M Espe) and not temporarily.
- The Abutments should reach a final torque of 30 Ncm. In the posterior maxilla (D3 / D4 bone) the final torque should be 25 Ncm.

X1: From January 2018 this requirement was corrected so that it was now possible to place a Shuttle with an equigingival closure or the Hybrid Screws Georgi with a gingival height of GH 1.5 (golden) and GH 2.5 (pink), which have then been introduced, in addition to the already existing Surgical Cover Screws with GH 0.5.

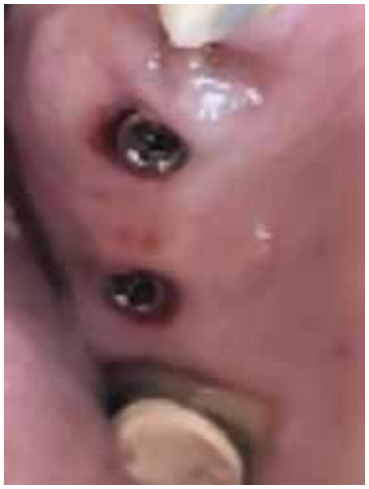
A Hybrid Screw Georgi should preferably be closed at 1–2 mm in a subgingival position. The Hybrid Screws Georgi are available in gingival heights of GH 0.5 (gray), 1.5 (golden), and 2.5 (pink).

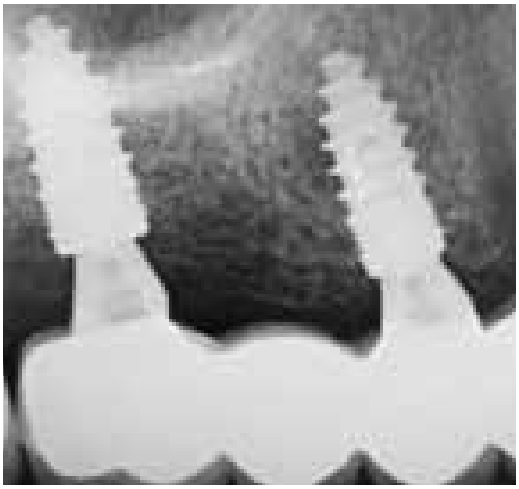
Two-piece implant systems have therefore been developed to strictly avoid lateral micromovements within the first 8 weeks post-surgery. During this time, peri-implant bone is broken down, remodeled, and modeled. If, for example, a CHAMPIONS (R)Evolution implant is placed at a mucosal thickness of 2 mm with its 3.5 mm-high Shuttle at "bone level", its osseointegration is jeopardized in the "healing

phase" since only the slightest movements can badly affect the implant osseointegration. External factors such as tongue movements on the implant would thus be able to endanger the osseous implant integration. In these cases, after taking implant X-rays-still with the Shuttle – you should remove the screw and the Shuttle in order to replace the Shuttle with one of the three "Hybrid Screws Georgi". In this way, there are no micromovements of the CHAMPIONS (R)Evolution implant due to eating behavior or a removable denture.

If you leave the 3.5 mm-high Shuttle sterile on the implant in case of a gingival height of e.g. 2 mm, subcrestal implant placement is recommended. Then the Shuttle also closes at "tissue level" or even in a slight subgingival position so that no movements and forces on the implant can occur during the implant healing phase. Subcrestal implantation is very possible with the CHAMPIONS (R)Evolution system as due to the double cone with integrated Hexadapter, there is no micro-gap that is vulnerable to bacteria. Due to this subcrestal implantation procedure, the exchange of the Shuttle for the Hybrid Screw Georgi is not necessary.

Another advantage of the subcrestal implantation is that at crestal bone level there are no great forces so that a crater-shaped bone loss during the healing phase can be avoided.





Navigation

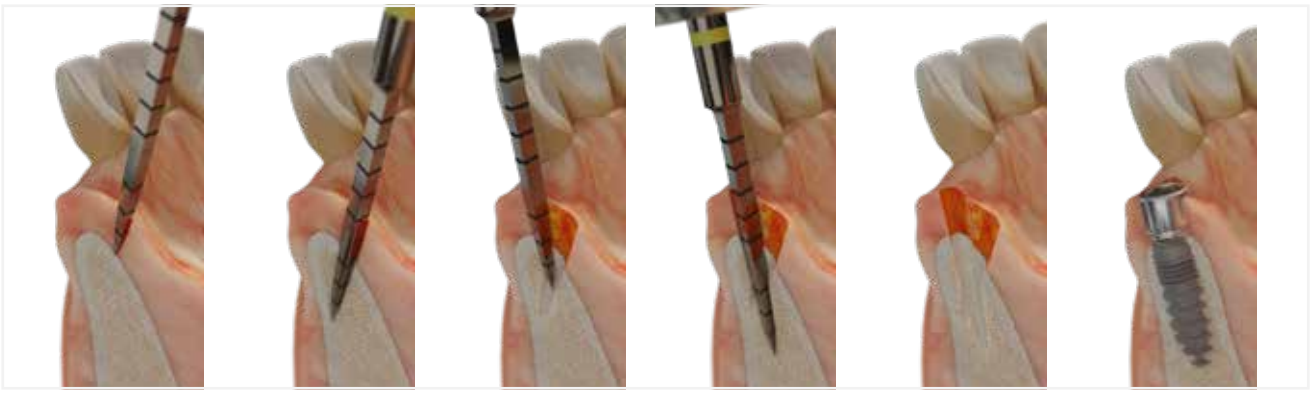
There are 3 navigation aids:

CNIP-Navigation: actually, CNIP, the "Cortical Navigated Implantation Procedure", is a natural procedure. CNIP is performed using Conical Triangular Drills at low speed (about 50–70 RPM in the spongy bone) and guided through the cortical structures of the bone (250 RPM), which ensures that the drills always stay in the spongy bone without perforating cortical structures. Using CNIP, cortical bone structures in the buccal and oral positions serve as natural navigation aids.

With a correct procedure and by performing a BCC (Bone Cavity Check) with a sufficiently long, thin, flexible metal probe after the first and last drilling, you can successfully and safely prepare the bone for the flapless implant placement.

The "Chetry" Drill Stop Sleeves for the yellow pilot drill are another aid for finding the correct distance between several implants next to each other. With the "Chetrys" ø 5.0, ø 7.0 and ø 9.0 mm, the ideal implant spacing is automatically obtained by leaving the yellow drills together with the Drill Stop Sleeve inserted in the drilling position.

For the user CHAMPIONS Guides serve as a navigation aid for the optimized prosthodontic position, allowing for preoperative and intraoperative individual shaping for the patient.



Implantation in the dense D1/D2 bone

For a "Bone-Level" implantation in dense D1/D2 bone, crestal bone is relieved:

- For a 3.5 mm-diameter implant, the 4.0 mm-diameter drill is finally used
- For a 4.0 mm-diameter implant, the 4.5 mm-diameter drill is finally used in the crestal position

QR Code: Dr. Nedjat explains "Bone Level", "Tissue Level", subcrestal implantation "crestal relief" and "platform switching"

Surgery and prosthodontic restoration of a CHAMPIONS (R)Evolution implant in site 46

Implantation in the D3/D4 bone

In the low density bone (D3+D4) and for immediate implantation, the so-called "osseous metamorphosis" (OM) occurs. Using your hands, so "digitally" (manually and with the Torque Wrench Insertion Aid), the first two Conical Triangular Drills are used making awl-like movements. Then, only the CHAMPIONS Condensers are used.

Condensers are bone condensing instruments. The Condensers are located in the 2nd row of the CHAMPIONS system: if you achieve primary stability at a torque of about 20 Ncm (hand-tightened) with the Ø 4.3 mm blue Condenser in the low density bone, place a 4.5 mm-diameter implant. Condensers also allow you for intraoperative determination of the length of the required implant.

- The anatomy (e.g. by means of a preoperative cone beam) does not determine which implant diameter is to be used. Rather, the diameter of the implant is determined by the bone density; Condensers allow for intraoperative determination of the bone density in the low density bone or when performing immediate implantation.

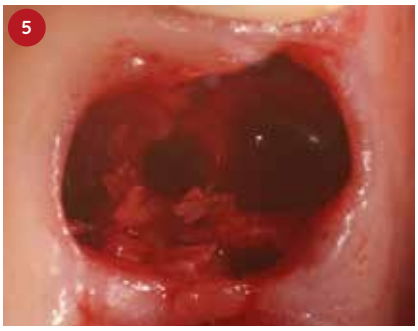
Which implant Ø do you place in low density bone?

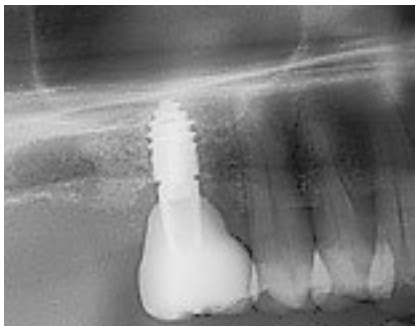
First intention:

Ø 3.5 mm when primary stability at 30/40 Ncm is achieved

Exception: single molar → ø 4.0 mm

Condenser stability at 20 Ncm		Implant diameter
3.3	→	3.5
3.8	→	4.0
4.3	→	4.5
5.3	→	5.5





Case report 6: For immediate implantation for maxillary first molars, a trifurcation is performed, which is also recommended from a prosthodontic point of view. Immediate implantation in the mandibular molar region can be successfully performed by means of Condensers in a few minutes. Spongy bone can be modeled very well so that a 4.0 mm-diameter implant can achieve primary stability even in a thin, 1.5 mm-wide septum.

Film: Immediate implantation in the molar region

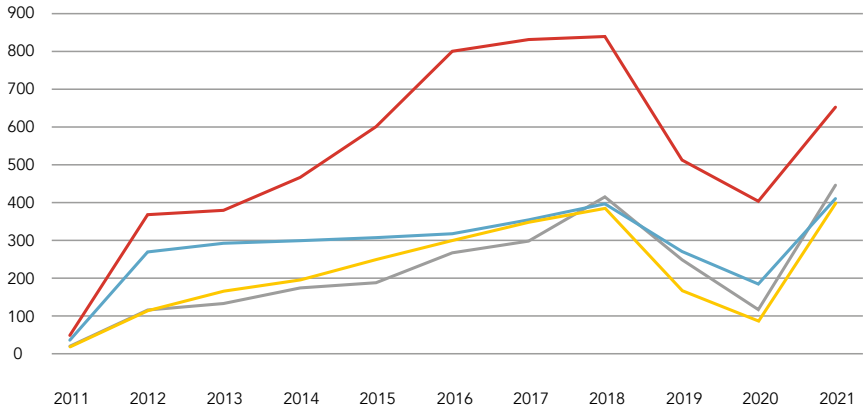
Scientifically prepared data of 2011–2021

Observations included patients who underwent implant therapy in 4 Implantology dental offices in Europe (one in Austria, one in Germany, one in France, one in Poland) between July 2011 and September 2021. Observations (Practice 2) also included all CHAMPIONS (R)Evolution cases that have been treated since February 2017 by Implantology novices of the one-year CIPC Implantology & Implant Prosthodontics Curriculum by two experienced supervisors across Germany. This intensive, comprehensive training concept is based on the SIAO/CITC concept of Prof. Dr. Jean-Pierre Bernard (University of Geneva), who advised his students in their respective private dental offices within the framework of the Clinical Implant Training Concept in the 90s.

Iatrogenic influence factors: learning curves of the practitioners

Practitioner teams needed some time to adjust when introducing a new implant system in their practice. Placing this implant system has become routine after treating about 10 patients. After the first surgeries in 2011, the procedure became more routine in the following years and reached a preliminary maximum after 7 years with more than 800 implants (Practice 2) per year. Due to lock-down measures and uncertainties in individual countries because of the Corona pandemic, all practices were not able to continue implanting to the same extent in 2019 and 2020 as they had been able in the years before, but then they increased again implantations significantly in the year 2021.

Implants/year in the individual practices from 2011 to 2021



Overview of inserted implant lengths and diameters as well as other parameters in the involved practices

In the frame of this scientific study, 13,834 implants were placed and restored with dentures in 4,192 patients. The chart below shows an overview of the placed CHAMPIONS (R)Evolution implants:

A%V Augm.: Number and % of failures with simultaneous augmentation

PSt V: Primary stability in Ncm for failures on average

A%V GH > 0 mm: Number and % of failures when during the "healing phase", the Shuttle or the Georgi was placed with a gingival height of more than 0 mm

II ∑&%: Immediate implantation, number and % of implant types

Failure II ∑&%: Quantity of immediate implant failures and % of implant types

Implant length / Ø in mm	Practice 1		Practice 2		Practice 3		Practice 4		Total							
	N	%	N	%	N	%	N	%	N	%	Number of failures and %	A % V Augm.	PSt V	A % V > GH 0 mm	II ∑ & %	Failures II ∑ & %
CHAMPIONS (R)Evolution 8 – 3.5	582	18.67	1,135	19.42	272	11.31	425	17,51	2,414	17,45	84 3.48 %	5 5.95 %	< & = 20 Ncm	62 73.81 %	2 0.08 %	0
CHAMPIONS (R)Evolution 8 – 4.0	118	3.79	851	14.56	187	7.77	377	15.53	1,533	11.08	52 3.39 %	3 5.77 %	< & = 20 Ncm	38 73.08 %	12 0.78 %	0
CHAMPIONS (R)Evolution 8 – 4.5	84	2.69	486	8.32	252	10.47	355	14.63	1,177	8.51	42 3,57 %	13 30.95 %	< & = 20 Ncm	38 90.48 %	56 4.76 %	2 3.57 %
CHAMPIONS (R)Evolution 8 – 5.5	12	0.38	52	0.89	3	0.12	4	0.16	71	0.51	2 6.39 %	2 100 %	< & = 20 Ncm	2 100 %	4 5.63 %	1 25 %
CHAMPIONS (R)Evolution 10 – 3.5	876	28.10	945	16.17	386	16.04	437	18.01	2,644	19.11	91 3.44 %	4 4.39 %	< & = 20 Ncm	78 85.71 %	21 0,79 %	1 4.76 %
CHAMPIONS (R)Evolution 10 – 4.0	547	17.55	734	12.56	404	16.79	402	16.56	2,087	15.09	71 3.40 %	6 8.45 %	< & = 20 Ncm	62 87.32 %	13 0.62 %	0
CHAMPIONS (R)Evolution 10 – 4.5	391	12.54	342	5.85	276	11.47	352	14.50	1,361	9.84	47 3.45 %	8 17.02 %	< & = 20 Ncm	41 87.23 %	124 9.11 %	4 3.22 %
CHAMPIONS (R)Evolution 10 – 5.5	2	0.06	31	0.53	6	0.25	9	0.37	48	0.35	1 2.08 %	1 100 %	< & = 20 Ncm	1 100 %	0	0
CHAMPIONS (R)Evolution 12 – 3.5	274	8.79	422	7.22	188	7.81	26	1.07	910	6.58	34 3.74 %	2 5.88 %	< & = 20 Ncm	30 88.24 %	112 12.31 %	2 1.79 %
CHAMPIONS (R)Evolution 12 – 4.0	185	5.94	327	5.60	221	9.19	15	0.62	748	5.41	29 3.88 %	2 6.90 %	< & = 20 Ncm	18 62.07 %	66 8.82 %	1 1.52 %
CHAMPIONS (R)Evolution 12 – 4.5	32	1.03	534	9.14	202	8.40	13	0.54	781	5.65	28 3.59 %	5 17.85 %	> & = 40 Ncm	20 71.43 %	145 18.57 %	2 1.38 %
CHAMPIONS (R)Evolution 12 – 5.5	1	0.03	16	0.27	4	0.17	2	0.08	23	0.17	1 4.35 %	1 100 %	> & = 40 Ncm	1 100 %	15 65.22 %	0
CHAMPIONS (R)Evolution 14 – 3.5	6	0,09	4	0.09	2	0.08	2	0.08	14	0.10	0 0 %	0	-	-	9 64.29 %	0
CHAMPIONS (R)Evolution 14 – 4.0	5	0.09	2	0.03	2	0.08	3	0.12	12	0.09	1 8.33 %	0	-	-	7 58.33 %	0
CHAMPIONS (R)Evolution 14 – 4.5	2	0.06	2	0.03	1	0.04	4	0.16	9	0.07	1 11.11 %	0	-	-	7 77.78 %	0
CHAMPIONS (R)Evolution 14 – 5.5	0	0	1	0.02	0	0	1	0.04	2	0.01	0 0 %	0	-	-	2 100 %	0

Statistical methods

Statistical calculations performed using SPSS 11.0.0 (IBM, Armonk, NY, USA) and SAS Version 9.2 (SAS Institute Inc., Cary, NC, USA). In the context of the available analyses, the following characteristic values were given, depending on the following values:

- For frequency data, these were absolute and/or relative frequencies (percentage values).
- For metric data there were the arithmetic means, as a measure for variability, the standard deviation, the minimum and maximum, the number of cases, and percentiles.
- Survival rates have been presented as a Kaplan-Meier-curve.
- Individual subgroup significances were investigated using log-rank or chi-square test statistics. The p-values and test statistics were reported.
- In case of statistically significant group differences, the estimated difference (%) as well as its 95 % confidence interval are reported.

Results

Implant-related survival rate and survival probability

The 1-year survival probability of all implants was 98.89 % and decreased to 97.6 % after 5 years and 96.5 % after 10 years.

The observed overall failure rate (failure rate) of 3.50 % improved to 2.40 % when the CHAMPIONS (R)Evolution implants were placed 1–2 mm in the subcrestal position.

Reason for implant failures

Altogether, 484 of 13,834 implant failed during the 10-year observation time, corresponding to 3.50 %. For the individual practices the values were 2.9 % (Practice 1), 4.2 % (Practice 2), 3.2 % (Practice 3), and 3.7 % (Practice 4).

Implant failures were predominantly related to the supragingival position of the Shuttle (thanks to the MIMI methodology not colonized by bacteria, i. e. non-inflammatory) within the first 8 weeks after surgery. Acute and chronic peri-implantitis as well as classic peri-implantitis affecting soft tissue and bone contributed only very little to implant failures. The guidelines or statements of the leading scientific societies usually refer to the late form of periimplantitis with mucositis and ostitis, which we refer to here as periimplantitis chronica.

The early forms of inflammations, which also lead to loss, are given less consideration. These are the acute osteomyelitis or its localized form, which immediately force you to remove the implant (periimplantitis totalis acuta) or the insidiously progressing form, which the patient does not notice, and the practitioner is only surprised to discover that there has been very little or no osseointegration in the prosthodontic phase, with the consequence that the implant has a degree of loosening II (periimplantitis totalis chronica). From a patho-histological point of view, these are also inflammations, although they are completely different from the peri-implantitis that occurs later with mucositis and progressive bone loss around the implants after initial osseointegration.

Most implant failures occurred in the first months during the healing period of the implants: In the first 2-4 months post implantation, 436 implants (90.08 % of failures) failed, or 3.15 % of all placed implants failed.

By the end of the first year after fitting the denture, 27 (5.58 % of the failures) or 0.2% of the remained implants with superstructure failed, another 13 implants (2.69 % of the failures) by the end of the second year or 0.1 % of the remained implants were lost, up to 5 years another 5 (1.03 % of the failures) or 0.04 % of the remained implants were lost, up to 10 years 3 (0.62 %) or 0.02 % of the remained implants were lost.

Only 3 implants failed because of implant fracture: a CHAMPIONS (R)Evolution implant with a length of 14 mm and a diameter of 3.5 mm in 46, an implant (12 x 3.5 mm) in 13 (bridge sites 13–16) , and an implant (10 x 3.5 mm) in 36 (as splinted crowns 36+37).

Since the Hybrid Screws Georgi were introduced in the year 2017, a progressive decrease in the failure rate in the first 2–4 months of healing time was observed. When the Shuttle sometimes protruded more than 0.5 mm from the gingiva during equicrestal implantation, it therefore led to lateral micromovements of the implant (e.g. through a temporary removable denture). By replacing the 3.5 mm-high Shuttle with a Surgical Cover Screw Georgi with a gingival height (GH) of 0.5 mm, a Hybrid Screw Georgi with a GH of 1.5 mm (golden), or the one with a GH of 2.5 mm (pink), complete non-osseointegration or insufficient osseointegration could be significantly

Reason for explantation	N (Implants)	% (Failures)
Periimplantitis chronica	45	9.30
Periimplantitis totalis chronica	47	9.71
Periimplantitis totalis acuta	8	1.65
Osteolysis/ Residual necrosis in case of immediate implantation	12	2.48
Lateral forces exerted on the implant during the healing time (Shuttle > 1 mm in supragingival position), no signs of inflammation, no pain	324	66.94
Implant fracture	3	0.62
Osteolysis in case of augmentation with foreign bone replacement graft	1	0.21
Aversion, explantation on the patient's demand	2	0.41
Paresthesia	1	0.21
(Grade 3 & 4) Ti-O_2 intolerance	41	8.47
Total	484	100.0

reduced in these cases during the healing phase.

As long as the CHAMPIONS (R)Evolution system was placed at least 1–2 mm in a subcrestal position (with a gingival height of e.g. 2 mm), there were almost no osseointegration failures of the implants during the healing phase of 2–4 months.

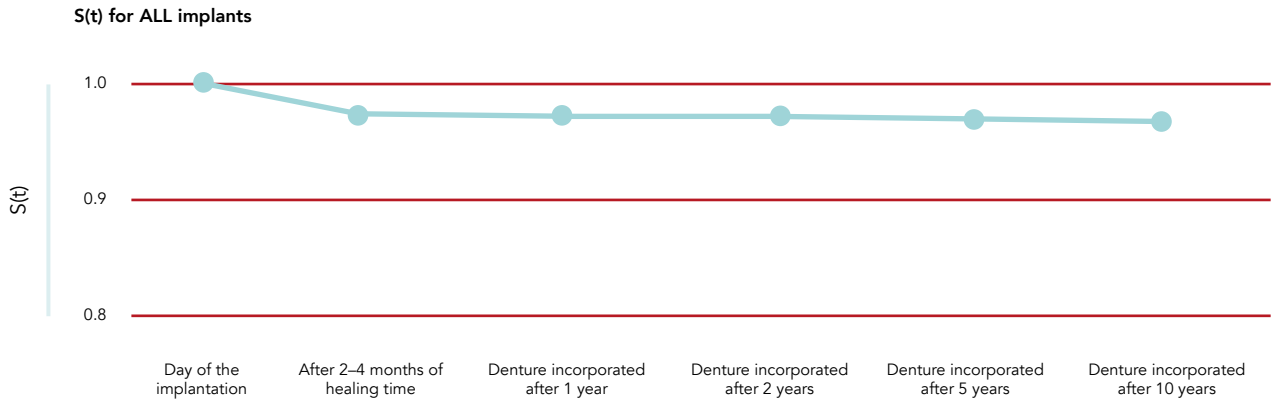
The dogma "Implants should be as long and wide in diameter as possible", which was propagated at the beginning of the history of Implantology, has been impressively refuted (also by preliminary investigations by Prof. Dr. Jean-Pierre Bernard, University of Geneva/Switzerland).

- It has been preferable to place an 8 mm long implant, correctly placed in the ideal prosthodontic position (the old rule of always placing a 4.0 mm diameter implant for a single molar has been observed) rather than a longer implant placed as close as possible to the inferior alveolar nerve. There were no statistical differences in implant failures related to implant lengths of 8, 10, 12 and 14 mm for the same diameters and maintenance of adequate primary stability.

Surprisingly, there were no increased complications or failures in case of an immediate implantation (extraction and implantation only in one treatment session → MIMI 0) compared to a delayed implantation (MIMI I): Of a total of 595 immediate implants (4.3 % of all implantations), only 13 implants failed. This corresponds to a failure rate of only 2.18 % compared to a total of 3.5 % (or 2.4 % "corrected"). This is probably due to the good surgical protocol with the help of the Condensers, the periosteum preserving surgery concept, and the bone condensing design of the CHAMPIONS (R)Evolution system:

- Bone-preserving cavity preparation using Conical Triangular Drills and Condensers.
- Palatal/ lingual axis inclination to protect the buccal bone wall with fully intact periosteum
- Achieving at least 40 Ncm primary stability only through the spongy bone
- No buccal pressure on the buccal bone lamella

MIMI, the Minimally Invasive Implantation Method, has become commonplace in the surgical and prosthodontic dental practice, meeting patients' needs. Dental Implantology has been revolutionized by the MIMI procedure for over 25 years: mucogingival flap detachment, including periosteal detachments, and reopenings in the prosthodontic phase with multiple manipulations inside the implant are not only time-consuming and unnecessary, but also the main reasons for iatrogenic peri-implantitis and subsequent complications. The main advantage of MIMI, however, is that it is time-saving and efficient so that dental implantations can be performed effortlessly every day (and also "spontaneously" such as an immediate implantation). Thus, Implantology has become a completely demystified regular discipline in a regular dental office.



Summary

The aim of this clinical, retrospective study was to investigate the long-term survival rate and success rate of the CHAMPIONS (R)Evolution implant system and to calculate the statistical long-term survival probability and the success probability as well as to compare them with each other and with data of previous studies. This should help both the practitioner and the patient in making treatment decisions by ensuring the greatest possible safety regarding the predictability of the long-term success of this implant system.

In this study, 4,192 patients received a total of 13,834 CHAMPIONS (R)Evolution implants within 10 years, from September 2011 to September 2021.

Data were collected concerning age, gender, date of the implant placement, and the clinical examination, augmentations performed with the augmentation material used, time between tooth loss and implant placement, the subsequent prosthodontic restoration and the presence of risk factors for implant success.

The percussion sound of the implant, the loosening degree, the sulcus probing depths, and recessions in 4 areas were clinically studied. Bleeding On Probing as well as signs of inflammation of the peri-implant mucous membranes were documented.

Regular X-rays were taken to evaluate bone loss.

Patient satisfaction and the psychosocial aspect of implant care were assessed with a questionnaire. The data obtained were statistically evaluated using Cox regression analysis, and survival probabilities were determined according to the Kaplan-Meier method.

After an average of 6 years, 96.5 % of the implants inserted in the minimally invasive MIMI procedure were still functioning, and the success rate according to the extended criteria of Albrektsson was 92.5 %.

The main cause of implant failure was failed healing in 67 % of the cases in the first 12 weeks post implantation, which, however, could be statistically reduced to only 20 % by the "Erni test" ("re-tightening of the implant" in the 3rd/4th week from 2011–2016) and by the introduction of the two additional Hybrid Screws Georgi (GH 1.5 – GH 2.5) in 2017 for equigingival healing.

There were 31.82 % of inflammatory processes leading to implant failure.

Thus, the minimally invasive implantation method (MIMI) with its periosteum-preserving procedure is a very efficient surgical technique, which fully ensures bone nourishment even for years.

Nicotine abuse and chronic periodontitis had a statistically significant influence on the survival probability.

Augmentations in the course of MIMI II (horizontal distraction) and MIMI VI (Internal Direct Sinus Lift), the implant length, and the implant diameter had no influence on implant failure, as long as the given parameters for implant placement were taken into account (primary stability and protection against lateral micromovements).

The CHAMPIONS (R)Evolution implant system can be considered as safe therapy alternative to bridges or conventionally retained dentures.

It can also be safely assumed that the failure rates are better with limited indications than with implantation in the full range of possibilities. In addition, the anamnestic patient selection seems to play a role, also with the MIMI procedure, in particular with immediate implantation (MIMI 0) and MIMI II / MMI VI.

Thus, it also seems justified to state that inexperienced people can achieve good results. The failure rates at the beginning of implantological activity can be almost equally low with the CHAMPIONS (R)Evolution with previous (online and practical) training. Once you get familiar with the field of Implantology and the MIMI procedure, the failure rate will be as low as for experienced users.

A difference between the indication classes has not been observed.

Also, a horizontal distraction (MIMI II) or IDS (Internal Direct Sinus Lift) did not play a role in the implant failure, although there was still a trend in favor of implants in the local bone.

Implants were equally successfully placed and restored with dentures in the maxilla or in the mandible ($p = 0.0001$).

There is a 96.5 % probability that an implant is still incorporated after 10 years if the implant is placed in an equicrestal position. If necessary, the Shuttle must be exchanged for one of the 3 Hybrid Screws Georgi in order to close it at least in an equigingival position, if not then even in a slightly subgingival position. With this procedure, the "5-year study" of 2016 showed a survival probability of 97.6 %.

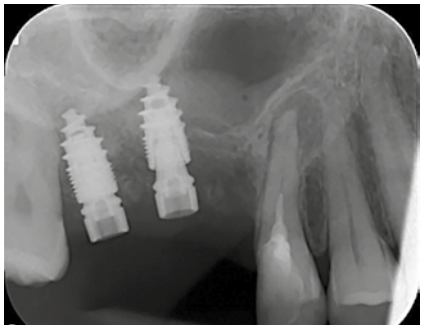
The innovation of the CHAMPIONS (R)Evolution design with crestal microthread and the inner double cone of 9.5°, the surface finishing through Al_2O_3 radiation and triple etching of the implant surfaces, which has remained unchanged since 2011, the so far unique innovation of the Shuttle, which is attached to the actual implant with a Screw with 10 Ncm, and last but not least the cost-effectiveness for end customers are certainly reasons for the success of the system in Europe.

The sustainability of CHAMPIONS (R)Evolution has been scientifically proven in this 10-year study.

Meanwhile, the CHAMPIONS (R)Evolution system is a tried and tested, fully developed implant system, which is completely convincing in surgery (also thanks to the non-traumatic and patient-friendly minimally invasive insertion), and in Prosthodontics (e. g. only one prosthetic platform for all implant diameters) and in its optimized workflow.

X-rays of case series with the CHAMPIONS (R)Evolution implant system

Case 1: Implantation sites 16 + 17 (with sinus lift 16)



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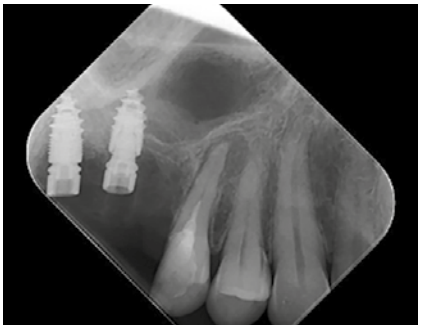

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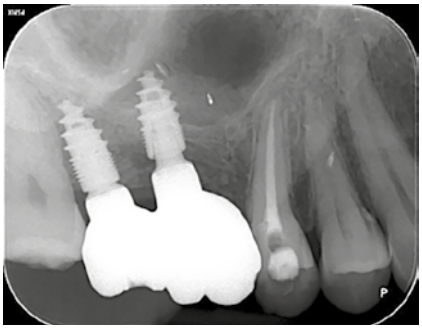

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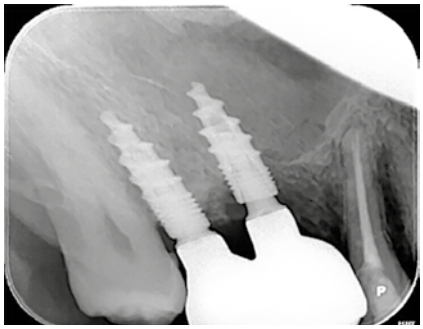

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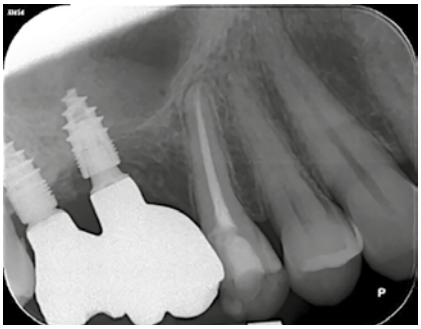
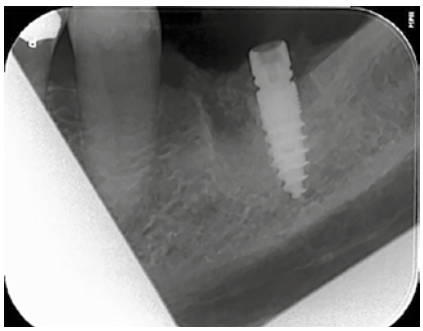


18.10.2021

Case 2: Implantation site 36



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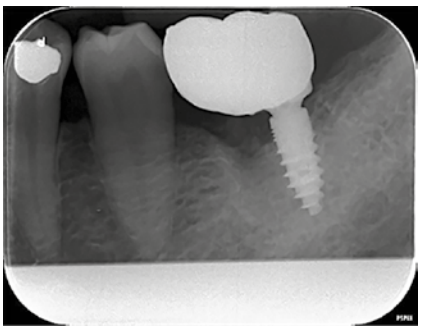

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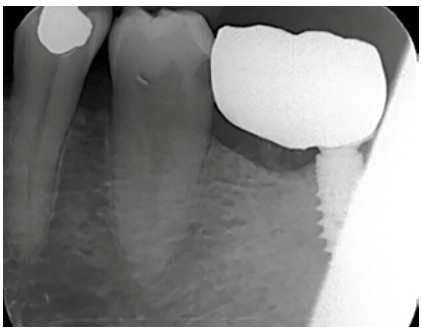
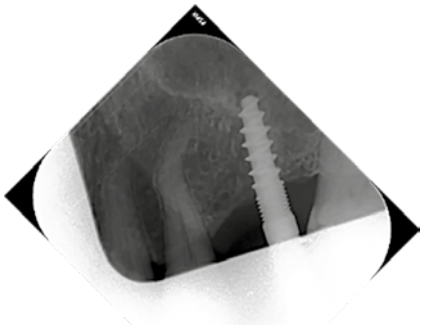


05.03.2021

Case 3: Implantation in site 26 with simultaneous IDS sinus lift surgery



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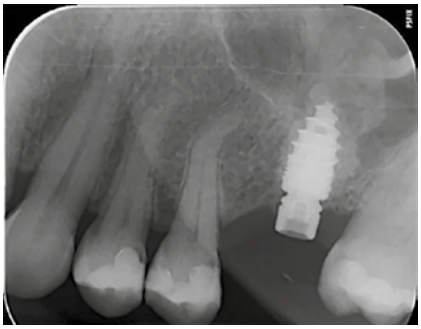

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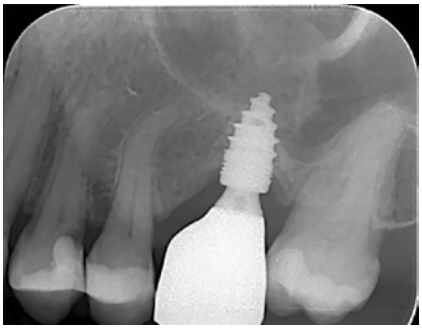
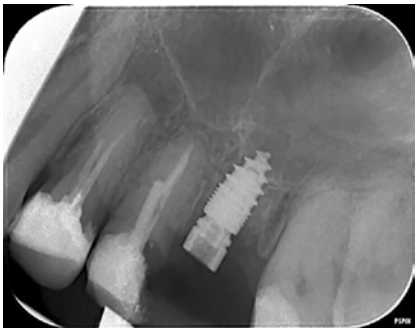


22.03.2021

Case 4: immediate implantation in site 26 with simultaneous augmentation



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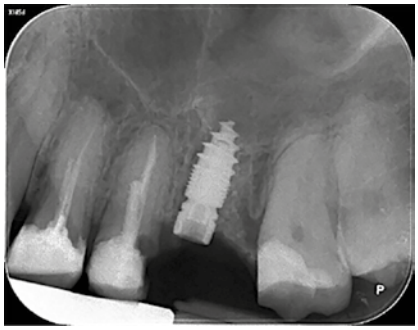

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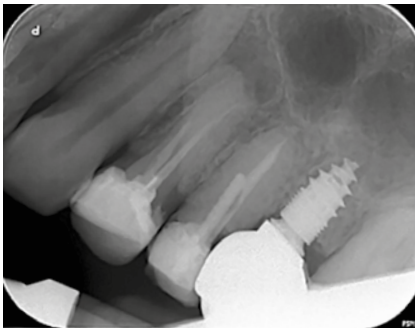
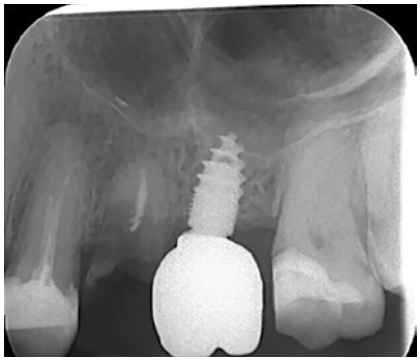


24.01.2013

Case 5: immediate implantation site 25 (same patient as Case 4)



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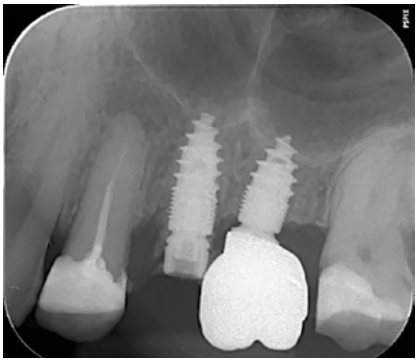

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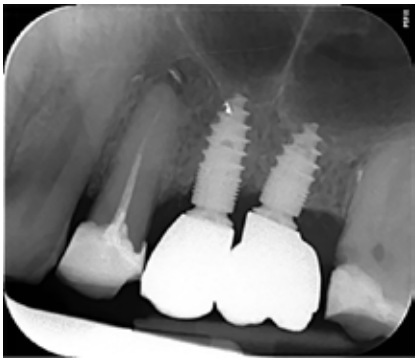
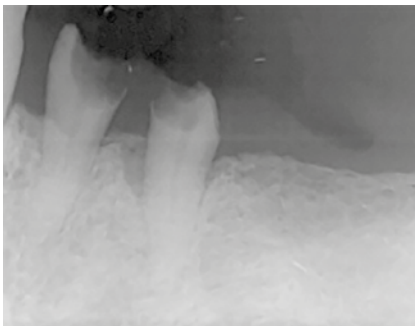


28.08.2018

Case 6: immediate implantation sites 34 + 36



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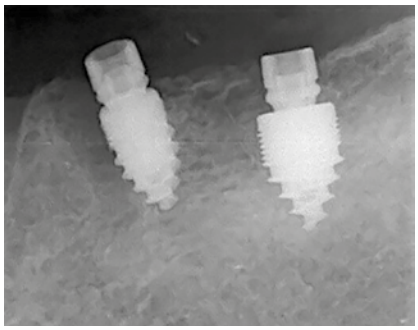

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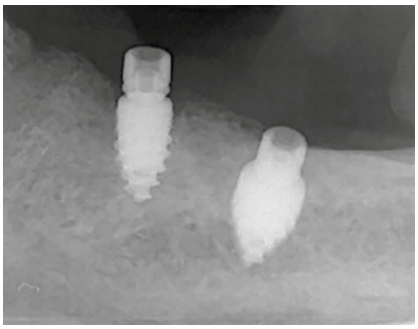

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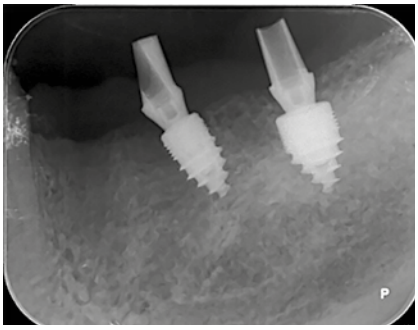
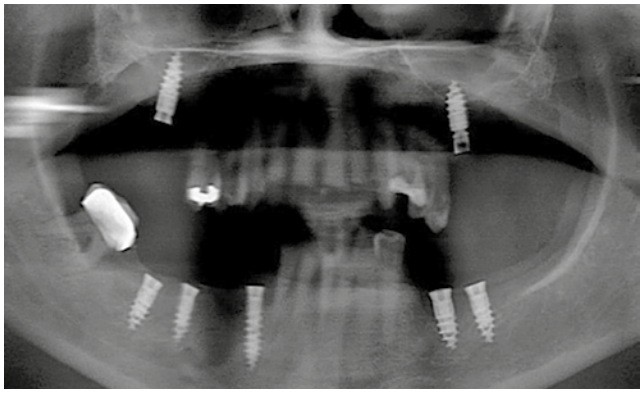


14.12.2021

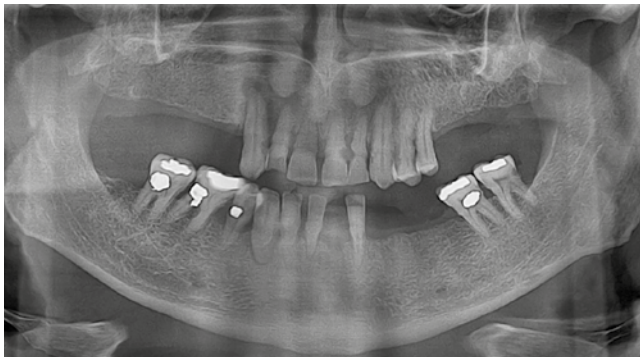
Case 7: immediate implantation 17 +
27 + 36 + 35 + 44–47



12.05.2015

09.08.2021

Case 8: Implantations 17, 15, 13, 11,
21, 25, 25, 35, 33, 32, 42, 43, 46



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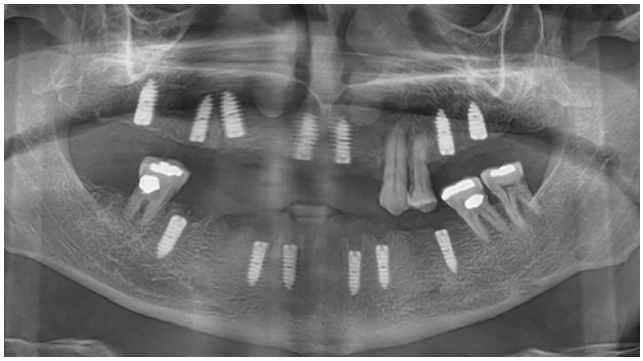

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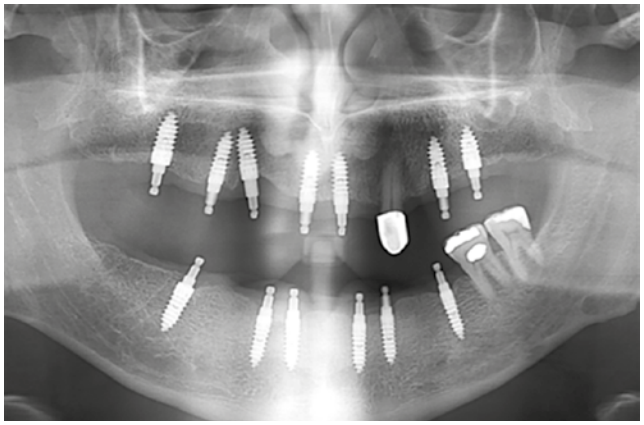
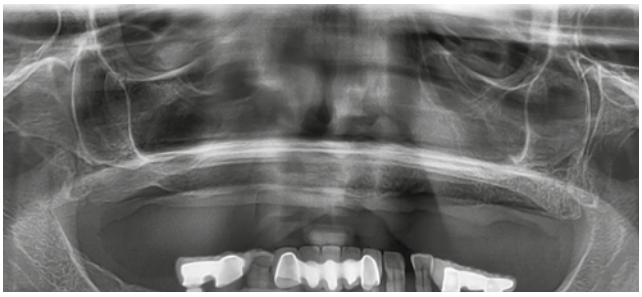


27.08.2021

Case 9: late implantation in the maxilla in sites 15–25



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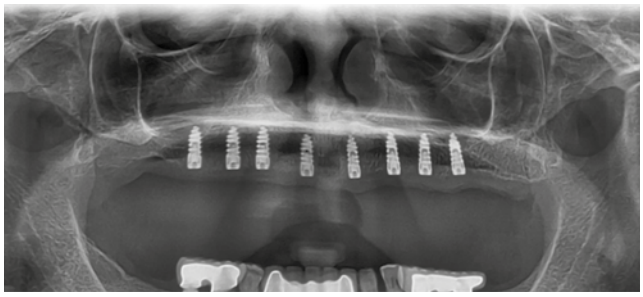

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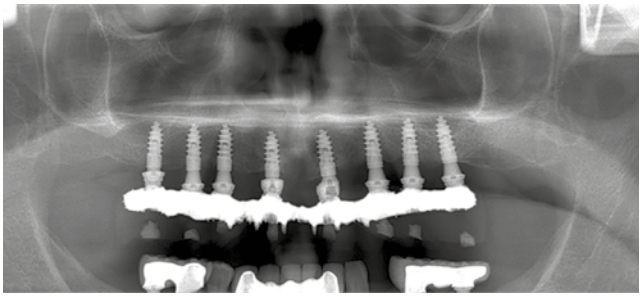

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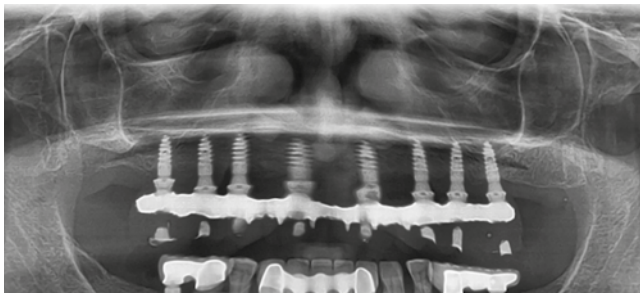
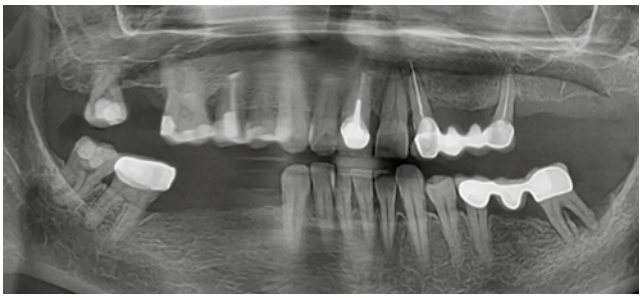


24.04.2020

Case 10: Implantations sites 17, 22, 24 + 26 as well as 36, 44 + 46



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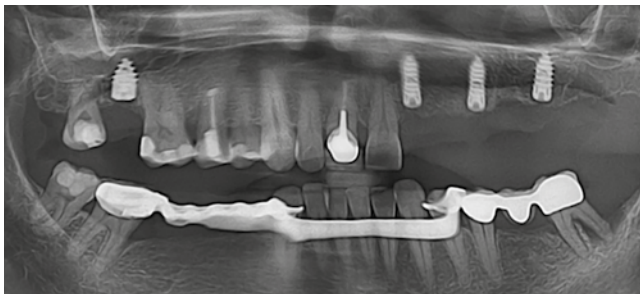

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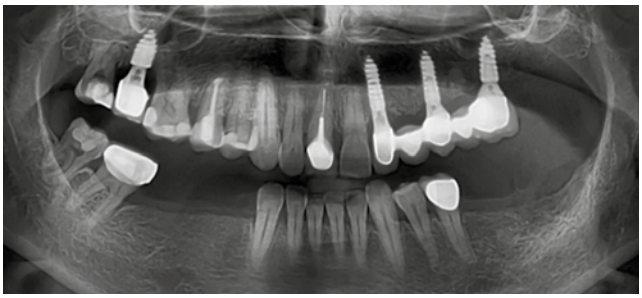

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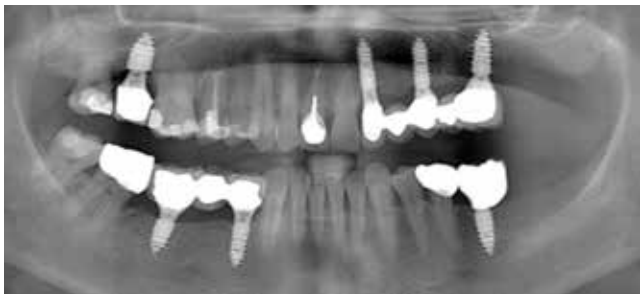
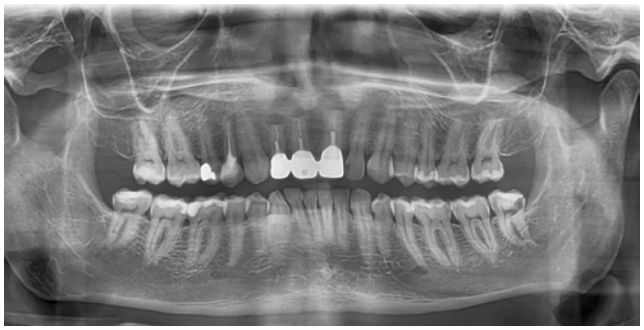


20.11.2020

Case 11: immediate implantation
12 + 21



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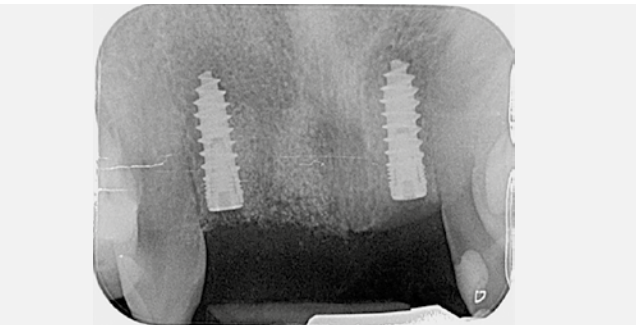

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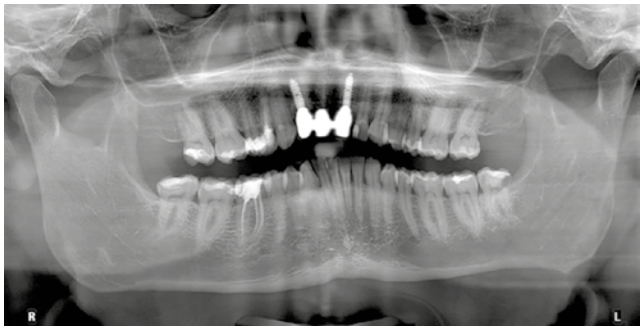

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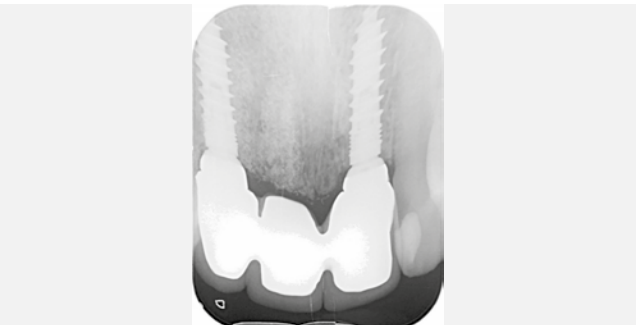

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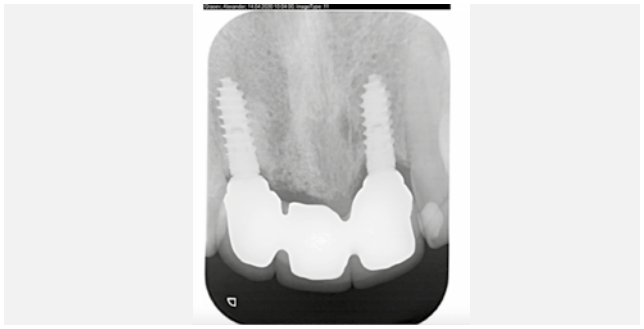
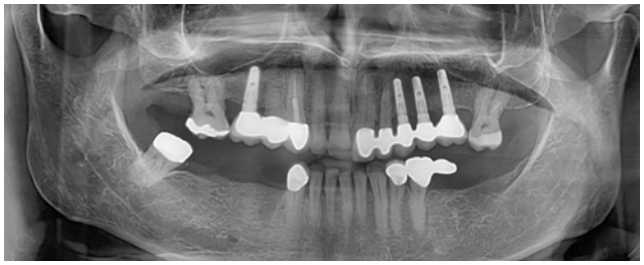


17.04.2020

Case 12: Implantations 35, 36, 44–46



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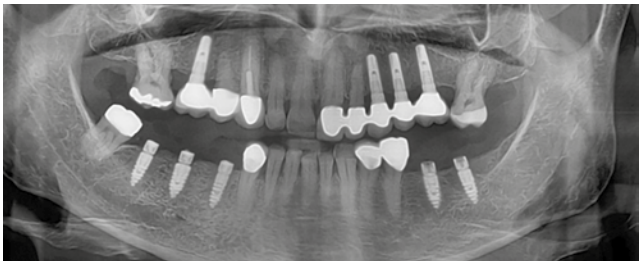

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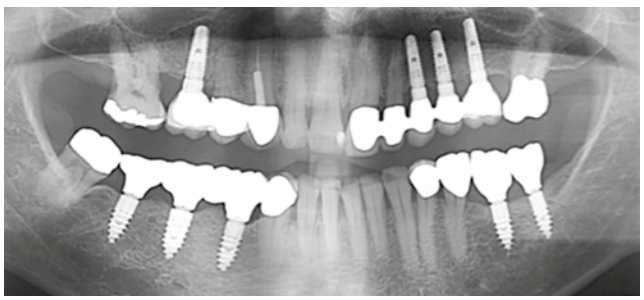

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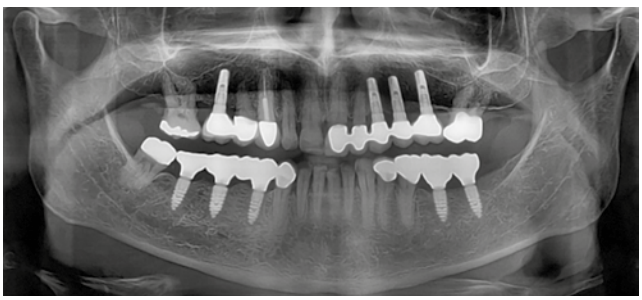

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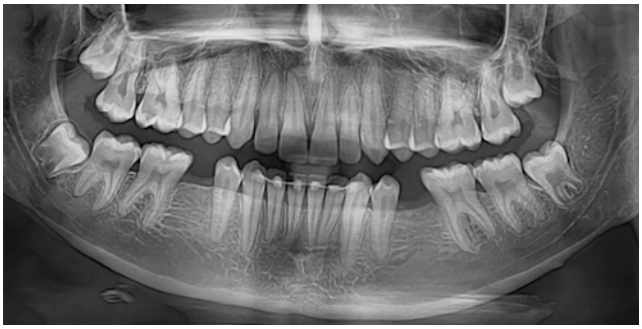
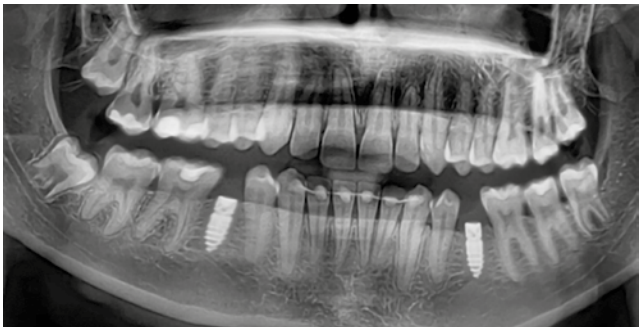
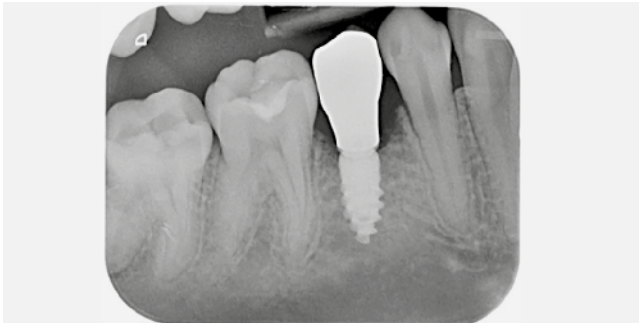
Case 13: Implantation 35 + 45



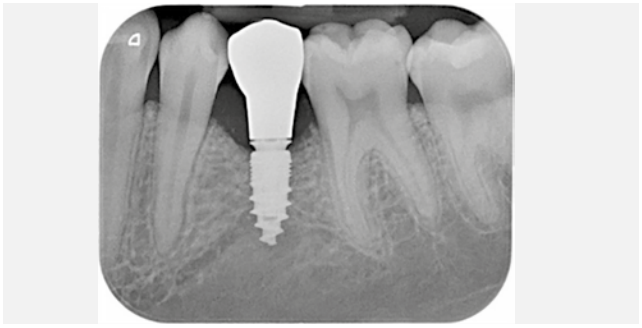
08.11.2011



10.02.2012



15.09.2017



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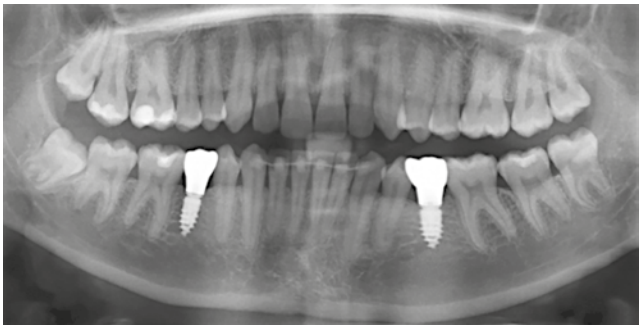
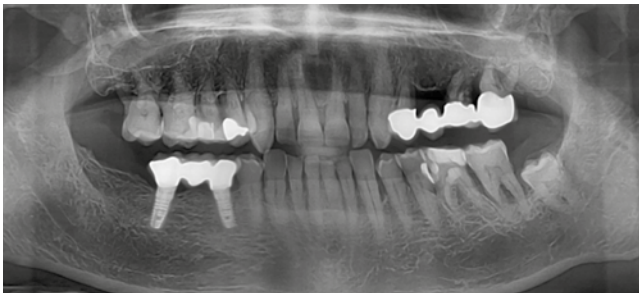


18.06.2021

Case 14: delayed immediate implantation 24, 26, 27 + 36, 35



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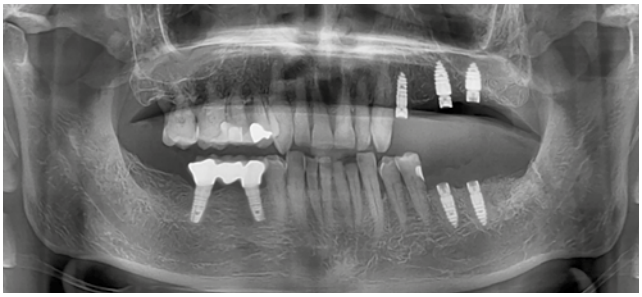

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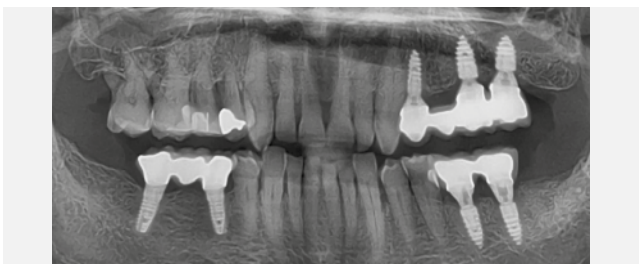
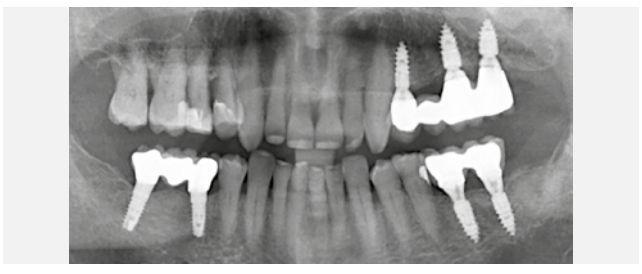
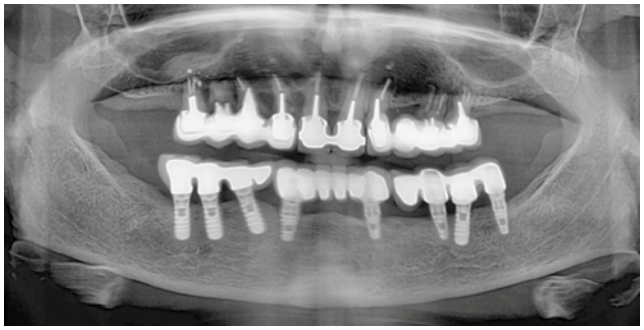


22.03.2019



15.09.2021

Case 15: implantations 15, 13, 11,
21, 23, 25 for "All-On-6" concept



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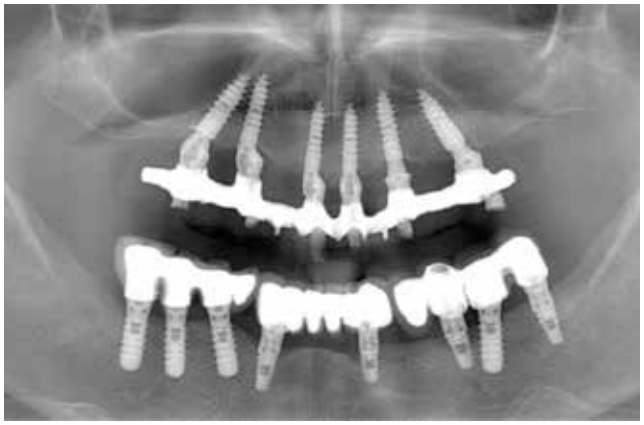
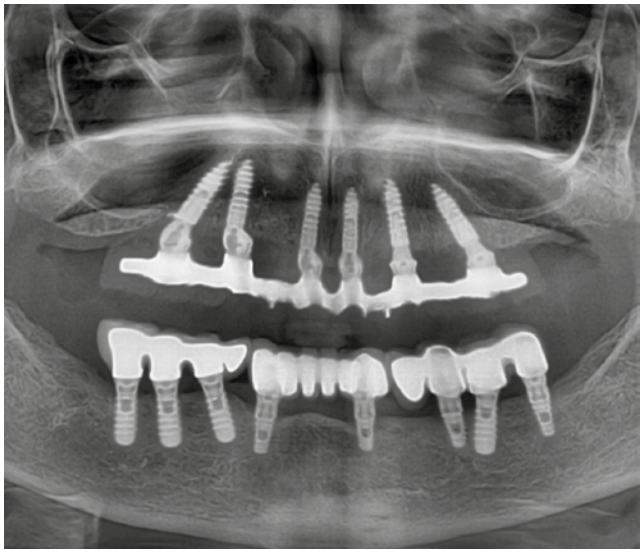
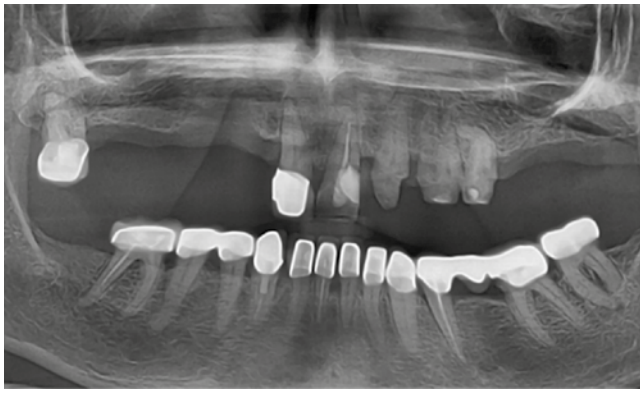


11.03.2021



11.02.2018

Case 16: Implantations 16, 15, 13,
11, 21, 25, 26



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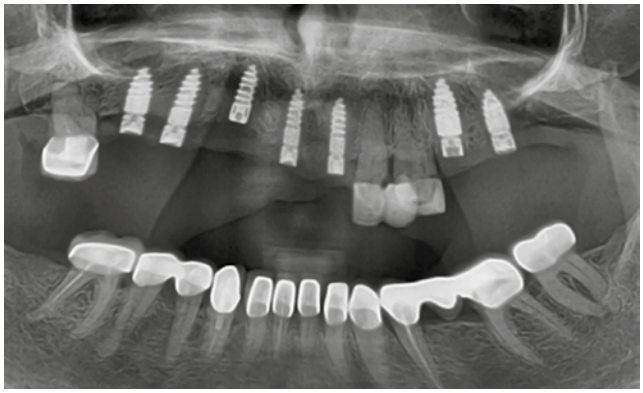

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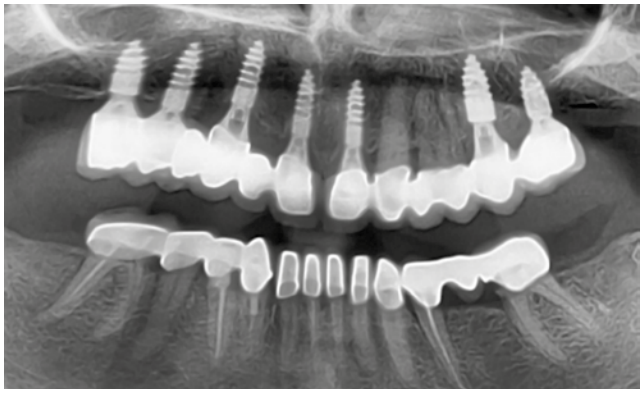

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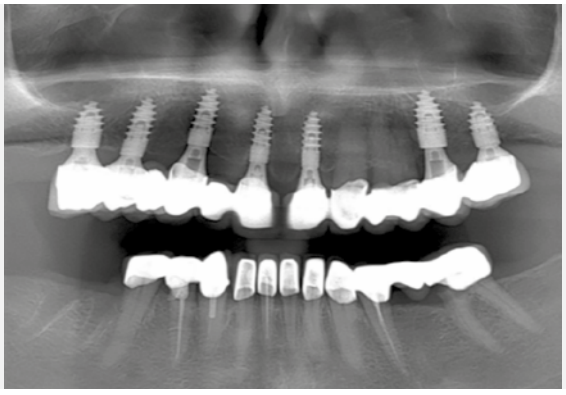
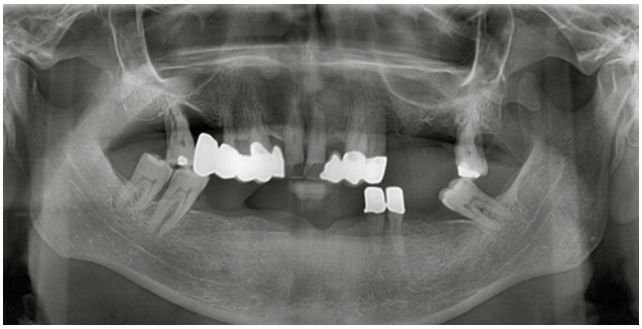


10.03.2021

Case 17: implantations 17, 15, 24,
25, 27, 32, 43, 45



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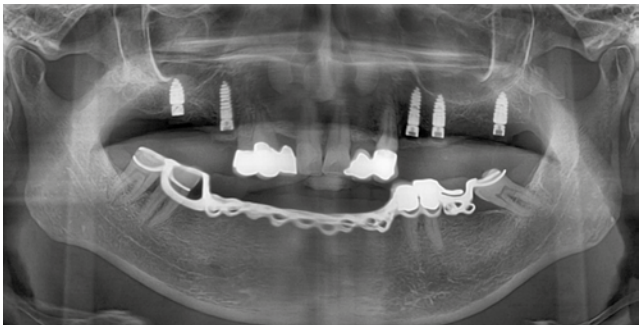

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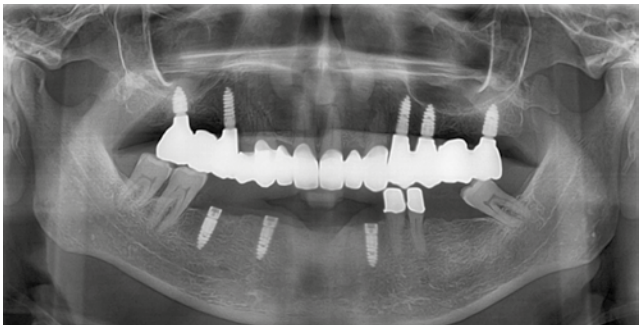

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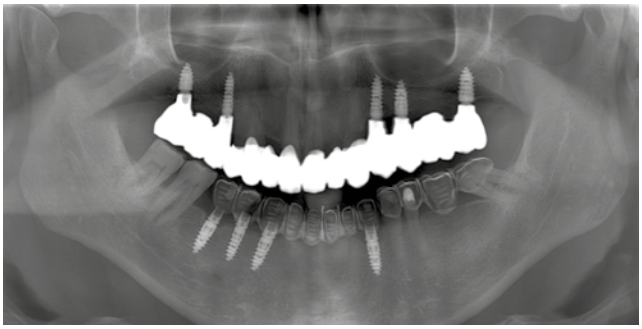

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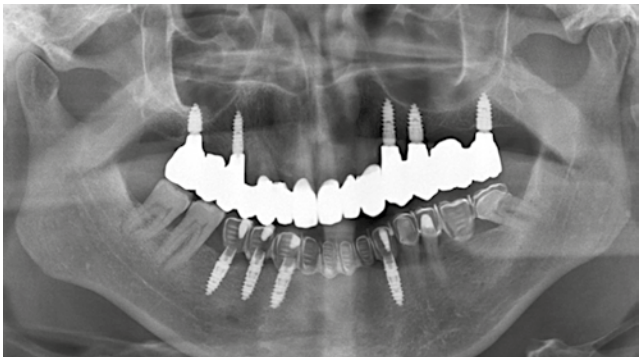

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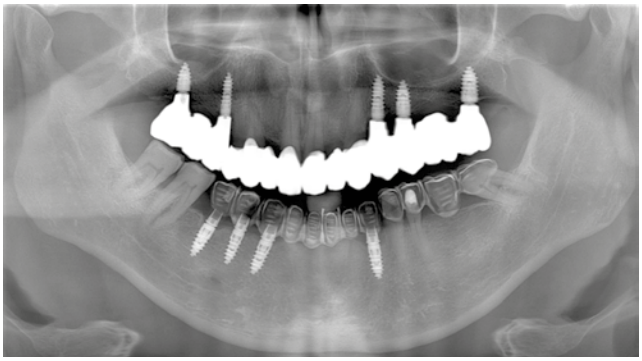
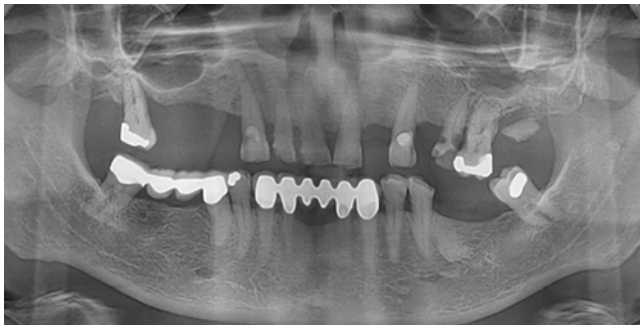


19.03.2021

Case 18: implantations 17, 15, 14, 26 + 45, 46, 47



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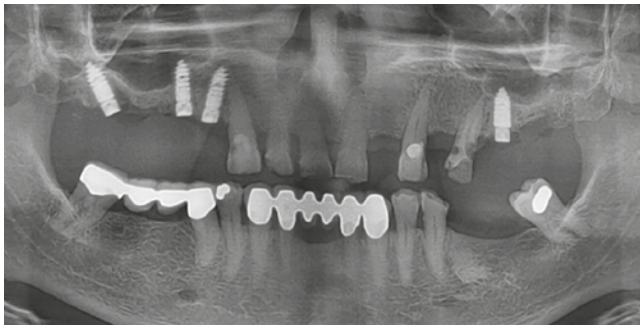

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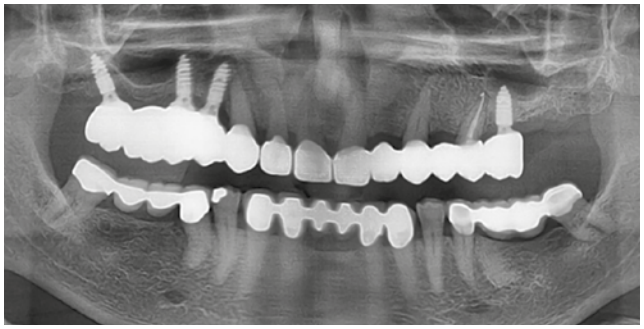

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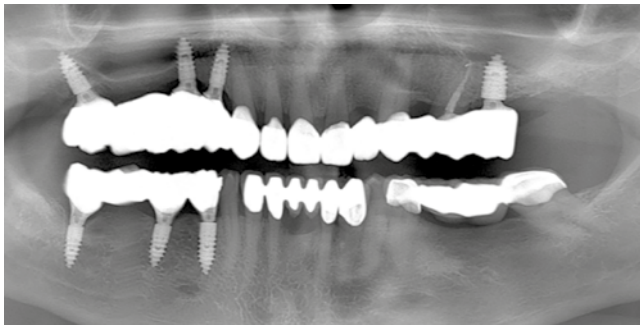
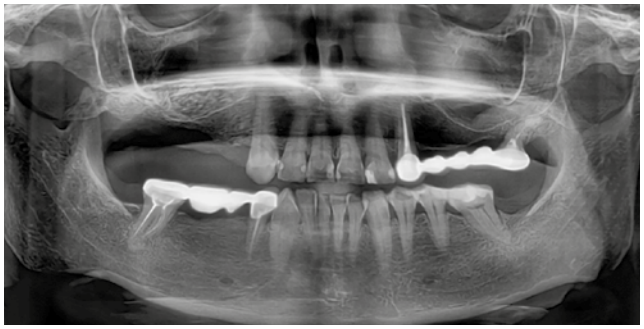


18.08.2021

Case 19: implantations 16, 15, 14 + immediate implantations 23, 24, 25, 27



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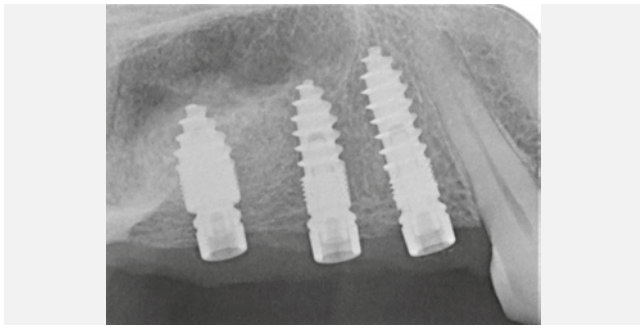

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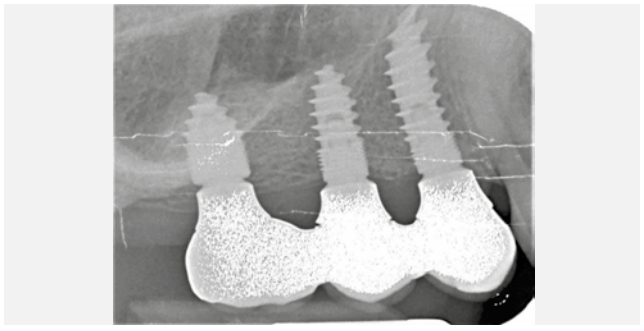

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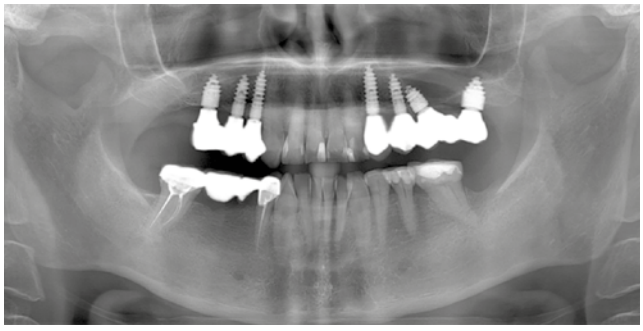
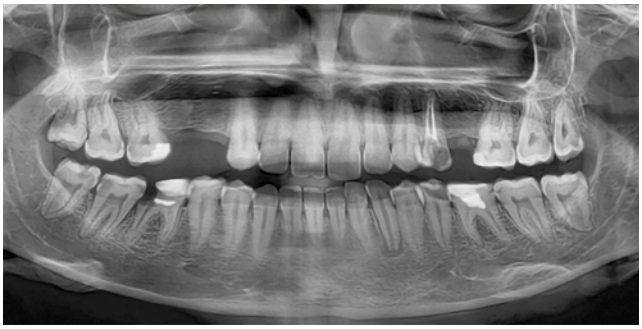


20.10.2020

Case 20: implantations 15, 14, 25



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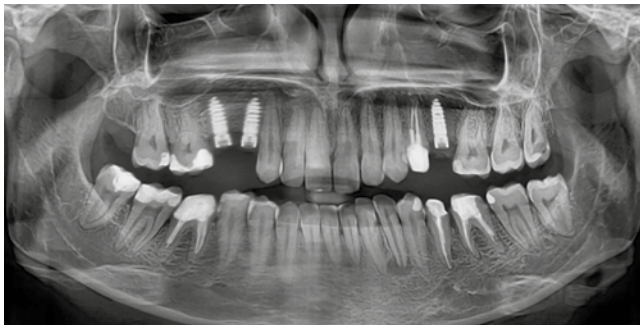

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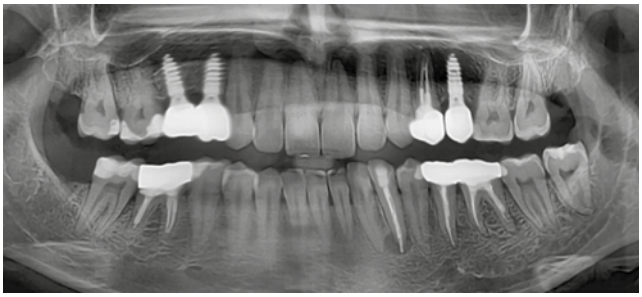
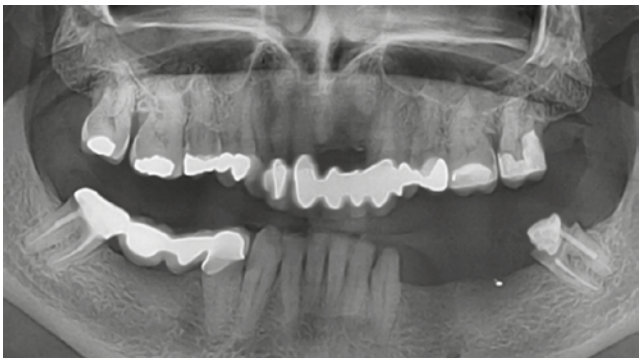


12.12.2016

Case 21: Implantations 34, 36, 37



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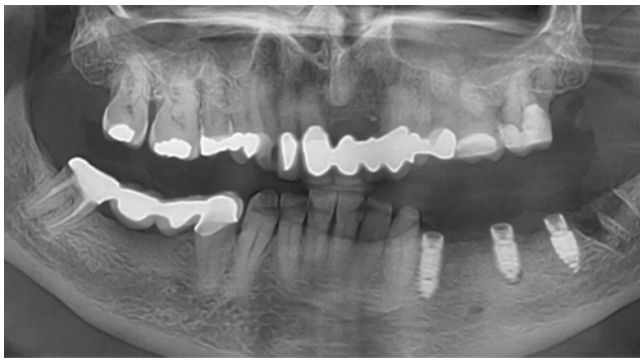

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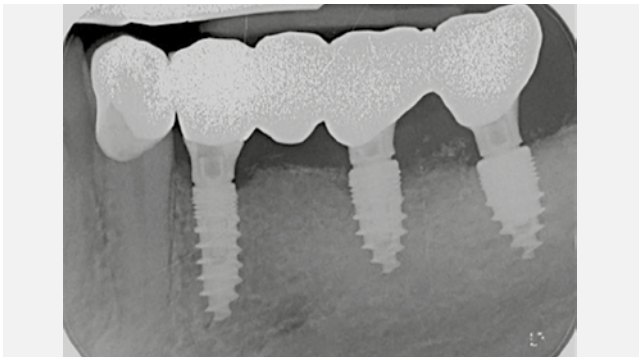
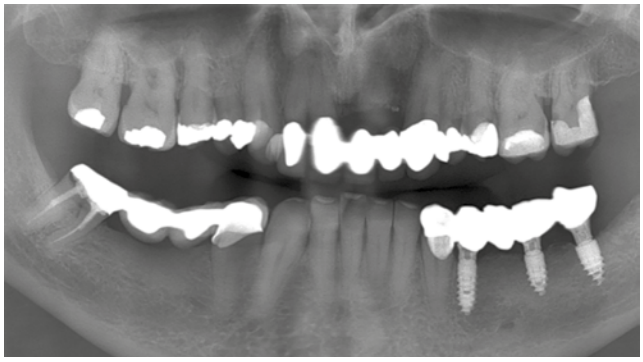
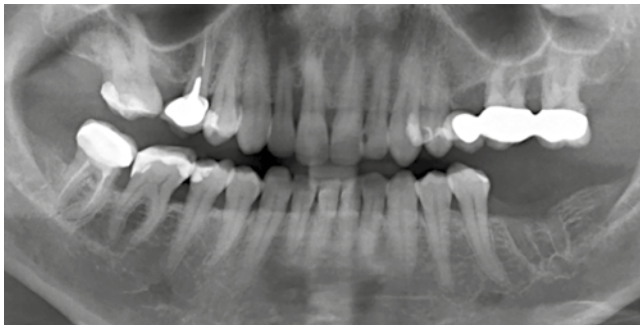


07.11.2017



08.06.2021

Case 22: implantations 25, 26, 27, 37, 36



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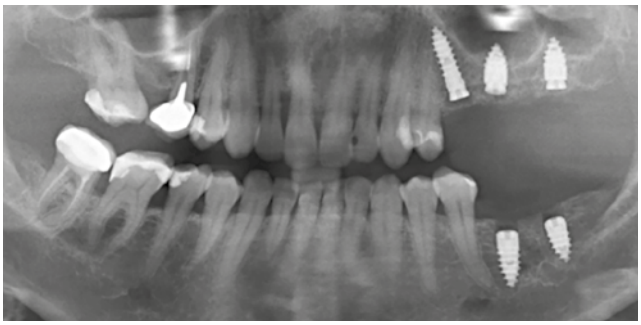

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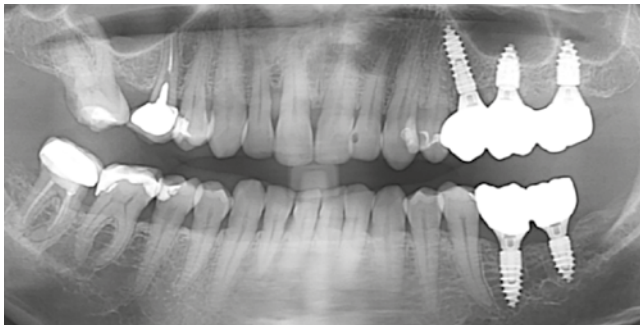

15.09.2021

Literature

1 Adell R, Lekholm U, Röckler B, Brånemark PI. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. Int J Oral Surg 1981; 10:387–416.

2 Agrawal KK, Rao J, Anwar M, Singh K, Himanshu D. Flapless vs flapped implant insertion in patients with controlled type 2 diabetes subjected to delayed loading: 1-year follow-up results from a randomised controlled trial. Eur J Oral Implantol. 2017; 10(4): 403-413. PMID: 29234747

3 Albrektsson T, Zarb G, Worthington P, Eriksson RA (1986). The long-term efficacy of currently used dental implants: A review and proposed criteria of success. Int J Oral Maxillofac Impl 1(11).

4 Albrektsson T, Dahl E, Enbom L, Engeval S, Engquist B, Anders RE, Feldmann G, Freiberg N, Glantz P-O, Kjellmann G, Kristersson L, Kvint S, Köndell P-A, Palmquist J, Werndahl L, Astrand P (1988). Osseointegrated oral implants. J Periodontal 59(287–96). Anderson JD (1998). The need for criteria on reporting treatment outcomes. J Prosthet Dent 79(1):49–55.

5 Al-Juboori MJ, AbdulRahaman SB. The Effect of Flapless and Full-thickness Flap Techniques on Implant Stability During the Healing Period. Open Dent J. 2015 Jul 31; 9:243-9. doi: 10. 2174/1874210601509010243. eCollection 2015. PMID: 26312095

6 Al-Juboori MJ, bin Abdulrahaman S, Subramaniam R, Tawfiq OF. Less morbidity with flapless implant. Dent Implantol Update. 2012 Apr; 23 (4): 25-30. TSV

7 Al-Juboori MJ. Flap Designs for Implant-Related Surgical Procedures: A Review. Implant Dent. 2016 Dec; 25(6): 845-854. Review. PMID: 27540840

8 Al-Juboori MJ, Ab Rahman S, Hassan A, Bin Ismail IH, Tawfiq OF. What is the effect of initial implant position on the crestal bone level in flap and flapless technique during healing period?: J Periodontal Implant Sci. 2013 Aug; 43(4): 153-9. doi: 10. 5051/jpis. 2013. 43. 4. 153. Epub 2013 Aug 31

9 Albiero AM, Benato R, Benato A, Degidi M. Use of Intraoral Welding to Increase the Predictability of Immediately Loaded Computer-Guided Implants. Int J Periodontics Restorative Dent. 2017 Jul/Aug; 37(4): 591-598. doi: 10. 11607/ prd. 3027. PMID: 28609507

10 Albiero AM, Benato R, Degidi M. Buccal plate regeneration with immediate postextraction implant placement and restoration: case reports. Int J Periodontics Restorative Dent. 2014 Jul-Aug; 34(4): e67-72. doi: 10. 11607/prd. 2025. PMID: 25006776

11 Albiero AM, Benato R, Fincato A. Immediately Loaded Intraorally Welded Complete-Arch Maxillary Provisional Prosthesis. Int J Periodontics Restorative Dent. 2015 Sep-Oct; 35(5): 725-31. doi: 10. 11607/prd. 2293. PMID: 26357702

12 Albiero AM, Benato R. Computer-assisted surgery and intraoral welding technique for immediate implant-supported rehabilitation of the edentulous maxilla: case report and technical description. Int J Med Robot. 2016 Sep; 12(3): 453-60. doi: 10. 1002/rcs. 1715. Epub 2015 Nov 4. PMID: 26537291

13 Albrektsson T, Wennerberg A. Reasons for failures of oral implants. J Oral Rehabil. 2014 Jun; 41(6):443–76. doi: 10.1111/ joor.12157. Epub 2014 Mar 11.

14 Albrektsson T, Isidor F. Consensus report of session IV. In: Lang NP, Karring T (eds). Proceedings of the First European Workshop on Periodontology. London: Quintessenz, 1994: 365–369

15 Altinci P, Can G, Gunes O, Ozturk C, Eren H. Stability and Marginal Bone Level Changes of SLActive Titanium-Zirconium Implants Placed with Flapless Surgery: A Prospective Pilot Study. Clin Implant Dent Relat Res. 2016 Dec; 18(6): 1193-1199. doi: 10. 1111/cid. 12392. Epub 2016 Feb 14. PMID: 26874460

16 Anderson L, Meraw S, Al-Hezaimi K, Wang HL. The influence of radiation therapy on dental implantology. Implant Dent. 2013 Feb;22(1):31–8. doi: 10.1097/ ID.0b013e31827e84ee.

17 Andreasi Bassi M, Andrisani C, Lico S, Silvestre F, Gargari M, Arcuri C. Increasing volume of vestibular soft tissues in flapless implant surgery through a modified connective punch technique: a controlled clinical trial. Oral Implantol (Rome). 2016 Nov 13; 9(3): 143-150. doi: 10. 11138/orl/2016. 9. 3. 143. eCollection 2016 Jul-Sep. PMID: 28042442

18 Andreasi Bassi M, Andrisani C, Lopez MA, Gaudio RM, Lombardo L, Lauritano D. Modified connective tissue punch technique to increase the vestibular/buccal keratinized tissue on flapless implant surgery: a case series. J Biol Regul Homeost Agents. 2016 Apr-Jun; 30(2 Suppl 1): 29-34. PMID: 27469545

19 Anitua E, Orive G, Aguirre JJ, Ardanza B, Andía I. 5-year clinical experience with BTI dental implants: risk factors for implant failure. J Clin Periodontol. 2008 Aug; 35(8):724–32. doi: 10.1111/j.1600-051X.2008.01248.x. Epub 2008 Jul 8.

20 Anner R, Grossmann Y, Anner Y, Levin L. : Smoking, diabetes mellitus, periodontitis, and supportive periodontal treatment as factors associated with dental implant survival: a long-term retrospective evaluation of patients followed for up to 10 years. Implant Dent. 2010 Feb; 19(1):57–64. doi: 10.1097/ID.0b013e3181bb8f6c

21 Arora H, Ivanovski S. Correlation between pre-operative buccal bone thickness and soft tissue changes around immediately placed and restored implants in the maxillary anterior region: A 2-year prospective study. Clin Oral Implants Res. 2017 Oct; 28(10): 1188-1194. doi: 10. 1111/clr. 12939. Epub 2016 Jul 29. PMID: 27469422

22 Arora H, Khzam N, Roberts D, Bruce WL, Ivanovski S. Immediate implant placement and restoration in the anterior maxilla: Tissue dimensional changes after 2-5 year follow up. Clin Implant Dent Relat Res. 2017 Aug; 19(4): 694-702. doi: 10. 1111/cid. 12487. Epub 2017 Apr 21. PMID: 28429394

23 Assaf JH, Assaf DD, Antoniazzi RP, Osório LB, França FM. Correction of Buccal Dehiscence During Immediate Implant Placement Using the Flapless Technique: A Tomographic Evaluation. J Periodontol. 2017 Feb; 88(2): 173-180. doi: 10. 1902/jop. 2016. 160276. Epub 2016 Sep 13. PMID: 27620655

24 Balshi TJ, Hernandez RE, Pryszlak MC, Rangert B (1996). A comparative study of one implant versus two replacing a single molar. Int J Oral Maxillofac Implants 11(3):372–8.

25 Barone A, Toti P, Quaranta A, Derchi G, Covani U. The Clinical Outcomes of Immediate Versus Delayed Restoration Procedures on Immediate Implants: A Comparative Cohort Study for Single-Tooth Replacement. Clin Implant Dent Relat Res. 2015 Dec; 17(6): 1114-26. doi: 10. 1111/cid. 12225. Epub 2014 May 22. PMID: 24852761

26 Barone A, Toti P, Piattelli A, Iezzi G, Derchi G, Covani U. Extraction socket healing in humans after ridge preservation techniques: comparison between flapless and flapped procedures in a randomized clinical trial; J Periodontol. 2014 Jan; 85(1): 14-23. doi: 10. 1902/jop. 2013. 120711. Epub 2013 May 20.

27 Barros Vde M, Costa NR, Martins PH, Vasconcellos WA, Discacciati JA, Moreira AN1. Definitive Presurgical CAD/CAM-Guided Implant-Supported Crown in an Esthetic Area. Braz Dent J. 2015 Nov-Dec; 26(6): 695-700. doi: 10. 1590/0103-6440201300437. PMID: 26963219

28 Baruffaldi A, Poli PP, Baruffaldi A, Giberti L, Pigozzo M, Maiorana C. Computer-aided flapless implant surgery and immediate loading. A technical note. Oral Maxillofac Surg. 2016 Sep; 20(3): 313-9. doi: 10. 1007/s10006-016-0554-5. Epub 2016 Apr 5. PMID: 27044419

29 Bashutski JD, Wang HL, Rudek I, Moreno I, Koticha T, Oh TJ. Effect of flapless surgery on single-tooth implants in the esthetic zone: a randomized clinical trial; J Periodontol. 2013 Dec; 84(12): 1747-54. doi: 10. 1902/jop. 2013. 120575. Epub 2013 Jan 24

30 Behneke A1, Behneke N, d'Hoedt B. A 5-year longitudinal study of the clinical effectiveness of ITI solid-screw implants in the treatment of mandibular edentulism.

31 Behneke A, Behneke N (1996). Recall und Nachsorge München, Wien, Balt imore: Urban & Schwarzenberg.

32 Behneke A, Behneke N, d'Hoedt B, Wagner W (1997). Hard and soft tissue reactions to ITI screw implants: 3-year longitudinal results of a prospective study. Int J Oral Maxillofac Implants 12(6):749–57.

33 Behneke A, Behneke N, d'Hoedt B, Wagner W (1998). Diabetes mellitus – ein Risikofaktor für enossale Implantate im zahnlosen Unterkiefer? Ergebnisse einer kontrollierten Studie über 5 Jahre. DZZ 5

34 Beretta M, Poli PP, Maiorana C. Accuracy of computer-aided template-guided oral implant placement: a prospective clinical study. J Periodontal Implant Sci. 2014 Aug; 44(4): 184-93. doi: 10. 5051/jpis. 2014. 44. 4. 184. Epub 2014 Aug 28. PMID: 25177520

35 Better H, Chaushu L, Nissan J, Xavier S, Talarico M, Chaushu G. The Feasibility of Flapless Approach to Sinus Augmentation Using an Implant Device Designed According to Residual Alveolar Ridge Height. Int J Periodontics Restorative Dent. 2017 Dec 18. doi: 10. 11607/prd. 2950. PMID: 29253040, prosdent. 2013. 09. 019. Epub 2013 Nov 25

36 Bidra AS. Flapless implant surgery to overcome anatomic challenges in the anterior mandible for overdenture therapy: a clinical report. J Prosthet Dent. 2014 Mar; 111(3): 175-80. doi: 10. 1016/j. prosdent. 2013. 09. 019. Epub 2013 Nov 25. PMID: 24286637

37 Blanchaert RH (1998). Implants in the medically challenged patient. Dent Clin North Am 42(1):35–45. (BMFG) BfG (1994). Maßnahmen der medizinischen Qualitätssicherung in der Bundesrepublick Deutschland. In: Schriftenreihe des BMFG. Baden-Baden: Nomos.

38 Block MS, Kent JN. Factors associated with soft- and hard-tissue compromise of endosseous implants. J Oral Maxillofac Surg 1990; 48:1153–1160.

39 Boardman N, Darby I, Chen S. A retrospective evaluation of aesthetic outcomes for single-tooth implants in the anterior maxilla. Clin Oral Implants Res. 2016 Apr; 27(4): 443-51. doi: 10. 1111/clr. 12593. Epub 2015 Mar 29. PMID: 25818351

40 Bornstein MM, Cionca N, Mombelli A. Systemic conditions and treatments as risks for implant therapy. Int J Oral Maxillofac Implants. 2009; 24 Suppl:12–27.

41 Boven GC, Meijer HJ, Vissink A, Raghoebar GM. Reconstruction of the extremely atrophied mandible with iliac crest onlay grafts followed by two endosteal implants: a retrospective study with long-term follow-up. Int J Oral Maxillofac Surg. 2014 Jan 8. pii: S0901-5027(13)01167-3. doi: 10.1016/j.ijom.2013.11.003. [Epub ahead of print]

42 Brägger U, Hugel-Pisoni C, Bürgin W, Buser D, Lang NP. Correlations between radiographic, clinical and mobility parameters after loading of oral implants with fixed partial dentures. A 2-year longitudinal study. Clin Oral Implants Res. 1996 Sep; 7(3):230–9

43 Brägger U, Karoussis I, Persson R, Pjetursson B, Salvi G, Lang N. Technical and biological complications/failures with single crowns and fixed partial dentures on implants: a 10-year prospective cohort study. Clin Oral Implants Res. 2005 Jun; 16(3):326–34.

44 Buser D, Mericske-Stern R, Bernard JP, Behneke A, Behneke N, Hirt HP, Belser UC, Lang NP. Long-term evaluation of non-submerged ITI implants. Part 1: 8-year life table analysis of a prospective multi-center study with 2359 implants. Clin Oral Implants Res. 1997 Jun; 8(3):161–72.

45 Bömicke W, Gabbert O, Koob A, Krisam J, Rammelsberg P. Comparison of immediately loaded flapless-placed one-piece implants and flapped-placed conventionally loaded two-piece implants, both fitted with all-ceramic single crowns, in the posterior mandible: 3-year results from a randomised controlled pilot trial. Eur J Oral Implantol. 2017; 10(2): 179-195. PMID: 28555208

46 Brånemark PI, Breine U, Adell R, Hansson BO, Lindstrom H, Ohlssen A (1969). Intraosseous Anchorage of Dental Prostheses. Scand J Plast Reconstr Surg 3(81).

47 Brånemark PI, Svensson B, van Steenberghe D (1995). Ten -year survival rates of fixed prostheses on four or six implants ad modum Branemark in full edentulism. Clin Oral Implants Res 6(4):227–31.

48 Brånemark PI, Hansson BO, Adell R, et al. Osseointegrated implants in the treatment of the edentulous jaw. Experience from a 10-year period. Scand J Plast Reconstr Surg Suppl 1977; 16:1–132.

49 Brignardello-Petersen R. Minimally invasive flapless approach results in less pain and better healing after implant placement compared with conventional surgery. J Am Dent Assoc. 2017 Apr; 148(4): e24. doi: 10. 1016/j. adaj. 2016. 12. 020. Epub 2017 Feb 16. No abstract available. PMID: 28215433

50 Brodala, Flapless Surgery and Its Effect on Dental Implant Outcomes, INT J ORAL MAXILLOFAC IMPLANTS 2009; 24(SUPPL):118–125

51 Browaeys H, Dierens M, Ruyffelaert C, Matthijs C, De Bruyn H, Vandeweghe S. Ongoing Crestal Bone Loss around Implants Subjected to Computer-Guided Flapless Surgery and Immediate Loading Using the All-on-4 Concept. Clin Implant Dent Relat Res. 2015 Oct; 17(5): 831-43. doi: 10. 1111/ cid. 12197. Epub 2014 Jan 8. PMID: 24397413

52 Brugnami F, Caiazzo A, Mehra P. Piezosurgery-assisted, flapless split crest surgery for implant site preparation. J Maxillofac Oral Surg. 2014 Mar; 13(1): 67-72. doi: 10. 1007/s12663-012-0377-3. Epub 2012 May 16. PMID: 24644400

53 Buser D, Weber HP, Lang NP. Tissue integration of non-submerged implants. 1-year results of a prospective study with 100 ITI hollow-cylinder and hollow-screw implants. Clin Oral Implants Res 1990; 1:33–40.

54 Buser, D. et al. Long-term evaluation of non-submerged ITI implants. Part 1: 8- year life table analysis of a prospective multi-center study with 2359 implants. Clin Oral Implants Res 1997;8:161-172.

55 Cakarer S1, Selvi F, Can T, Kirli I, Palancioglu A, Keskin B, Yaltirik M, Keskin C. Investigation of the risk factors associated with the survival rate of dental implants. Implant Dent. 2014 Jun; 23(3):328–33. doi: 10.1097/ ID.0000000000000079.

56 Campelo LD, Camara JR. Flapless implant surgery: A 10 – year clinical retrospective analysis. Int J Oral Maxillofac Implants 2002; 7: 271-276

57 Cannizzaro G, Felice P, Boveri M, Lazzarini M, Ferri V, Leone M, Esposito M. Immediate loading of two flapless placed mandibular implants supporting cross-arch fi xed prostheses: a 3-year follow-up prospective single cohort study; Eur J Oral Implantol. 2014 Spring; 7(1): 89-98.

58 Cannizzaro G, Felice P, Boveri M, Lazzarini M, Ferri V, Leone M, Esposito M. Immediate loading of two flapless placed mandibular implants supporting cross-arch fixed prostheses: a 3-year follow-up prospective single cohort study. Eur J Oral Implantol. 2014 Spring; 7(1): 89-98. PMID: 24892116

59 Cannizzaro G, Felice P, Buti J, Leone M, Ferri V, Esposito M. Immediate loading of fixed cross-arch prostheses supported by flapless-placed supershort or long implants: 1-year results from a randomised controlled trial. Eur J Oral Implantol. 2015 Spring; 8(1): 27-36. PMID: 25738177

60 Cannizzaro G, Felice P, Gherlone E, Barausse C, Ferri V, Leone M, Trullenque-Eriksson A, Esposito M. Immediate loading of two (fixed-on-2) vs four (fixed-on-4) implants placed with a flapless technique supporting mandibular cross-arch fixed prostheses: 3-year results from a pilot randomised controlled trial. Eur J Oral Implantol. 2017; 10(2): 133-145. PMID: 28555204

61 Cannizzaro G, Felice P, Lazzarini M, Ferri V, Leone M, Trullenque-Eriksson A, Esposito M. Immediate loading of two flapless placed mandibular implants supporting cross-arch fixed prostheses: A 5-year follow-up prospective single cohort study. Eur J Oral Implantol. 2016; 9 Suppl 1(2): 165-77. PMID: 27314124

62 Cannizzaro G, Felice P, Loi I, Viola P, Ferri V, Leone M, Collivasone D, Esposito M. Immediate loading of bimaxillary total fixed prostheses supported by five flapless-placed implants with machined surfaces: A 6-month follow-up prospective single cohort study. Eur J Oral Implantol. 2016 Spring; 9(1): 67-74. PMID: 27022638

63 Cannizzaro G, Felice P, Loi I, Viola P, Ferri V, Leone M, Lazzarini M, Trullenque-Eriksson A, Esposito M. Machined versus roughened immediately loaded and finally restored single implants inserted flapless: Preliminary 6-month data from a split-mouth randomised controlled trial. Eur J Oral Implantol. 2016; 9 Suppl 1(2): 155-63. PMID: 27314121

64 Cannizzaro G, Loi I, Viola P, Ferri V, Leone M, Trullenque-Eriksson A, Esposito M. Immediate loading of two (fixed-on-2) versus three (fixed-on-3) implants placed flapless supporting cross-arch fixed prostheses: One-year results from a randomised controlled trial. Eur J Oral Implantol. 2016; 9 Suppl 1(2): 143-53. PMID: 27314120

65 Cannizzaro G, Felice P, Leone M, Ferri V, Viola P, Esposito M. Immediate versus early loading of 6. 5 mm-long flapless-placed single implants: a 4-year after loading report of a splitmouth randomised controlled trial; Eur J Oral Implantol. 2012 Summer; 5(2): 111-21

66 Chandran S, Sakkir N. Implant – Supported Full Mouth Rehabilitation A Guided Surgical and Prosthetic Protocol. J Clin Diagn Res. 2016 Feb; 10(2): ZJ05-6. doi: 10. 7860/JCDR/2016/17467. 7264. Epub 2016 Feb 1. No abstract available. PMID: 27042601

67 Chambrone L1, Preshaw PM, Ferreira JD, Rodrigues JA, Cassoni A, Shibli JA. Effects of tobacco smoking on the survival rate of dental implants placed in areas of maxillary sinus floor augmentation: a systematic review. Clin Oral Implants Res. 2014 Apr; 25(4):408–16. doi: 10.1111/clr.12186. Epub 2013 May 7.

68 Charalampakis G, Abrahamsson I, Carcuac O, Dahlén G, Berglundh T. Microbiota in experimental periodontitis and peri-implantitis in dogs. Clin Oral Implants Res. 2013 Aug 13. doi: 10.1111/clr.12235.

69 Chaytor D-V, Zarb GA, Schmitt A, Lewis DW (1991). Langzeiterfolg osseointegrierter Implantate. Die Toronto-Studie: Veränderungen in der Knochenhöhe. Int J Periodont Res Dent 111(11).

70 Chen H, Liu N, Xu X, Qu X, Lu E. Smoking, radiotherapy, diabetes and osteoporosis as risk factors for dental implant failure: a meta-analysis. PLoS One. 2013 Aug 5; 8(8):e71955. doi: 10.1371/journal.pone.0071955. Print 2013.

71 Chen ST, Wilson TG Jr, Hämmerle CH. Immediate or early placement of implants following tooth extraction: review of biologic basis, clinical procedures, and outcomes. Int J Oral Maxillofac Implants. 2004;19 Suppl:12-25. Chrcanovic BR1

72 Chrcanovic BR, Albrektsson T, Wennerberg A. Flapless versus conventional flapped dental implant surgery: a meta-analysis. PLoS One. 2014 Jun 20; 9(6): e100624. doi: 10. 1371/journal. pone. 0100624. eCollection 2014. PMID: 24950053

73 Chu SJ, Salama MA, Garber DA, Salama H, Sarnachiaro GO, Sarnachiaro E, Gotta SL, Reynolds MA, Saito H, Tarnow DP. Flapless Postextraction Socket Implant Placement, Part 2: The Effects of Bone Grafting and Provisional Restoration on Peri-implant Soft Tissue Height and Thickness – A Retrospective Study. Int J Periodontics Restorative Dent. 2015 Nov-Dec; 35(6): 803-9. doi: 10. 11607/prd. 2178. PMID: 26509983

74 Ciabattoni G, Acocella A, Sacco R. Immediately restored full arch-fixed prosthesis on implants placed in both healed and fresh extraction sockets after computer-planned flapless guided surgery. A 3-year follow-up study. Clin Implant Dent Relat Res. 2017 Dec; 19(6): 997-1008. doi: 10. 1111/cid. 12550. Epub 2017 Oct 29. PMID: 29082655

75 Clementini M, Tiravia L, De Risi V, Vittorini Orgeas G, Mannocci A, de Sanctis M. Dimensional changes after immediate implant placement with or without simultaneous regenerative procedures: a systematic review and meta-analysis. J Clin Periodontol. 2015 Jul; 42(7): 666-77. doi: 10. 1111/jcpe. 12423. Epub 2015 Jul 14. Review. PMID: 26073267

76 Cooper LF, Reside GJ, Raes F, Garriga JS, Tarrida LG, Wiltfang J, Kern M, De Bruyn H. Immediate provisionalization of dental implants placed in healed alveolar ridges and extraction sockets: a 5-year prospective evaluation. Int J Oral Maxillofac Implants. 2014 May-Jun; 29(3): 709-17. doi: 10. 11607/jomi. 3617. PMID: 24818212

77 Corbella S, Del Fabbro M, Taschieri S, De Siena F, Francetti L. Clinical evaluation of an implant maintenance protocol for the prevention of periimplant diseases in patients treated with immediately loaded full-arch rehabilitations. Int J Dent Hyg. 2011 Aug; 9(3):216–22. doi: 10.1111/j.1601-5037.2010.00489.x. Epub 2010 Oct 14. Cortese A, Pantaleo G, Amato M, Claudio PP. Ridge Expansion by Flapless Split Crest and Immediate Implant Placement: Evolution of the Technique. J Craniofac Surg. 2016 Mar; 27(2): e123-8. doi: 10. 1097/SCS. 0000000000002367. PMID: 26845089

78 Corinaldesi G, Pieri F, Sapigni L, Marchetti C. Evaluation of survival and success rates of dental implants placed at the time of or after alveolar ridge augmentation with an autogenous mandibular bone graft and titanium mesh: a 3- to 8-year retrospective study. Int J Oral Maxillofac Implants. 2009 Nov-Dec;24(6):1119–28.

79 Cortese A, Pantaleo G, Amato M, Howard CM, Pedicini L, Claudio PP. Platelet-Rich Fibrin (PRF) in Implants Dentistry in Combination with New Bone Regenerative Flapless Technique: Evolution of the Technique and Final Results. Open Med (Wars). 2017 Mar 9; 12: 24-32. doi: 10. 1515/med-2017-0005. eCollection 2017 Jan. PMID:28401197

80 Cortese A, Pantaleo G, Borri A, Caggiano M, Amato M. Platelet-rich fibrin (PRF) in implant dentistry in combination with new bone regenerative technique in elderly patients. Int J Surg Case Rep. 2016; 28: 52-56. doi: 10. 1016/j. ijscr. 2016. 09. 022. Epub 2016 Sep 22. PMID: 27689517

81 Cosyn J, Eghbali A, Hermans A, Vervaeke S, De Bruyn H, Cleymaet R. A 5-year prospective study on single immediate implants in the aesthetic zone. J Clin Periodontol. 2016 Aug; 43(8): 702-9. doi: 10. 1111/jcpe. 12571. Epub 2016 Jun 13. PMID: 27120578

82 Cosyn J, Pollaris L, Van der Linden F, De Bruyn H. Minimally Invasive Single Implant Treatment (M. I. S. I. T.) based on ridge preservation and contour augmentation in patients with a high aesthetic risk profile: one-year results. J Clin Periodontol. 2015 Apr; 42(4): 398-405. doi: 10. 1111/jcpe. 12384. Epub 2015 Mar 31. PMID: 25728590

83 Cosyn J, Vandenbulcke E, Browaeys H, Van Maele G, De Bruyn H. Factors associated with failure of surface-modified implants up to four years of function. Clin Implant Dent Relat Res. 2012 Jun; 14(3):347–58. doi: 10.1111/j.1708-8208.2010.00282.x. Epub 2010 May 11.

84 Covani U, Canullo L, Toti P, Alfonsi F, Barone A. Tissue stability of implants placed in fresh extraction sockets: a 5-year prospective single-cohort study; J Periodontol. 2014 Sep; 85(9): e323-32. doi: 10. 1902/jop. 2014. 140175. Epub 2014 May 16.

85 Cox D Regression models and life tables. Journal of the Royal Statistical Society B, 34 (1972), S. 187–220

86 Cranin AN, Silverbrand H, Sher J, Salter N. The requirements and clinical performance of dental implants. Smith DC, Williams DF, editors. Biocompatibility of Dental Materials. Vol. 4. Boca Raton: Fla: CRC Press; 1982. p. 198.

87 Cristache CM. Presurgical Cone Beam Computed Tomography Bone Quality Evaluation for Predictable Immediate Implant Placement and Restoration in Esthetic Zone. Case Rep Dent. 2017; 2017: 1096365. doi: 10. 1155/2017/1096365. Epub 2017 Feb 22. PMID: 28321342

88 D'haese J, Ackhurst J, Wismeijer D, De Bruyn H, Tahmaseb A. Current state of the art of computer-guided implant surgery. Periodontol 2000. 2017 Feb; 73(1): 121-133. doi: 10. 1111/prd. 12175. Review. PMID: 28000275

89 D´Hoedt B, Lukas D (1987). Verlaufsmessungen parodontaler Indizes beim Tübinger Implantat aus Frialit. Z Zahnärztl Implantol III (6–14).

90 Dao TT, Anderson JD, Zarb GA (1993). Is osteoporosis a risk factor for osseointegration of dental implants? Int J Oral Maxillofac Implants 8(2):137–44.

91 Darwish M, Nassani MZ, Baroudi K. Effect of neutral zone technique on marginal bone loss around implant-supported overdentures. J Int Soc Prev Community Dent. 2015 Dec; 5(Suppl 2): S57-62. doi: 10. 4103/2231-0762. 164786. PMID: 26942118

92 Davies JE. Mechanisms of endosseous integration. Int J Prosthodont. 1998 Sep–Oct; 11(5):391-401. Dawson AS, Cardaci SC. Endodontics versus implantology: to extirpate or integrate? Aust Endod J. 2006 Aug; 32(2):57–63.

93 De Bruyn H, Collaert B (1994). The effects of smoking on early impla nt failures. Clin Oral Impl Res 5(260-264. DGI, DGZMK (1998). Statement der DGI und der DGZMK zum Stand der Implantologie. De Carvalho BC, de Carvalho EM, Consani RL. Flapless single-tooth immediate implant placement; Int J Oral Maxillofac Implants. 2013 May-Jun; 28(3): 783-9. doi: 10. 11607/ jomi. 2140

94 De Molon RS, de Avila ED, de Barros-Filho LA, Ricci WA, Tetradis S, Cirelli JA, Borelli de Barros LA. Reconstruction of the Alveolar Buccal Bone Plate in Compromised Fresh Socket after Immediate Implant Placement Followed by Immediate Provisionalization. J Esthet Restor Dent. 2015 May-Jun; 27(3): 122-35. doi: 10. 1111/jerd. 12154. Epub 2015 Jun 1. PMID: 26037327

95 Deppe H, Horch HH, Henke J, Donath K. Peri-implant care of ailing implants with the carbon dioxide laser. Int J Oral Maxillofac Implants. 2001 Sep-Oct; 16(5):659–67.

96 Derks, J. et al. Effectiveness of implant therapy analyzed in a Swedishpopulation: early and late implant loss. Journal of dental research 2015; 94:44S–46551S.

97 DGOI kurz & schmerzlos. Risiken und Komplikationen. Praktische Implantologie und Implantatprothetik 2015; 6:22–46.

98 Dierens M, Vandeweghe S, Kisch J, Nilner K, De Bruyn H. Long-term follow-up of turned single implants placed in periodontally healthy patients after 16-22 years: radiographic and peri-implant outcome. Clin Oral Implants Res. 2012 Feb; 23(2):197–204. doi: 10.1111/j.1600-0501.2011.02212.x. Epub 2011 Jul 6.

99 Di Giacomo GA, Cury PR, da Silva AM, da Silva JV, Ajzen SA. A selective laser sintering prototype guide used to fabricate immediate interim fixed complete arch prostheses in flapless dental implant surgery: Technique description and clinical results. J Prosthet Dent. 2016 Dec; 116(6): 874-879. doi: 10. 1016/j. prosdent. 2016. 04. 018. Epub 2016 Jul 25. PMID: 27460326

100 Di Torresanto VM, Milinkovic I, Torsello F, Cordaro L. Computer-assisted flapless implant surgery in edentulous elderly patients: a 2-year follow up. Quintessence Int. 2014 May; 45(5): 419-29. doi: 10. 3290/j. qi. a31534. PMID: 24634906

101 Dietrich U, Lippold R, Dirmeier T, Behneke N, Wagner W (1993). Statistische Prognose zur Implantatprognose am Beispiel von 2017 IMZ -Implantaten unterschiedlicher Indikation der letzten 13 Jahre. Z Zahnärztl Implantol 9(9–18).

102 Dinato TR, Grossi ML, Teixeira ER, Dinato JC, Sczepanik FS, Gehrke SA. Marginal Bone Loss in Implants Placed in the Maxillary Sinus Grafted with Anorganic Bovine Bone: A Prospective Clinical and Radiographic Study. J Periodontol. 2016 Aug; 87(8): 880-7. doi: 10. 1902/jop. 2016. 150514. Epub 2016 Mar 4. PMID: 26944409

103 Discepoli N, Vignoletti F, Laino L, de Sanctis M, Muñoz F, Sanz M. Early healing of the alveolar process after tooth extraction: an experimental study in the beagle dog. J Clin Periodontol. 2013 Jun; 40(6):638–44. doi: 10.1111/ jcpe.12074. Epub 2013 Mar 27.

104 Diz P, Scully C, Sanz M. Dental implants in the medically compromised patient. J Dent. 2013 Mar; 41(3):195–206. doi: 10.1016/j.jdent.2012.12.008. Epub 2013 Jan 11.

105 Doan N, Du Z, Crawford R, Reher P, Xiao Y. Is flapless implant surgery a viable option in posterior maxilla? A review; Int J Oral Maxillofac Surg. 2012 Sep; 41(9): 1064-71. doi: 10. 1016/j. ijom. 2012. 06. 002. Epub 2012 Jul 9

106 Doan NV, Du Z, Reher P, Xiao Y. Flapless dental implant surgery: a retrospective study of 1, 241 consecutive implants; Int J Oral Maxillofac Implants. 2014 May-Jun; 29(3): 650-8. doi: 10. 11607/ jomi. 3195.

107 Doan NV, Du Z, Reher P, Xiao Y. Flapless dental implant surgery: a retrospective study of 1, 241 consecutive implants. Int J Oral Maxillofac Implants. 2014 May-Jun; 29(3): 650-8. doi: 10. 11607/ jomi. 3195. PMID: 24818204

108 Domínguez GC, Fernández DA, Calzavara D, Fábrega JG. Immediate placement and restoration of implants in the esthetic zone: Trimodal Approach therapeutic options. Int J Esthet Dent. 2015 Spring; 10(1): 100-21. PMID: 25625129

109 Dvorak G, Arnhart C, Heuberer S, Huber CD, Watzek G, Gruber R. Peri-implantitis and late implant failures in postmenopausal women: a cross-sectional study. J Clin Periodontol. 2011 Oct; 38(10):950–5. doi: 10.1111/j.1600-051X.2011.01772.x. Epub 2011 Jul 21.

110 DZZ 53(DGZMK (2000). Statement der DGZMK zur Lebenserwartung von Implantaten und Implantatlager. DZZ 55

111 Eckert SE, Meraw SJ, Cal E, Ow RK. Analysis of incidence and associated factors with fractured implants: a retrospective study. Int J Oral Maxillofac Implants. 2000 Sep-Oct; 15(5):662–7.

112 Elsyad MA, Mahanna FF, Elshahat MA, Elshoukouki AH. Locators versus magnetic attachment effect on peri-implant tissue health of immediate loaded two implants retaining a mandibular overdenture: a 1-year randomised trial. J Oral Rehabil. 2016 Apr; 43(4): 297-305. doi: 10. 1111/joor. 12368. Epub 2015 Nov 9. PMID: 26549496

113 Esposito M, Grusovin MG, Achille H, Coulthard P, Worthington HV. Interventions for replacing missing teeth: different times for loading dental implants. Cochrane Database Syst Rev. 2009 Jan 21; (1):CD003878. doi: 10.1002/14651858.CD003878. pub4.

114 Esposito M, Grusovin MG, Polyzos IP, Felice P, Worthington HV. Timing of implant placement after tooth extraction: immediate, immediate-delayed or delayed implants? A Cochrane systematic review. Eur J Oral Implantol. 2010 Autumn; 3(3):189–205.

115 Esposito M, Grusovin MG, Willings M, Coulthard P, Worthington HV. The effectiveness of immediate, early, and conventional loading of dental implants: a Cochrane systematic review of randomized controlled clinical trials. Int J Oral Maxillofac Implants. 2007 Nov-Dec; 22(6):893–904.

116 Esposito M, Maghaireh H, Grusovin MG, Ziounas I, Worthington HV. Soft tissue management for dental implants: what are the most effective techniques? A Cochrane systematic review; Eur J Oral Implantol. 2012 Autumn; 5(3): 221-38

117 Evian CI, Emling R, Rosenberg ES, Waasdorp JA, Halpern W, Shah S, Garcia M. Retrospective analysis of implant survival and the influence of periodontal disease and immediate placement on long-term results. Int J Oral Maxillofac Implants. 2004 May–Jun; 19(3):393–8.

118 Fangman R. 3D-gesteuerte Implantation mit Sofortbelastung im ästhetischen Bereich; Jahrbuch Implantologie 2012:44-47

119 Felice P, Soardi E, Piattelli M, Pistilli R, Jacotti M, Esposito M. Immediate non-occlusal loading of immediate post-extractive versus delayed placement of single implants in preserved sockets of the anterior maxilla: 4-month post-loading results from a pragmatic multicentre randomised controlled trial. Eur J Oral Implantol. 2011 Winter; 4(4):329–44.

120 Feloutzis A, Lang NP, Tonetti MS, Bürgin W, Brägger U, Buser D, Duff GW, Kornman KS. IL-1 gene polymorphism and smoking as risk factors for peri-implant bone loss in a well-maintained population. Clin Oral Implants Res. 2003 Feb; 14(1):10–7.

121 Filipek D, Koszowski R, Smieszek-Wilczewska J. A comparative clinical study on human tooth extractions: flap vs flapless buccal surgery; Quintessence Int. 2012 Nov-Dec; 43(10): 887-9.

122 Fischer KR, Stavropoulos A, Calvo-Guirado JL, Schneider D, Fickl S. Influence of local administration of pamidronate on extraction socket healing--a histomorphometric proof-of-principle pre-clinical in vivo evaluation. Clin Oral Implants Res. 2015 Oct; 26(10): 1135-42. doi: 10. 1111/clr. 12483. Epub 2014 Sep 15. PMID: 25219296

123 Fortin T, Bosson JL, Isidori M, Blanchet E. Effect of flapless surgery on pain experienced in implant placement using an image-guided system. Int J Oral Maxillofac Implants 2006; 21:298–304.

124 Frascaria M, Casinelli M, Mauro S, M D'Amario M, Gatto R, Marzo G. Aesthetic rehabilitation in a young patient using a minimally invasive approach. A multidisciplinary case report. Eur J Paediatr Dent. 2016 Sep; 17(3): 234-238. PMID: 27759414

125 Fürhauser R, Mailath-Pokorny G, Haas R, Busenlechner D, Watzek G, Pommer B. Esthetics of Flapless Single-Tooth Implants in the Anterior Maxilla Using Guided Surgery: Association of Three-Dimensional Accuracy and Pink Esthetic Score. Clin Implant Dent Relat Res. 2015 Oct; 17 Suppl 2: e427-33. doi: 10. 1111/ cid. 12264. Epub 2014 Oct 27. PMID: 25346154

126 Gamborena I, Lee J, Fiorini T, Wenzel BA, Schüpbach P, Wikesjö UM, Susin C. Effect of Platform Shift/Switch and Concave Abutments on Crestal Bone Levels and Mucosal Profile following Flap and Flapless Implant Surgery. Clin Implant Dent Relat Res. 2015 Oct; 17(5): 908-16. doi: 10. 1111/cid. 12208. Epub 2014 Feb 20. PMID: 25881715

127 García-Bellosta S, Bravo M, Subirá C, Echeverría JJ. Retrospective study of the long-term survival of 980 implants placed in a periodontal practice. Int J Oral Maxillofac Implants. 2010 May-Jun; 25(3):613–9.

128 Gargallo Albiol J, Satorres-Nieto M, Puyuelo Capablo JL, Sánchez Garcés MA, Pi Urgell J, Gay Escoda C. Endosseous dental implant fractures: an analysis of 21 cases. Med Oral Patol Oral Cir Bucal. 2008 Feb 1; 13(2):E124–8.

129 Gatti C, Gatti F, Chiapasco M, Esposito M. Outcome of dental implants in partially edentulous patients with and without a history of periodontitis: a 5-year interim analysis of a cohort study. Eur J Oral Implantol. 2008 Spring; 1(1):45–51.

130 Geckili O, Bilhan H, Geckili E, Cilingir A, Mumcu E, Bural C. Evaluation of Possible Prognostic Factors for the Success, Survival, and Failure of Dental Implants. Implant Dent. 2013 Oct 9.

131 Gibreel M, Fouad M, El-Waseef F, El-Amier N, Marzook H. Clips vs Resilient Liners Used With Bilateral Posterior Prefabricated Bars for Retaining Four Implant-Supported Mandibular Overdentures. J Oral Implantol. 2017 Aug; 43(4): 273-281. doi: 10. 1563/aaid-joi-D-16-00148. Epub 2017 Jun 19. PMID: 28628356

132 Giuliani A, Iezzi G, Mazzoni S, Piattelli A, Perrotti V, Barone A. Regenerative properties of collagenated porcine bone grafts in human maxilla: demonstrative study of the kinetics by synchrotron radiation microtomography and light microscopy. Clin Oral Investig. 2017 Jun 2. doi: 10. 1007/ s00784-017-2139-6. PMID: 28577053

133 Gober DD, Fien MJ. Flapless Extraction Socket Healing Around an Immediate Implant Placed into a Mandibular Molar Site Without the Use of Regenerative Materials: A Case Report. Int J Periodontics Restorative Dent. 2016 Mar-Apr; 36(2): e26-32. doi: 10. 11607/ prd. 2516. PMID: 26901307

134 González D, Cabello G, Olmos G, Niñoles CL. The saddle connective tissue graft: a periodontal plastic surgery technique to obtain soft tissue coronal gain on immediate implants. A case report. Int J Esthet Dent. 2015 Autumn; 10(3): 444-55. PMID: 26171446

135 Greenfield EJ (1913). Implantation of artificial crown and bridge abutments. Dent Cosmos 55(364).

136 Grossi SG, Dunford RG, Ho A, Koch G, Machtei EE, Genco RJ. Sources of error for periodontal probing measurements. J Periodontal Res. 1996 Jul; 31(5):330–6.

137 Grötz KA, Wahlmann UW, Krummenauer F, Wegener J, Al-Nawas B, Kuffner H-DW, W. (1999). Prognose und Prognosefaktoren enossaler Implantate im bestrahlten Kiefer-Prognosis and factors affecting prognosis for enossal implants in the irradiated jaw. Mund Kiefer Gesichtschir 3(117–124).

138 Guckes AD, Scurria MS, Shugars DA. A conceptual framework for understanding outcomes of oral implant therapy. J Prosthet Dent. 1996 Jun; 75(6):633–9.

139 Günay H (2001). Ätiologie periimplantärer Infektionen. Implantologie 3 Homburg C, Rudolph B (1995). Perspektiven zur Kundenzufriedenheit. In: Kundenzufriedenheit: Konzepte - Methoden - Erfahrungen. HSCH (Hrsg.) Editor. Wiesbaden: Th. Gabler, pp. 30–49. Jacob G, Bengel J (2000). Das Konstrukt Patientenzufriedenheit: Eine kritische Bestandsaufnahme. Zeitschrift für Klinische Psychologie, Psychiatrie und Psychotherapie 48(280–301).

140 Güth JF, Beuer F, Edelhoff D. Navigierte Implantation ohne konventionelle Abformung-Ein Case-Report; digital dentistry Ausgabe 1-2013: 16-19

141 Hahn TR. Virtuelle Implantatplanung im Vergleich; digital dentistry Ausgabe 1-2013: 10-14

142 Hämmerle, Stone, Jung, Kapos, Brodala. Consensus Statements and Recommended Clinical Procedures Regarding Computer-Assisted Implant Dentistry, Fourth ITI Consensus Conference, sponsored by the International Team for Implantology (ITI) and held August 26–28, 2008, in Stuttgart, Germany.

143 Hämmerle CH, Araújo MG, Simion M; Osteology Consensus Group 2011. Evidence-based knowledge on the biology and treatment of extraction sockets. Clin Oral Implants Res. 2012 Feb; 23 Suppl 5:80-2. doi: 10.1111/ j.1600- 0501.2011.02370.x.

144 Heitz-Mayfield LJ1, Huynh-Ba G. History of treated periodontitis and smoking as risks for implant therapy. Int J Oral Maxillofac Implants. 2009;24 Suppl:39-68. Heitz-Mayfield LJ, Lang NP. Comparative biology of chronic and aggressive periodontitis vs. peri-implantitis. Periodontol 2000. 2010 Jun; 53:167–81. doi: 10.1111/j.1600-0757.2010.00348.x.

145 Helal E, El-Zawahry M, Gouda A, Elkhadem AH, Ibrahim SI. Bone Height Changes of the Mandibular Edentulous Ridge in Screw Retained Versus Telescopic Restorations for Completely Edentulous Patients. Open Access Maced J Med Sci. 2017 Mar 15; 5(1): 72-78. doi: 10. 3889/oamjms. 2017. 004. Epub 2017 Jan 18. PMID: 28293321

146 Heuer W, Kettenring A, Stumpp SN, Eberhard J, Gellermann E, Winkel A, Stiesch M. Metagenomic analysis of the peri-implant and periodontal microflora in patients with clinical signs of gingivitis or mucositis. Clin Oral Investig. 2012 Jun; 16(3):843–50. doi: 10.1007/ s00784-011-0561-8. Epub 2011 May 3.

147 Hill EG, Slate EH, Wiegand RE, Grossi SG, Salinas CF. Study design for calibration of clinical examiners measuring periodontal parameters. J Periodontol. 2006 Jul; 77(7):1129–41.

148 Hopp M, Biffar R. Prothetische Planung bei Implantatversorgungen; Jahrbuch Implantologie 2012:100-106

149 Hsu YT, Chan HL, Rudek I, Bashutski J, Oh WS, Wang HL, Oh TJ. Comparison of Clinical and Radiographic Outcomes of Platform-Switched Implants with a Rough Collar and Platform-Matched Implants with a Smooth Collar: A 1-Year Randomized Clinical Trial. Int J Oral Maxillofac Implants. 2016 Mar-Apr; 31(2): 382-90. doi: 10. 11607/jomi. 4189. PMID: 27004284

150 Hsu YT, Oh TJ, Rudek I, Wang HL. The Effect of Inital-Phase Bone Remodeling on Implant Wound Healing. Int J Periodontics Restorative Dent. 2016 Sep-Oct; 36(5): 737-43. doi: 10. 11607/prd. 2353. PMID: 27560679

151 Hsu KM, Choi BH, Ko CY, Kim HS, Xuan F, Jeong SM. Ridge alterations following immediate implant placement and the treatment of bone defects with Bio-Oss in an animal model. Clin Implant Dent Relat Res. 2012 Oct; 14(5):690-5. doi: 10.1111/ j.1708- 8208.2010.00316.x. Epub 2010 Oct 26.

152 Hu C, Gong T, Lin W, Yuan Q, Man Y. Immediate implant placement into posterior sockets with or without buccal bone dehiscence defects: A retrospective cohort study. J Dent. 2017 Oct; 65: 95-100. doi: 10. 1016/j. jdent. 2017. 07. 010. Epub 2017 Jul 21. PMID: 28739320

153 Huang JY, Li HQ, Chen L, Zhao HM, Lin Y. Medication compliance and diet compliance in 309 oral lichen planus patients. Shanghai Kou Qiang Yi Xue. 2016 Jun; 25(3): 340-4. Chinese. PMID: 27609390

154 Hürzeler MB, Weng D. Periimplant tissue management: optimal timing for an aesthetic result. Pract Periodontics Aesthet Dent. 1996 Nov-Dec; 8(9):857–69; quiz 869.

155 Inbarajan A, Banu F, Tv P, Kumar A, Seenivasan M. Pre-surgical Provisional Prosthesis for Immediate Non-occlusal-loaded Flapless Implant. Cureus. 2017 Jun 13; 9(6): e1345. doi: 10. 7759/cureus. 1345. PMID: 28713661

156 Inchingolo F, Ballini A, Cagiano R, Inchingolo AD, Serafini M, De Benedittis M, Cortelazzi R, Tatullo M, Marrelli M, Inchingolo AM, Vermesan D, Del Corso M, Malcangi G, Diteodoro S, Mura SA, Cantore S, Cortelazzi A, Paduanelli G, Resta G, Muollo F, Cirulli N, Pettini F, Farronato D, De Vito D, Caprio M, Haragus H, Dipalma G. Immediately loaded dental implants bioactivated with platelet-rich plasma (PRP) placed in maxillary and mandibular region. Clin Ter. 2015; 166(3): e146-52. doi: 10. 7417/T. 2015. 1845. PMID: 26152623

157 Incici E, Matuliene G, Hüsler J, Salvi GE, Pjetursson B, Brägger U. Cumulative costs for the prosthetic reconstructions and maintenance in young adult patients with birth defects affecting the formation of teeth. Clin Oral Implants Res. 2009 Jul; 20(7):715-21. doi: 10.1111/j.1600-0501.2009.01711.x. Epub 2009 Mar 27.

158 Jacobi-Gresser E, Huesker K, Schütt S. Genetic and immunological markers predict titanium implant failure: a retrospective study. Int J Oral Maxillofac Surg. 2013 Apr; 42(4):537–43. doi: 10.1016/j. ijom.2012.07.018. Epub 2012 Aug 24.

159 Jacobs R, Adrianses A, Versteken A, Seutens P, Van Steenberghe D. Predictability of a three-dimensional planning system for oral implant surgery. Dentomaxillofac Radiol, 1999. 28 (105–112)

160 Jaffin RA, Kumar A, Berman CL. Immediate loading of implants in the completely edentulous maxilla: a clinical report. Int J Oral Maxillofac Implants, 2004. 19: 721– 730

161 Jahn M, d`Hoedt B (1992). Zur Definition des Erfolges bei dentalen Implantaten. Z Zahnärztl Impl 8(221–26). Kaplan EL, Meier P (1958). Nonparametric estimation from incomplete observations. J Am Statist Assoc 53(457). Jain D, Gaur G. Flapless implant placement: a case report. J Oral Implantol. 2014 Jun; 40(3): 321-4. doi: 10. 1563/ AAID-JOI-D-12-00026. PMID: 24914919

162 Javed F, Romanos GE. Impact of diabetes mellitus and glycemic control on the osseointegration of dental implants: a systematic literature review. J Periodontol. 2009 Nov; 80(11):1719–30. doi: 10.1902/jop.2009.090283.

163 Jemt, T., Olsson, M., Renouard, F., Stenport, V. & Friberg, B. Early Implant Failures related to Individual Surgeons: An Analysis Covering 11,074 Operations Performed during 28 Years. Clin Implant Dent Relat Res 437; 2016;18:861-872.

164 Jeong SM Choi BH, Li J, Kim HS, Ko CY, Jung JH, Kim YH, Lee SH, Engelke W. Flapless implant surgery: an experimental study. Oral Surg Oral Med Oral Pathol Otal Radiol Endod 2007; 104: 24-28 Pmes

165 Jeong SM, Choi BH, Li J, Ahn KM, Lee SH, Xuan F. Bone healing around implants following flap and mini-flap surgeries: A radiographic evaluation. Oral Surg Oral Med Oral Pathol Otal Radiol Endod 2007; 106: 32–34

166 Jeong SM, Yoo JH, Fang Y, Choi BH, Son JS, Oh JH. The effect of guided flapless implant procedure on heat generation from implant drilling. J Craniomaxillofac Surg. 2014 Sep; 42(6): 725-9. doi: 10. 1016/j. jcms. 2013. 11. 002. Epub 2013 Nov 14. PMID: 24332815

167 Jeong SM, Yoo JH, Fang Y, Choi BH, Son JS, Oh JH1 The effect of guided flapless implant procedure on heat generation from implant drilling, Craniomaxillofac Surg. 2013 Nov 14. pii: S1010-5182(13)00301-6. doi: 10. 1016/j. jcms. 2013. 11. 002.

168 Jinmeng L, Guomin O. Accuracy of computer-guided implant placement and influencing factors. Hua Xi Kou Qiang Yi Xue Za Zhi. 2017 Feb 1; 35(1): 93-98. doi: 10. 7518/hxkq. 2017. 01. 015. Review. Chinese. PMID: 28326735

169 Kaku T, Ogino Y, Matsushita Y, Koyano K. Technique for identifying keratinized gingival tissue and soft tissue morphology on 3-dimensional implant-planning software images. J Prosthet Dent. 2016 Jul; 116(1): 21–4. doi: 10. 1016/j. prosdent. 2015. 09. 031. Epub 2016 Feb 26. PMID: 26922210

170 Kanazawa M, Feine J, Esfandiari S. Clinical guidelines and procedures for provision of mandibular overdentures on 4 mini-dental implants. J Prosthet Dent. 2017 Jan; 117(1): 22-27. doi: 10. 1016/j. prosdent. 2016. 04. 020. Epub 2016 Aug 1. PMID: 27492988

171 Kaplan, E. L. & Meier, P. Nonparametric estimation from incomplete observations. American Statistical Assosiation Journal 1958; 53:457–481.

172 Karami D, Alborzinia HR, Amid R, Kadkhodazadeh M, Yousefi N, Badakhshan S. In-Office Guided Implant Placement for Prosthetically Driven Implant Surgery. Craniomaxillofac Trauma Reconstr. 2017 Sep; 10(3): 246-254. doi: 10. 1055/s-0036-1584891. Epub 2016 Jul 19. Review. PMID: 28751952

173 Karoussis IK, Salvi GE, Heitz-Mayfield LJA, Brägger U, Hämmerle CHF, Lang NP. Long term implant prognosis in patients with and without a history of chronic periodontitis: a 10- year prospective cohort study of the ITI Dental Implant System. Clin Oral Impl Res 2003; 14: 329–339

174 Khayat PG, Arnal HM, Tourbah BI, Sennerby L. Clinical outcome of dental implants placed with high insertion torques (up to 176 Ncm). Clin Implant Dent Relat Res. 2013 Apr; 15(2): 227–33. doi: 10. 1111/j. 1708-8208. 2011. 00351. x. Epub 2011 May 20.

175 Kher U, Tunkiwala A, Umrigar Z. Management of Fenestration Defects During Flapless Immediate Implant Placement in the Esthetic Zone. Int J Periodontics Restorative Dent. 2015 Nov-Dec; 35(6): e90-6. doi: 10. 11607/prd. 1944. PMID: 26509994

176 Khzam N, Mattheos N, Roberts D, Bruce WL, Ivanovski S. Immediate placement and restoration of dental implants in the esthetic region: clinical case series. J Esthet Restor Dent. 2014 Sep-Oct; 26(5): 332–44. doi: 10. 1111/jerd. 12083. Epub 2013 Dec 18. PMID: 24350660

177 Kim JI, Choi BH, Li J, Xuan F, Jeong SM. Blood vessels of the peri-implant mucosa: A comparison between the flap and flapless procedures. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009; 107: 508–512

178 Kim JM, Sohn DS, Bae MS, Moon JW, Lee JH, Park IS. Flapless transcrestal sinus augmentation using hydrodynamic piezoelectric internal sinus elevation with autologous concentrated growth factors alone. Implant Dent. 2014 Apr; 23(2): 168–74. doi: 10. 1097/ID. 0000000000000053. PMID: 24637529

179 Kirsch A (1980). Fünf Jahre IMZ-Implantatsystem - Grundlagen, Methodik, Erfahrungen München: Hanser. Koch W (1976). Die zweiphasige enossale Implantation von intramobilen Zylinderimplantaten IMZ. Quintessenz 27(21).

180 Knöfler, W., Knöfler, A. & Graf, H. L. Die Überlebenswahrscheinlichkeit von Implantaten in einer zahnärztlichen Praxis im Zeitraum von zehn Jahren. Zahnärztl Implantol 2004; 20:230–246.

181 Knöfler, W., Barth, T., Graul, R., Krampe, D. & Schmenger, K. Beobachtungen an 10000 Implantaten über 20 Jahre – eine retrospektive Studie – Der Einfluss von Implantatlänge, -durchmesser und Typ auf die Überlebensrate. Implantologie 2016; 2017-04-11

182 Knöfler, W., Barth, T., Graul, R. & Schmenger, K. Beobachtungen an 10000 Implantaten über 20 Jahre - eine retrospektive Studie - Einfluß von Alter, Geschlecht und Anatomie. Implantologie 2016; 24:1-13.

183 Knofler, W., Barth, T., Graul, R. & Krampe, D. Retrospective analysis of 10,000 implants from insertion up to 20 years-analysis of implantations using augmentative procedures. Int J Implant Dent 2016; 2:25.

184 Kolerman R, Mijiritsky E, Barnea E, Dabaja A, Nissan J, Tal H. Esthetic Assessment of Implants Placed into Fresh Extraction Sockets for Single-Tooth Replacements Using a Flapless Approach. Clin Implant Dent Relat Res. 2017 Apr; 19(2): 351-364. doi: 10. 1111/cid. 12458. Epub 2016 Nov 2. PMID: 27807931

185 Kosinski T. Simple flapless surgical overdenture techniques; Dent Today. 2014 Mar; 33(3): 104, 106-7.

186 Koyanagi T, Sakamoto M, Takeuchi Y, Maruyama N, Ohkuma M, Izumi Y. Comprehensive microbiological findings in peri-implantitis and periodontitis. J Clin Periodontol. 2013 Mar; 40(3):218–26. doi: 10.1111/jcpe.12047. Epub 2013 Jan 7.

187 Krebs M, Schmenger K, Neumann K, Weigl P, Moser W, Nentwig GH. Long-Term Evaluation of ANKYLOS® Dental Implants, Part I: 20-Year Life Table Analysis of a Longitudinal Study of More Than 12,500 Implants. Clin Implant Dent Relat Res. 2013 Sep 17. doi: 10.1111/cid.12154.

188 Krebs, M. et al. Long-term evaluation of ANKYLOS(R) dental implants, part i:20-year life table analysis of a longitudinal study of more than 12,500 implants. Clin Implant Dent Relat Res 2015;17 Suppl 1:e275-286.

189 Kroeplin, B. S. & Strub, J. R. Implant dentistry curriculum in undergraduate education: part 1-a literature review. The International journal of prosthodontics ; 2011; 24:221–234.

190 Kumar MN, Honne T. Survival of dental implants in bisphosphonate users versus non-users: a systematic review. Eur J Prosthodont Restor Dent. 2012 Dec; 20(4):159–62.

191 Laleman I, Bernard L, Vercruyssen M, Jacobs R, Bornstein MM, Quirynen M. Guided Implant Surgery in the Edentulous Maxilla: A Systematic Review. Int J Oral Maxillofac Implants. 2016; 31 Suppl: s103-17. doi: 10. 11607/jomi. 16suppl. g3. Review. PMID: 27228244

192 Lambert FE, Lecloux G, Grenade C, Bouhy A, Lamy M, Rompen EH. Less Invasive Surgical Procedures Using Narrow-Diameter Implants: A Prospective Study in 20 Consecutive Patients. J Oral Implantol. 2015 Dec; 41(6): 693–9. doi: 10. 1563/AAID-JOI-D-13-00201. Epub 2014 Apr 25. PMID: 24766161

193 Landazuri-Del Barrio RA, Nunes de Paula W, Spin-Neto R, Chaves de Souza JA, Pimentel Lopes de Oliveira GJ, Marcantonio-Junior E. Effect of 2 Different Drilling Speeds on the Osseointegration of Implants Placed With Flapless Guided Surgery: A Study in Rabbits. Implant Dent. 2017 Dec; 26(6): 882–887. doi: 10. 1097/ID. 0000000000000654. PMID: 28984664

194 Lang NP, Berglundh T, Heitz-Mayfield LJ, Pjetursson BE, Salvi GE, Sanz M. Consensus statements and recommended clinical procedures regarding implant survival and complications. Int J Oral Maxillofac Implants. 2004; 19 Suppl:150–4. 52

195 Lang NP, Pun L, Lau KY, Li KY, Wong MC. A systematic review on survival and success rates of implants placed immediately into fresh extraction sockets after at least 1 year. Clin Oral Implants Res. 2012 Feb; 23 Suppl 5:39–66. doi: 10.1111/j.1600-0501.2011.02372.x.

196 Lazić Z, Golubović M, Marković A, Šćepanović M, Mišić T, Vlahović Z. Immunohistochemical analysis of blood vessels in peri-implant mucosa: a comparison between mini-incision flapless and flap surgeries in domestic pigs. Clin Oral Implants Res. 2015 Jul; 26(7): 775-9. doi: 10. 1111/clr. 12337. Epub 2014 Jan 20. PMID: 24438481

197 Lazić Z, Golubović M, Marković A, Sćepanović M, Mišić T, Vlahović Z. Immunohistochemical analysis of blood vessels in peri-implant mucosa: a comparison between mini-incision flapless and flap surgeries in domestic pigs; Clin Oral Implants Res. 2014 Jan 20. doi: 10. 1111/clr. 12337

198 Lazzara R, Siddiqui AA, Binon P, Feldman SA, Weiner R, Phillips R, Gonshor A. Retrospective multicenter analysis of 3i endosseous dental implants placed over a five-year period. Clin Oral Implants Res. 1996 Mar; 7(1):73–83.

199 Lee DH, Choi BH, Jeong SM, Xuan F, Kim HR. University Wonju, South Korea Effects of flapless implant surgery on soft tissue profiles: a prospective clinical study. Clin Implant Dent Relat Res. 2011 Dec; 13(4): 324–9. doi: 10. 1111/j. 1708-8208. 2009. 00217. x. Epub 2009 Aug 5.

200 Lee EA, Gonzalez-Martin O, Fiorellini J. Lingualized flapless implant placement into fresh extraction sockets preserves buccal alveolar bone: a cone beam computed tomography study; Int J Periodontics Restorative Dent. 2014 Jan-Feb; 34(1): 61–8. doi: 10. 11607/prd. 1807

201 Lee J, Fiorini T, Gamborena I, Wenzel BA, Schüpbach P, Wikesjö UM, Susin C. Effect of Platform Shift/Switch on Crestal Bone Levels and Mucosal Profile Following Flapless Surgery and Crestal/Subcrestal Implant Placement. Clin Implant Dent Relat Res. 2016 Feb; 18(1): 73–81. doi: 10. 1111/cid. 12243. Epub 2014 May 29. PMID: 24889401

202 Lei Q, Chen J, Jiang J, Fu X, Lin H, Cai Z. Comparison of soft tissue healing around implants in beagle dogs: flap surgery versus flapless surgery; Oral Surg Oral Med Oral Pathol Oral Radiol. 2013 Mar; 115(3): e21-7. doi: 10. 1016/j. oooo. 2011. 11. 025. Epub 2012 May 30

203 Leimkühler AM (1996). Patientenzufriedenheit – Artefakt oder soziale Tatsache? Nervenarzt 67(765–773).

204 Lekholm U, Gunne J, Henry P, Higuchi K, Lindén U, Bergström C, van Steenberghe D. Survival of the Brånemark implant in partially edentulous jaws: a 10-year prospective multicenter study. Int J Oral Maxillofac Implants. 1999 Sep-Oct; 14(5):639–45.

205 Lindhe J, Nyman S. The role of occlusion in periodontal disease and the biological rationale for splinting in treatment of periodontitis. Oral Sci Rev. 1977; 10:11–43.

206 Lioubavina-Hack N, Lang NP, Karring T. Significance of primary stability for osseointegration of dental implants. Clin Oral Implants Res. 2006 Jun; 17(3):244–50.

207 Lemmerman, K. J. & Lemmerman, N. E. Osseointegrated dental implants in private practice: a long-term case series study. J Periodontol 2005; 76:310–319.

208 Linkow LI (1972). Some variant designs of the subperiosteal implant. Oral Implantol 2(3):190–205.

209 Lin GH, Chan HL, Bashutski JD, Oh TJ, Wang HL. The effect of flapless surgery on implant survival and marginal bone level: a systematic review and meta-analysis; J Periodontol. 2014 May; 85(5): e91-103. doi: 10. 1902/jop. 2013. 130481. Epub 2013 Oct 23

210 Lindeboom JA, van Wijk AJ. A comparison of two implant techniques on patient-based outcome measures: a report of flapless vs. conventional flapped implant placement; Clin Oral Implants Res. 2010 Apr 1; 21(4): 366-70. doi: 10. 1111/j. 1600-0501. 2009. 01866. x. Epub 2010 Feb 1.

211 Llamas-Monteagudo O, Girbés-Ballester P, Viña-Almunia J, Peñarrocha-Oltra D, Peñarrocha-Diago M. Clinical parameters of implants placed in healed sites using flapped and flapless techniques: A systematic review. Med Oral Patol Oral Cir Bucal. 2017 Sep 1; 22(5): e572-e581. doi: 10. 4317/medoral. 21897. PMID: 28809375

212 Lopes A, Maló P, de Araújo Nobre M, Sánchez-Fernández E, Gravito I. The NobelGuide All-on-4 Treatment Concept for Rehabilitation of Edentulous Jaws: A Retrospective Report on the 7-Years Clinical and 5-Years Radiographic Outcomes. Clin Implant Dent Relat Res. 2017 Apr; 19(2): 233-244. doi: 10. 1111/cid. 12456. Epub 2016 Oct 18. PMID: 27758069

213 Lopes A, Maló P, de Araújo Nobre M, Sanchez-Fernández E. The NobelGuide All-on-4 Treatment Concept for Rehabilitation of Edentulous Jaws: A Prospective Report on Medium- and Long-Term Outcomes. Clin Implant Dent Relat Res. 2015 Oct; 17 Suppl 2: e406-16. doi: 10. 1111/cid. 12260. Epub 2014 Sep 5. PMID: 25195544

214 Maia LP, Reino DM, Muglia VA, Almeida AL, Nanci A, Wazen RM, de Oliveira PT, Palioto DB, Novaes AB Jr. Influence of periodontal tissue thickness on buccal plate remodelling on immediate implants with xenograft. J Clin Periodontol. 2015 Jun; 42(6): 590-8. doi: 10. 1111/jcpe. 12405. Epub 2015 May 4. PMID: 25875308

215 Maia LP, Reino DM, Muglia VA, de Souza SL, Palioto DB, Novaes AB Jr. The influence of the periodontal biotype on peri-implant tissues around immediate implants with and without xenografts. Clinical and micro-computerized tomographic study in small Beagle dogs. Clin Oral Implants Res. 2015; 26(1): 35-43. doi: 10. 1111/clr. 12298. Epub 2013 Dec 4. PMID: 24303896

216 Maia LP, Reino DM, Novaes Junior AB, Muglia VA, Taba Junior M, Grisi MF, Souza SL, Palioto DB. Influence of periodontal biotype on buccal bone remodeling after tooth extraction using the flapless approach with a xenograft: a histomorphometric and fluorescence study in small dogs. Clin Implant Dent Relat Res. 2015 Jan; 17 Suppl 1: e221-35. doi: 10. 1111/cid. 12182. Epub 2013 Dec 16. PMID: 24341781

217 Maier FM. Initial Crestal Bone Loss After Implant Placement with Flapped or Flapless Surgery-A Prospective Cohort Study. Int J Oral Maxillofac Implants. 2016 Jul–Aug; 31(4): 876-83. doi: 10. 11607/jomi. 4283. PMID: 27447156

218 Maiorana C, Poli PP, Poggio C, Barbieri P, Beretta M. Oral Rehabilitation of a Patient with Ectodermal Dysplasia Treated With Fresh-Frozen Bone Allografts and Computer-Guided Implant Placement: A Clinical Case Report. J Oral Maxillofac Surg. 2017 May; 75(5): 939-954. doi: 10. 1016/j. joms. 2017. 01. 010. Epub 2017 Jan 20. PMID: 28208056

219 Maló P, de Araújo Nobre M, Lopes A. Three-Year Outcome of Fixed Partial Rehabilitations Supported by Implants Inserted with Flap or Flapless Surgical Techniques. J Prosthodont. 2016 Jul; 25(5): 357-63. doi: 10. 1111/jopr. 12400. Epub 2015 Nov 20. PMID: 26588599

220 Mandelaris GA, Vlk SD. Guided implant surgery with placement of a presurgical CAD/CAM patient-specific abutment and provisional in the esthetic zone. Compend Contin Educ Dent. 2014 Jul–Aug; 35(7): 494-504. PMID: 25198877

221 Marra R, Acocella A, Alessandra R, Ganz SD, Blasi A. Rehabilitation of Full-Mouth Edentulism: Immediate Loading of Implants Inserted with Computer-Guided Flapless Surgery Versus Conventional Dentures: A 5-Year Multicenter Retrospective Analysis and OHIP Questionnaire. Implant Dent. 2017 Feb; 26(1): 54–58. doi: 10. 1097/ID. 0000000000000492. PMID: 27749520

222 Martins da Rosa JC, Fadanelli MA, Zimmerman D, de Oliveira Rosa ACP. The application of rapid prototyping to improve bone reconstruction in immediate dentoalveolar restoration: a case report. Int J Esthet Dent. 2017; 12(2): 258-270. PMID: 28653055

223 Maryod WH, Ali SM, Shawky AF. Immediate versus early loading of mini-implants supporting mandibular overdentures: a preliminary 3-year clinical outcome report. Int J Prosthodont. 2014 Nov–Dec; 27(6): 553-60. doi: 10. 11607/ijp. 3845. PMID: 25390870

224 McKinney R, Koth DL. Clinical standards for dental implants. Clark JW, editor. Clinical Dentistry. Harperstown: Harper and Row; 1984. pp. 1–11. 53

225 Meizi E, Meir M, Laster Z.: New-design dental implants: a 1-year prospective clinical study of 344 consecutively placed implants comparing immediate loading versus delayed loading and flapless versus full-thickness flap. Int J Oral Maxillofac Implants. 2014 Jan–Feb; 29(1): e14-21. doi: 10. 11607/jomi. te37. PMID: 24451883

226 Meloni SM, Tallarico M, De Riu G, Pisano M, Deledda A, Lolli FM, Massarelli O, Tullio A.: Guided implant surgery after free-flap reconstruction: Four-year results from a prospective clinical trial. J Craniomaxillofac Surg. 2015 Oct; 43(8): 1348-55. doi: 10. 1016/j. jcms. 2015. 06. 046. Epub 2015 Jul 11. PMID: 26297420

227 Mendonça G, Mendonça DB, Aragão FJ, Cooper LF. Advancing dental implant surface technology--from micron- to nanotopography. Biomaterials. 2008 Oct; 29(28):3822-35. doi: 10.1016/j. biomaterials.2008.05.012. Epub 2008 Jul 9.

228 Mengel R, Schroder T, Flores -de-Jacoby L (2001). Osseointegrated implants in patients treated for generalized chronic periodontitis an d generalized aggressive periodontitis: 3- and 5-year results of a prospective long-term study. J Periodontol 72(977–89).

229 Merheb J, Vercruyssen M, Coucke W, Beckers L, Teughels W, Quirynen M. The fate of buccal bone around dental implants. A 12-month postloading follow-up study. Clin Oral Implants Res. 2017 Jan; 28(1): 103–108. doi: 10. 1111/clr. 12767. Epub 2016 Jan 8. PMID: 26749417

230 Migliorati M, Amorfi ni L, Signori A, Barberis F, Biavati AS, Benedicenti S. Internal bone temperature change during guided surgery preparations for dental implants: an in vitro study. Int J Oral Maxillofac Implants. 2013 Nov–Dec; 28(6): 1464-9. doi: 10. 11607/jomi. 2854.

231 Migliorati M, Amorfini L, Signori A, Biavati AS, Benedicenti S. Clinical and Aesthetic Outcome with Post-Extractive Implants with or without Soft Tissue Augmentation: A 2-Year Randomized Clinical Trial. Clin Implant Dent Relat Res. 2015 Oct; 17(5): 983-95. doi: 10. 1111/ cid. 12194. Epub 2013 Dec 27. PMID: 24373419

232 Mijiritsky E1, Lorean A, Mazor Z, Levin L. Implant Tooth-Supported Removable Partial Denture with at Least 15-Year LongTerm Follow-Up. Clin Implant Dent Relat Res. 2013 Dec 27. doi: 10.1111/cid.12190.

233 Min HG, Kim SG, Oh JS, You JS, Lim SC, Jeong MA. Comparative Study on Osseointegration of Implants After Flap and Flapless Surgery in the Mandible of Dogs. Implant Dent. 2017 Oct; 26(5): 730–734. doi: 10. 1097/ ID. 0000000000000648. PMID: 28846560

234 Miranda M, Bollero P, D'Ovidio N, Marsango V, Barlattani A Jr. Implant surgery and oral anticoagulant therapy: case report. Oral Implantol (Rome). 2014 Dec 27; 7(2): 51–6. eCollection 2014 Apr–Jun. PMID: 25694802

235 Mir-Mari J, Mir-Orfila P, Valmaseda-Castellón E, Gay-Escoda C. Long-term marginal bone loss in 217 machined-surface implants placed in 68 patients with 5 to 9 years of follow-up: a retrospective study. Int J Oral Maxillofac Implants. 2012 Sep-Oct; 27(5):1163–9.

236 Moberg LE, Kondell PA, Kullman L, Heimdahl A, Gynther GW (1999). Evaluation of singletooth restorations on ITI dental implants. A prospective study of 29 patients. Clin Oral Implants Res 10(1):45–53.

237 Mombelli A, Cionca N. Systemic diseases affecting osseointegration therapy. Clin Oral Implants Res. 2006 Oct;17 Suppl 2:97-103. Morris HF, Ochi S, Winkler S. Implant survival in patients with type 2 diabetes: placement to 36 months. Ann Periodontol. 2000 Dec; 5(1):157–65.

238 Moraschini V, Velloso G, Luz D, Barboza EP. Implant survival rates, marginal bone level changes, and complications in full-mouth rehabilitation with flapless computer-guided surgery: a systematic review and meta-analysis. Int J Oral Maxillofac Surg. 2015 Jul; 44(7): 892-901. doi: 10. 1016/j. ijom. 2015. 02. 013. Epub 2015 Mar 17. Review. PMID: 25790741

239 Morgan N, Khawaja N, Obisesan O. Flapless sectioning; Br Dent J. 2013 May; 214(10): 485. doi: 10. 1038/sj. bdj. 2013. 486

240 Mueller CK, Thorwarth M, Chen J, Schulze-Mosgau S. A. (Universität Jena, Deutschland) Laboratory study comparing the effect of ridge exposure using tissue punch versus mucoperiosteal flap on the formation of the implant-epithelial junction. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2012 Jan 25

241 Naert I, Quirynen M, van Steenberghe D, Darius P (1992). A six-year prosthodontic study of 509 consecutively inserted implants for the treatment of partial edentulism. J Prosthet Dent 67(2):236–45.

242 Neukam FW, Buser D (1996). Implantate bei unzureichendem Knochenangebot. In: Implantologie. Praxis der Zahnheilkunde. WWH Koeck B editor. München Wien Baltimore: Urban & Schwarzenberg, pp. 177–218.

243 Neukam, F. Lebenserwartung von Implantaten und Implantatlagern. Deutsche Gesellschaft für Zahn-Mund- und Kieferheilkunde 2000; 00:

244 Nikellis I, Levi A, Nicolopoulos C. Immediate loading of 190 endosseous dental implants: a prospective observational study of 40 patient treatments with up to 2-year data. Int J Oral Maxillofac Implants. 2004 Jan–Feb; 19(1):116–23.

245 Nkenke E, Eitner S, Radespiel-Troger M, Vairaktaris E, Neukam FW, Fenner M. Patient-centred outcomes comparing transmucosal implant placement with an open approach in the maxilla:A prospective, non-randomized pilot study. Clin Oral Implants Res 2007; 18:197–203.

246 Nocini PF, Castellani R, Zanotti G, Bertossi D, Luciano U, De Santis D. The use of computer-guided flapless dental implant surgery (NobelGuide) and immediate function to support a fixed full-arch prosthesis in fresh-frozen homologous patients with bone grafts. J Craniofac Surg. 2013 Nov; 24(6): e551-8. doi: 10. 1097/SCS. 0b013e31829ac8e2. PMID: 24220464

247 Noelken R, Oberhansl F, Kunkel M, Wagner W. Immediately provisionalized OsseoSpeed™ Profile implants inserted into extraction sockets: 3-year results. Clin Oral Implants Res. 2016 Jun; 27(6): 744–9. doi: 10. 1111/ clr. 12651. Epub 2015 Aug 24. PMID: 26300062

248 Odin G, Petitbois R, Cotten P, Philip P. Distraction Osteogenesis Using Bone Matrix Osteotensors in Ectodermal Dysplasia: A Case Report. Implant Dent. 2015 Oct; 24(5): 612–9. doi: 10. 1097/ ID. 0000000000000310. PMID: 26317574

249 Oh JH, An X, Jeong SM, Choi BH. Digital Workflow for Computer-Guided Implant Surgery in Edentulous Patients: A Case Report. J Oral Maxillofac Surg. 2017 Dec; 75(12): 2541–2549. doi: 10. 1016/j. joms. 2017. 08. 008. Epub 2017 Aug 12. PMID: 28881181

250 Olate S, Lyrio MC, de Moraes M, Mazzonetto R, Moreira RW. Influence of diameter and length of implant on early dental implant failure. J Oral Maxillofac Surg. 2010 Feb; 68(2):414–9. doi: 10.1016/j.joms.2009.10.002.

251 Oliveira LB, Gabrielli MA, Gabrielli MF, Pereira-Filho VA. Implant-supported rehabilitation after treatment of atrophic mandibular fractures: report of two cases. Oral Maxillofac Surg. 2015 Dec; 19(4): 427–31. doi: 10. 1007/s10006-015-0507-4. Epub 2015 May 22. PMID: 25994530

252 Oliver R1. Flapless dental implant surgery may improve hard and soft tissue outcomes; J Evid Based Dent Pract. 2012 Sep; 12(3 Suppl): 87–8. doi: 10. 1016/S1532-3382(12)70020-9

253 Olsson M, Gunne J, Astrand P, Borg K (1995). Bridges supported by free-standing implants versus bridges supported by tooth and implant. A five-year prospective study. Clin Oral Implants Res 6(2):114–21.

254 Omura Y, Kanazawa M, Sato D, Kasugai S, Minakuchi S. Comparison of patient-reported outcomes between immediately and conventionally loaded mandibular two-implant overdentures: A preliminary study. J Prosthodont Res. 2016 Jul; 60(3): 185–92. doi: 10. 1016/j. jpor. 2015. 12. 010. Epub 2016 Jan 21. PMID: 26803560

255 Ong CT, Ivanovski S, Needleman IG, Retzepi M, Moles DR, Tonetti MS, Donos N. Systematic review of implant outcomes in treated periodontitis subjects. J Clin Periodontol. 2008 May; 35(5):438–62. doi: 10.1111/j.1600-051X.2008.01207.x.

256 Ortega-Oller I, Suarez F, Galindo-Moreno P, Torrecillas-Martínez L, Monje A, Catena A, Wang HL. The Influence of Implant Diameter Upon its Survival: A Meta-Analysis Based on Prospective Clinical Trials. J Periodontol. 2013 Aug 1.

257 Papaspyridakos P, Chen CJ, Chuang SK, Weber HP. Implant loading protocols for edentulous patients with fixed prostheses: a systematic review and meta-analysis. Int J Oral Maxillofac Implants. 2014; 29 Suppl: 256–70. doi: 10. 11607/jomi. 2014suppl. g4. 3. Review. PMID: 24660202

258 Papaspyridakos P, Rajput N, Kudara Y, Weber HP. Digital Workflow for Fixed Implant Rehabilitation of an Extremely Atrophic Edentulous Mandible in Three Appointments. J Esthet Restor Dent. 2017 May 6; 29(3): 178–188. doi: 10. 1111/jerd. 12290. Epub 2017 Mar 18. PMID: 28316122

259 Papaspyridakos P. Full Mouth Implant Rehabilitation with Staged Approach: 6-Year Clinical Follow-Up. J Esthet Restor Dent. 2015 Jul–Aug; 27(4): 213-23. doi: 10. 1111/jerd. 12158. Epub 2015 May 18. PMID: 25988909

260 Parma-Benfenati S, Roncati M, Tinti C. Treatment of peri-implantitis: surgical therapeutic approaches based on periimplantitis defects. Int J Periodontics Restorative Dent. 2013 Sep–Oct; 33(5):627–33. doi: 10.11607/prd.1549.

261 Parmigiani-Izquierdo JM, Sánchez-Pérez A, Cabaña-Muñoz ME. A pilot study of postoperative pain felt after two implant surgery techniques: a randomized blinded prospective clinical study; Int J Oral Maxillofac Implants. 2013 Sep-Oct; 28(5): 1305-10. doi: 10. 11607/jomi. 3027

262 Passoni BB, Marques de Castro DS, de Araújo MA, de Araújo CD, Piatelli A, Benfatti CA. Influence of immediate/delayed implant placement and implant platform on the peri-implant bone formation. Clin Oral Implants Res. 2016 Nov; 27(11): 1376-1383. doi: 10. 1111/clr. 12750. Epub 2016 Feb 5. PMID: 26848887

263 Peñarrocha-Diago M, Aloy-Prósper A, Peñarrocha-Oltra D, Guirado JL, Peñarrocha-Diago M. Localized lateral alveolar ridge augmentation with block bone grafts: simultaneous versus delayed implant placement: a clinical and radiographic retrospective study. Int J Oral Maxillofac Implants. 2013 May–Jun; 28(3):846–53. doi: 10.11607/jomi.2964.

264 Pjetursson BE, Helbling C, Weber HP, Matuliene G, Salvi GE, Brägger U, Schmidlin K, Zwahlen M, Lang NP. Peri-implantitis susceptibility as it relates to periodontal therapy and supportive care. Clin Oral Implants Res. 2012 Jul; 23(7):888–94. doi: 10.1111/j.1600-0501.2012.02474.x. Epub 2012 Apr 24.

265 Pjetursson BE1, Tan K, Lang NP, Brägger U, Egger M, Zwahlen M. A systematic review of the survival and complication rates of fixed partial dentures (FPDs) after an observation period of at least 5 years. Clin Oral Implants Res. 2004 Dec; 15(6):625–42.

266 Pérez-Albacete Martínez C, Vlahović Z, Šćepanović M, Videnović G, Barone A, Calvo-Guirado JL. Submerged flapless technique vs. conventional flap approach for implant placement: experimental domestic pig study with 12-month follow-up. Clin Oral Implants Res. 2016 Aug; 27(8): 964-8. doi: 10. 1111/clr. 12665. Epub 2015 Jul 3. PMID: 26147852

267 Pisoni L, Ordesi P, Siervo P, Bianchi AE, Persia M, Siervo S. Flapless Versus Traditional Dental Implant Surgery: Long-Term Evaluation of Crestal Bone Resorption. J Oral Maxillofac Surg. 2016 Jul; 74(7): 1354-9. doi: 10. 1016/j. joms. 2016. 01. 053. Epub 2016 Feb 13. PMID: 26954560

268 Pommer B, Becker K, Arnhart C, Fabian F, Rathe F, Stigler RG. How meta-analytic evidence impacts clinical decision making in oral implantology: a Delphi opinion poll. Clin Oral Implants Res. 2016 Mar; 27(3): 282-7. doi: 10. 1111/clr. 12528. Epub 2014 Dec 18. PMID: 25523402

269 Pommer B, Busenlechner D, Fürhauser R, Watzek G, Mailath-Pokorny G, Haas R. Trends in techniques to avoid bone augmentation surgery: Application of short implants, narrow-diameter implants and guided surgery. J Craniomaxillofac Surg. 2016 Oct; 44(10): 1630–1634. doi: 10. 1016/j. jcms. 2016. 08. 012. Epub 2016 Aug 21. PMID: 27637478

270 Pommer B, Mailath-Pokorny G, Haas R, Busenlechner D, Fürhauser R, Watzek G. Patients' preferences towards minimally invasive treatment alternatives for implant rehabilitation of edentulous jaws. Eur J Oral Implantol. 2014 Summer; 7 Suppl 2: S91–109. Review. PMID: 24977244

271 Pommer B, Valkova V, Ubaidha Maheen C, Fürhauser L, Rausch-Fan X, Seeman R. Scientific Interests of 21st Century Clinical Oral Implant Research: Topical Trend Analysis. Clin Implant Dent Relat Res. 2016 Aug; 18(4): 850-6. doi: 10. 1111/cid. 12371. Epub 2015 Aug 28. Review. PMID: 26315310

272 Porter JA, von Fraunhofer JA. Success or failure of dental implants? A literature review with treatment considerations. Gen Dent. 2005 Nov-Dec; 53(6):423–32; quiz 433, 446.

273 Pozzi A, Tallarico M, Marchetti M, Scarfò B, Esposito M. Computer-guided versus free-hand placement of immediately loaded dental implants: 1-year post-loading results of a multicentre randomised controlled trial. Eur J Oral Implantol. 2014 Autumn; 7(3): 229-42. PMID: 25237668

274 Prashanti E, Sajjan S, Reddy JM. Failures in implants. Indian J Dent Res. 2011 May–Jun; 22(3):446–53. doi: 10.4103/0970-9290.87069.

275 Prati C, Zamparini F, Scialabba VS, Gatto MR, Piattelli A, Montebugnoli L, Gandolfi MG. A 3-Year Prospective Cohort Study on 132 Calcium Phosphate-Blasted Implants: Flap vs Flapless Technique. Int J Oral Maxillofac Implants. 2016 Mar–Apr; 31(2): 413-23. doi: 10. 11607/jomi. 4623. PMID: 27004288

276 Prithviraj DR, Gupta V, Muley N, Sandhu P. One-piece implants: placement timing, surgical technique, loading protocol, and marginal bone loss; J Prosthodont. 2013 Apr; 22(3): 237-44. doi: 10. 1111/j. 1532-849X. 2012. 00928. x. Epub 2012 Sep 17

277 Pruin EH (1974). [Long experience with implants]. Quintessenz 25(1):13-22 contd. Richter E-J, Jansen VK, Spiekermann H, Jovanovic SA (1992). Langzeitergebnisse von IMZ- und TPS-Implantaten im interforaminalen Bereich des zahnlosen Unterkiefers. Dtsch. zahnärztl. Z 47:449.

278 Raghoebar GM, Meijer HJA, van Minnen B, Vissink A. Immediate Reconstruction of Failed Implants in the Esthetic Zone Using a Flapless Technique and Autogenous Composite Tuberosity Graft. J Oral Maxillofac Surg. 2017 Sep 11. pii: S0278-2391(17)31169-2. doi: 10. 1016/j. joms. 2017. 09. 005. PMID: 28972882

279 Rajput N, K P S, G R, S C C, Mohammed J. Minimally invasive transmucosal insertion and immediate provisonalization of one-piece implant in partially edentulous posterior mandible. J Clin Diagn Res. 2013 Sep; 7(9): 2070-3. doi: 10. 7860/JCDR/2013/5580. 3408. Epub 2013 Sep 10

280 Ramanauskaite, A. & Juodzbalys, G. Diagnostic Principles of Peri-Implantitis:a Systematic Review and Guidelines for Peri-Implantitis Diagnosis Proposal. JOral Maxillofac Res 2016; 7:e8.

281 Ren SX, Hu XL, Li JH, Jiang X, Lin Y. A minimally invasive extraction technique using Benex Extraction System in flapless immediate implant placement in anterior teeth. Shanghai Kou Qiang Yi Xue. 2016 Jun; 25(3): 334–9. Chinese. PMID: 27609389

282 Richter E-J (1996). Diagnostik, Planung und Aufklärung aus prothetischer Sicht München, Wien, Baltimore: Urban & Schwarzenberg. Richter E-J, Spiekermann H (1996). Prothetische Versorgung München, Wien, Baltimore: Urban & Schwarzenberg.

283 Rocchietta I, Nisand D. A review assessing the quality of reporting of risk factor research in implant dentistry using smoking, diabetes and periodontitis and implant loss as an outcome: critical aspects in design and outcome assessment. J Clin Periodontol. 2012 Feb; 39 Suppl 12:114-21. doi: 10.1111/j.1600-051X.2011.01829.x. 56

284 Roccuzzo M, De Angelis N, Bonino L, Aglietta M. Ten-year results of a three-arm prospective cohort study on implants in periodontally compromised patients. Part 1: implant loss and radiographic bone loss. Clin Oral Implants Res. 2010 May; 21(5):490–6. doi: 10.1111/j.1600-0501.2009.01886.x. Epub 2010 Mar 11. Rocci A, Rocci M, Scoccia A, Martignoni M, Gottlow J, Sennerby L. Immediate loading of maxillary prostheses using flapless surgery, implant placement in predetermined positions, and prefabricated provisional restorations. Part 2: a retrospective 10-year clinical study; Int J Oral Maxillofac Implants. 2012 Sep–Oct; 27(5): 1199–204.

285 Rodrigo D, Martin C, Sanz M. Biological complications and peri-implant clinical and radiographic changes at immediately placed dental implants. A prospective 5-year cohort study. Clin Oral Implants Res. 2012 Oct; 23(10):1224–31. doi: 10.1111/j.1600-0501.2011.02294.x. Epub 2011 Aug 18.

286 Romero-Ruiz MM, Mosquera-Perez R, Gutierrez-Perez JL, Torres-Lagares D. Flapless implant surgery: A review of the literature and 3 case reports. J Clin Exp Dent. 2015 Feb 1; 7(1): e146-52. doi: 10. 4317/jced. 51985. eCollection 2015 Feb. Review. PMID: 25810827

287 Saadoun AP, Landsberg CJ. Treatment classifications and sequencing for postextraction implant therapy: a review. Pract Periodontics Aesthet Dent. 1997 Oct;9(8):933-41; quiz 942. Sakka S, Baroudi K, Nassani MZ. Factors associated with early and late failure of dental implants. J Investig Clin Dent. 2012 Nov; 3(4):258–61. doi: 10.1111/j.2041-1626.2012.00162.x. Epub 2012 Aug 27.

288 Salinas TJ, Eckert SE. In patients requiring single-tooth replacement, what are the outcomes of implant- as compared to tooth-supported restorations? Int J Oral Maxillofac Implants. 2007; 22 Suppl:71–95.

289 Sarnachiaro GO, Chu SJ, Sarnachiaro E, Gotta SL, Tarnow DP. Immediate Implant Placement into Extraction Sockets with Labial Plate Dehiscence Defects: A Clinical Case Series. Clin Implant Dent Relat Res. 2016 Aug; 18(4): 821–9. doi: 10. 1111/cid. 12347. Epub 2015 Apr 27. PMID: 25916859

290 Sato D, Kanazawa M, Kim YK, Yokoyama S, Omura Y, Ozeki M, Minakuchi S, Kasugai S, Baba K. Immediate loading of two freestanding implants placed by computer-guided flapless surgery supporting a mandibular overdenture with magnetic attachments. J Prosthodont Res. 2016 Jan; 60(1): 54–62. doi: 10. 1016/j. jpor. 2015. 09. 002. Epub 2015 Oct 1. PMID: 26431687

291 Sato RK, Thomé G, Fontão FNGK, de Melo Filho A, Melo ACM. Morse Taper Implants Immediately Loaded in Fresh Extraction Sockets: A Prospective Cohort Study. Implant Dent. 2017 Jun; 26(3): 345–350. doi: 10. 1097/ID. 0000000000000575. PMID: 28362688

292 Schaefer F, Pistner H, Sieger J, Schaefer D. Interdisziplinäre Zusammenarbeit bei navigierter Implantation; Jahrbuch Implantologie 2012; 128–131

293 Schaefer F, Schaefer D, Zäuner MC, Sieger J. Sicher interdisziplinär navigieren; Digital dentistry Ausgabe 1-2013 Seite 6–9

294 Schaller C, Richter E-J (2000). Verankerungselemente für implantatgestützten Zahnersatz im zahnlosen Kiefer. Implantologie 4:353.

295 Scherer MD, Ingel AP, Rathi N. Flapped or flapless surgery for narrow-diameter implant placement for overdentures: advantages, disadvantages, indications, and clinical rationale; Int J Periodontics Restorative Dent. 2014; 34 Suppl 3: s89–95. doi: 10. 11607/prd. 1581.

296 Scherer MD, Ingel AP, Rathi N. Flapped or flapless surgery for narrow-diameter implant placement for overdentures: advantages, disadvantages, indications, and clinical rationale. Int J Periodontics Restorative Dent. 2014; 34 Suppl 3: s89-95. doi: 10. 11607/prd. 1581. Review. PMID: 24956097

297 Scheuber S, Hicklin S, Brägger U. Implants versus short-span fixed bridges: survival, complications, patients' benefits. A systematic review on economic aspects. Clin Oral Implants Res. 2012 Oct;23 Suppl 6:50–62. doi: 10.1111/ j.1600- 0501.2012.02543.x.

298 Schimmel M, Müller F, Suter V, Buser D. Implants for elderly patients. Periodontol 2000. 2017 Feb; 73(1): 228–240. doi: 10. 1111/prd. 12166. Review. PMID: 28000268

299 Schiroli G, Angiero F, Zangerl A, Benedicenti S, Ferrante F, Widmann G. Accuracy of a flapless protocol for computer-guided zygomatic implant placement in human cadavers: expectations and reality. Int J Med Robot. 2016 Mar; 12(1): 102-8. doi: 10. 1002/rcs. 1646. Epub 2015 Jan 27. PMID: 25625236

300 Schmidlin K, Schnell N, Steiner S, Salvi GE, Pjetursson B, Matuliene G, Zwahlen M, Brägger U, Lang NP. Complication and failure rates in patients treated for chronic periodontitis and restored with single crowns on teeth and/or implants. Clin Oral Implants Res. 2010 May; 21(5):550–7. doi: 10.1111/j.1600-0501.2009.01907.x.

301 Schnitman PA, Hayashi C, Han RK. Why guided when freehand is easier, quicker, and less costly?; J Oral Implantol. 2014 Dec; 40(6): 670–8. doi: 10. 1563/aaid-joi-D-14-00231.

302 Schnitman PA, Shulman LB (1980). Dental implants: Benefit and risk. Proceedings of an NIH Harvard consensus development conference 1978. National Institute of Health (NIH) Harvard consensus development conference, Bethesda.

303 Schnitman PA, Shulman LB. Recommendations of the consensus development conference on dental implants. J Am Dent Assoc. 1979 Mar; 98(3):373–7.

304 Schnutenhaus S. Navigiertes Implantieren – Probleme erkennen und vermeiden; Jahrbuch der Implantologie 2012; 48–50

305 Schroeder A, Pohler O, Sutter F (1976). [Tissue reaction to an implant of a titanium hollow cylinder with a titanium surface spray layer]. SSO Schweiz Monatsschr Zahnheilkd 86(7):713–27.

306 Schropp L, Isidor F. Timing of implant placement relative to tooth extraction. J Oral Rehabil. 2008 Jan; 35 Suppl 1:33–43. doi: 10.1111/j.1365-2842.2007.01827.x.

307 Schulte W, Kleineikenscheidt H, Schareyka R, Heimke G (1978). [Concept and testing of the Tubingen immediate implant]. Dtsch Zahnarztl Z 33(5):319–25.

308 Schulz MC, Korn P, Stadlinger B, Range U, Möller S, Becher J, Schnabelrauch M, Mai R, Scharnweber D, Eckelt U, Hintze V. Coating with artificial matrices from collagen and sulfated hyaluronan influences the osseointegration of dental implants. J Mater Sci Mater Med. 2013 Oct 11.

309 Schwarz F, Terheyden H. Significance of dental implants for health care. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 2011 Sep; 54(9):1097–101. doi: 10.1007/s00103-011-1343-9.

310 Schwarz F, Sculean A, Rothamel D, Schwenzer K, Georg T, Becker J. Clinical evaluation of an Er:YAG laser for nonsurgical treatment of peri-implantitis: a pilot study. Clin Oral Implants Res. 2005 Feb; 16(1):44–52.

311 Schwarz, F. & Becker, J. Die Behandlung periimplantärer Infektionen an Zahnimplantaten – S3-Leitlinie Periimplantitis (Langversion). AWMF online – Das Portal der wissenschaftlichen Medizin 2016

312 Scialom J (1965). Implants aiguilles (pin implants). J Oral Implant Transplant Surg 11(18–23).

313 Sclar AG. Guidelines for flapless surgery. J Oral Maxillofac Surg 2007; 65:20–32.

314 Sclar AG. Preserving alveolar ridge anatomy following tooth removal in conjunction with immediate implant placement. The Bio-Col technique. Atlas Oral Maxillofac Surg Clin North Am 1999; 7:39–59.

315 Senna P, Antoninha Del Bel Cury A, Kates S, Meirelles L. Surface Damage on Dental Implants with Release of Loose Particles after Insertion into Bone. Clin Implant Dent Relat Res. 2013 Nov 28. doi: 10.1111/cid.12167.

316 Shadid RM, Sadaqah NR, Othman SA. Does the Implant Surgical Technique Affect the Primary and/or Secondary Stability of Dental Implants? A Systematic Review. Int J Dent. 2014; 2014: 204838. doi: 10. 1155/2014/204838. Epub 2014 Jul 7. Review. PMID: 25126094

317 Shen P, Zhao J, Fan L, Qiu H, Xu W, Wang Y, Zhang S, Kim YJ.: Accuracy evaluation of computer-designed surgical guide template in oral implantology. J Craniomaxillofac Surg. 2015 Dec; 43(10): 2189–94. PMID: 26776292

318 Singhal MK, Billing RK, Srivastava N, Khan Z. A 2D Panoramic Surgical Stent Imaging: Complete Arch Mandibular Implant Fixed Prosthesis along with Bar Supported Maxillary over Denture. Contemp Clin Dent. 2017 Apr–Jun; 8(2): 332–336. doi: 10. 4103/ccd. ccd_472_17. PMID: 28839424

319 Snauwaert, K., Duyck, J., van Steenberghe, D., Quirynen, M. & Naert, I. Time dependent failure rate and marginal bone loss of implant supported prostheses: a 15-year follow-up study. Clinical oral investigations 2000;4:13–20.

320 Soardi CM, Bramanti E, Cicciù M. Clinical and radiological 12-year follow-up of full arch maxilla prosthetic restoration supported by dental implants positioned through guide flapless surgery. Minerva Stomatol. 2014 Mar; 63(3): 85–94. English, Italian. PMID: 24632800

321 Sohrabi K1, Mushantat A, Esfandiari S, Feine J. How successful are small-diameter implants? A literature review. Clin Oral Implants Res. 2012 May; 23(5):515–25. doi: 10.1111/j.1600-0501.2011.02410.x. Epub 2012 Feb 7.

322 Spiekermann H (1994). Implantologie Stuttgart-New York: Rateitschak, K. Wolf, H.F. Tetsch P, Ackermann KL, Behneke N, Galandi M, Geis-Gerstorfer J, Kerschbaum T, Krämer A, Krekeler G, Nentwig GH, Richter EJ, Schulte W, Spiekermann H, Strunz V, Wagner W, Watzek G, Weber H (1990). Konsensus -Konferenz zur Implantologie, 18.10.1989 in Mainz. Z Zahnärztl Implantol VI (5–14).

323 Spinelli D, Ottria L, DE Vico G, Bollero R, Barlattani A, Bollero P. Full rehabilitation with nobel clinician and procera implant bridge : case report. Oral Implantol (Rome). 2013 Oct 15; 6(2): 25–36. eCollection 2013. PMID: 24175051

324 Stokholm R, Isidor F, Nyengaard JR. Histologic and histomorphometric evaluation of peri-implant bone of immediate or delayed occlusal-loaded non-splinted implants in the posterior mandible – an experimental study in monkeys. Clin Oral Implants Res. 2013 Oct 10. doi: 10.1111/clr.12274.

325 Stoupel J, Lee CT, Glick J, Sanz-Miralles E, Chiuzan C, Papapanou PN. Immediate implant placement and provisionalization in the aesthetic zone using a flapless or a flap-involving approach: a randomized controlled trial. J Clin Periodontol. 2016 Dec; 43(12): 1171–1179. doi: 10. 1111/jcpe. 12610. Epub 2016 Oct 17. PMID: 27501953

326 Strietzel, F. P., Lange, K. P., Svegar, M., Hartmann, H. J. & Kuchler, I. Retrospective evaluation of the success of oral rehabilitation using the Frialit-2 implant system. Part 1: Influence of topographic and surgical parameters. The International journal of prosthodontics 2004;17:187-194.

327 Suárez-López Del Amo F, Lin GH, Monje A, Galindo-Moreno P, Wang HL. Influence of Soft Tissue Thickness on Peri-Implant Marginal Bone Loss: A Systematic Review and Meta-Analysis. J Periodontol. 2016 Jun; 87(6): 690–9. doi: 10. 1902/ jop. 2016. 150571. Epub 2016 Jan 16. PMID: 26777766

328 Sunitha RV, Sapthagiri E. Flapless implant surgery: a 2-year follow-up study of 40 implants; Oral Surg Oral Med Oral Pathol Oral Radiol. 2013 Oct; 116(4): e237–43. doi: 10. 1016/j. oooo. 2011. 12. 027. Epub 2012 Jul 20

329 Swierkot K, Lottholz P, Flores-de-Jacoby L, Mengel R. Mucositis, peri-implantitis, implant success, and survival of implants in patients with treated generalized aggressive periodontitis: 3- to 16-year results of a prospective long-term cohort study. J Periodontol. 2012 Oct; 83(10):1213–25. Epub 2012 Jan 20.

330 Takemae R, Uemura T, Okamoto H, Matsui T, Yoshida M, Fukazawa S, Tsuchida K, Teruya K, Tsunoda T. Changes in mental health and quality of life with dental implants as evaluated by General Health Questionnaire (GHQ) and Health Utilities Index (HUI). Environ Health Prev Med. 2012 Nov; 17(6):463–73. doi: 10.1007/s12199-012-0275-9. Epub 2012 Apr 13.

331 Tan WL, Wong TL, Wong MC, Lang NP. A systematic review of post-extractional alveolar hard and soft tissue dimensional changes in humans. Clin Oral Implants Res. 2012 Feb; 23 Suppl 5:1–21. doi: 10.1111/j.1600-0501.2011.02375.x.

332 Tarnow DP, Chu SJ, Salama MA, Stappert CF, Salama H, Garber DA, Sarnachiaro GO, Sarnachiaro E, Gotta SL, Saito H. Flapless postextraction socket implant placement in the esthetic zone: part 1. The effect of bone grafting and/or provisional restoration on facial-palatal ridge dimensional change-a retrospective cohort study. Int J Periodontics Restorative Dent. 2014 May–Jun; 34(3): 323–31. doi: 10. 11607/prd. 1821. PMID: 24804283

333 Tarnow DP, Pérez JM, Ghamid SS, Manasse M, Froum SJ, Shabeesh M, Cho SC. A new technique to identify the location of the mucogingival junction on computer tomographic scans before implant placement. Implant Dent. 2015 Jun; 24(3): 338–42. doi: 10. 1097/ID. 0000000000000260. PMID: 25909489

334 Temmerman, A. et al. Oral implant placement and restoration by undergraduate students: clinical outcomes and student perceptions. Eur J Dent Educ 2016; 20:73–83

335 Tetsch, P. Misserfolge bei enossal verankerten Implantaten. Deutsche zahnärztliche Zeitschrift 1977; 32:302–304.

336 Tetsch, J., Tetsch, P. & Lysek, D. A. Long-term results after lateral and osteotome technique sinus floor elevation: a retrospective analysis of 2190 implants over a time period of 15 years. Clin Oral Implants Res 2010;21:

337 Tian JH, Di P, Lin Y, Zhang Y, Wei DH, Cui HY. A pilot clinical study of immediate provisionalization with a chairside computer aided design and computer aided manufacture monolithic crown for single tooth immediate implant placement. Zhonghua Kou Qiang Yi Xue Za Zhi. 2017 Jan 9; 52(1): 3-9. doi: 10. 3760/cma. j. issn. 1002-0098. 2017. 01. 002. Chinese. PMID: 28072987

338 Tomisa AP, Launey ME, Lee JS, Mankani MH, Wegst UG, Saiz E. Nanotechnology approaches to improve dental implants. Int J Oral Maxillofac Implants. 2011; 26 Suppl:25–44; discussion 45–9. 60

339 Tomisa AP, Lee JS, Wegst UG, Saiz E. Nanotechnology for dental implants. Int J Oral Maxillofac Implants. 2013 Nov–Dec; 28(6):e535–46. doi: 10.11607/jomi.te34.

340 Torabinejad M, Anderson P, Bader J, Brown LJ, Chen LH, Goodacre CJ, Kattadiyil MT, Kutsenko D, Lozada J, Patel R, Petersen F, Puterman I, White SN. Outcomes of root canal treatment and restoration, implant-supported single crowns, fixed partial dentures, and extraction without replacement: a systematic review. J Prosthet Dent. 2007 Oct; 98(4):285–311.

341 Tsoukaki M, Kalpidis CD, Sakellari D, Tsalikis L, Mikrogioigis G, Konstantinidis A. Clinical, radiographic, microbiological, and immunological outcomes of flapped vs. flapless dental implants: a prospective randomized controlled clinical trial. Clinic Oral Implants Res, 2012 Jun 18

342 Urban T, Kostopoulos L, Wenzel A. Immediate implant placement in molar regions: risk factors for early failure. Clin Oral Implants Res. 2012 Feb; 23(2):220–7. doi: 10.1111/j.1600-0501.2011.02167.x. Epub 2011 Apr 4.

343 Vandeweghe S1, Koole S, Younes F, De Coster P, De Bruyn H. Dental implants placed by undergraduate students: clinical outcomes and patients'/students' perceptions. Eur J Dent Educ. 2014 Mar; 18 Suppl 1:60-9. doi: 10.1111/eje.12077.

344 Van der Zee E, Oosterveld P, Van Waas MA. Effect of GBR and fixture installation on gingiva and bone levels at adjacent teeth. Clin Oral Implants Res 2004; 15:62–65.

345 Van Steenberghe D. Periodontal aspects of osseointegrated oral implants modum Brånemark. Dent Clin North Am 1988; 32:355–370.

346 Vercruyssen M, De Laat A, Coucke W, Quirynen M. An RCT comparing patient-centred outcome variables of guided surgery (bone or mucosa supported) with conventional implant placement. J Clin Periodontol. 2014 Jul; 41(7): 724–32. doi: 10. 1111/jcpe. 12257. Epub 2014 May 27. PMID: 24708422

347 Verhamme LM, Meijer GJ, Bergé SJ, Soehardi RA, Xi T, de Haan AF, Schutyser F, Maal TJ. An Accuracy Study of Computer-Planned Implant Placement in the Augmented Maxilla Using Mucosa-Supported Surgical Templates. Clin Implant Dent Relat Res. 2015 Dec; 17(6): 1154–63. doi: 10. 1111/cid. 12230. Epub 2014 Sep 2. PMID: 25181255

348 Verhamme LM, Meijer GJ, Soehardi A, Bergé SJ, Xi T, Maal TJJ. An accuracy study of computer-planned implant placement in the augmented maxilla using osteosynthesis screws. Int J Oral Maxillofac Surg. 2017 Apr; 46(4): 511–517. doi: 10. 1016/j. ijom. 2016. 10. 013. Epub 2016 Nov 22. PMID: 27887876

349 Vervaeke S, Collaert B, Cosyn J, Deschepper E, De Bruyn H. A Multifactorial Analysis to Identify Predictors of Implant Failure and Peri-Implant Bone Loss. Clin Implant Dent Relat Res. 2013 Sep 4. doi: 10.1111/cid.12149.

350 Vlahovic Z, Markovic A, Golubovic M, Scepanovic M, Kalanovic M, Djinic A. Histopathological comparative analysis of peri-implant soft tissue response after dental implant placement with flap and flapless surgical technique. Experimental study in pigs. Clin Oral Implants Res. 2015 Nov; 26(11): 1309–14. doi: 10. 1111/clr. 12456. Epub 2014 Jul 14. PMID: 25039366

351 Vlahović Z, Marković A, Lazić Z, Šćepanović M, Đinić A, Kalanović M. Histopathological comparative analysis of periimplant bone inflammatory response after dental implant insertion using flap and flapless surgical technique. An experimental study in pigs. Clin Oral Implants Res. 2017 Sep; 28(9): 1067–1073. doi: 10. 1111/clr. 12919. Epub 2016 Jul 8. PMID: 27393033

352 Vlahovic Z, Markovic A, Golubovic M, Scepanovic M, Kalanovic M, Djinic A. Histopathological comparative analysis of peri-implant soft tissue response after dental implant placement with flap and flapless surgical technique. Experimental study in pigs; Clin Oral Implants Res. 2014 Jul 14. doi: 10. 1111/clr. 12456.

353 Vlahović Z, Mihailović B, Lazić Z, Golubović M. Comparative radiographic and resonance frequency analyses of the peri-implant tissue after dental implants placement using flap and flapless techniques: an experimental study on domestic pigs; Vojnosanit Pregl. 2013 Jun; 70(6): 586–94.

354 Vockner H (2001). Periimplantitis auch durch Implantate – Entzündliche Veränderungen im Weichgewebe mit Knochendestruktion. Zahnarzt 5(10)

355 Vohra F, Al-Kheraif AA, Almas K, Javed F. Comparison of crestal bone loss around dental implants placed in healed sites using flapped and flapless techniques: a systematic review. J Periodontol. 2015 Feb; 86(2): 185-91. doi: 10. 1902/jop. 2014. 140355. Epub 2014 Sep 4. Review. PMID: 25186777

356 Voulgarakis A, Strub JR, Att W. Outcomes of implants placed with three different flapless surgical procedures: A systematic review. Int J Oral Maxillofac Surg. 2013 Nov 27. pii: S09015027(13)01163-6. doi: 10. 1016/j. ijom. 2013. 10. 024.

357 Voulgarakis A, Strub JR, Att W. Outcomes of implants placed with three different flapless surgical procedures: a systematic review. Int J Oral Maxillofac Surg. 2014 Apr; 43(4): 476–86. doi: 10. 1016/j. ijom. 2013. 10. 024. Epub 2013 Nov 27. Review. PMID: 24290308

358 Voulgarakis A, Strub JR, Att W. Outcomes of implants placed with three different flapless surgical procedures: a systematic review; Int J Oral Maxillofac Surg. 2014 Apr; 43(4): 476–86. doi: 10. 1016/j. ijom. 2013. 10. 024. Epub 2013 Nov 27

359 Wadhwa B, Jain V, Bhutia O, Bhalla AS, Pruthi G. Flapless versus open flap techniques of implant placement: A 15-month follow-up study. Indian J Dent Res. 2015 Jul–Aug; 26(4): 372–7. doi: 10. 4103/0970-9290. 167629. PMID: 26481883

360 Wahlström M, Sagulin GB, Jansson LE. Clinical follow-up of unilateral, fixed dental prosthesis on maxillary implants. Clin Oral Implants Res. 2010 Nov; 21(11):1294–300.

361 Wallkamm B, Ciocco M, Ettlin D, Syfrig B, Abbott W, Listrom R, Levin BP, Rosen PS. Three-year outcomes of Straumann Bone Level SLActive dental implants in daily dental practice: a prospective non-interventional study. Quintessence Int. 2015 Jul-Aug; 46(7): 591–602. doi: 10. 3290/j. qi. a34076. PMID: 25918761

362 Wang F, Huang W, Zhang Z, Wang H, Monje A, Wu Y. Minimally invasive flapless vs. flapped approach for single implant placement: a 2-year randomized controlled clinical trial. Clin Oral Implants Res. 2017 Jun; 28(6): 757–764. doi: 10. 1111/clr. 12875. Epub 2016 May 19. PMID: 27198588

363 Warrer K, Buser D, Lang NP, Karring T. Plaque-induced periimplantitis in the presence or absence of keratinized mucosa. An experimental study in monkeys. Clin Oral Implants Res 1995; 6:131–138.

364 Watanabe F, Hata Y, Komatsu S, Ramos TC, Fukuda H. Finite element analysis of the influence of implant inclination, loading position, and load direction on stress distribution. Odontology. 2003 Sep; 91(1):31–6.

365 Weibrich Gernot, Al-Nawas Bilal: Erfolgsaussichten implantologischer Maßnahmen. Fortbildungsteil 2/2001. https://www.unimedizin-mainz.de/Prothetik/Weibrich/Images/Artikel/zm%202001.pdf

366 Weigl P, Strangio A. The impact of immediately placed and restored single-tooth implants on hard and soft tissues in the anterior maxilla. Eur J Oral Implantol. 2016; 9 Suppl 1: S89-106. Review. PMID: 27314114

367 Weng D, Nagata MJ, Leite CM, de Melo LG, Bosco AF. Influence of microgap location and configuration on radiographic bone loss in nonsubmerged implants: an experimental study in dogs. Int J Prosthodont. 2011 Sep–Oct; 24(5):445–52.

368 Wennström JL, Bengazi F, Lekholm U. The influence of the masticatory mucosa on the peri-implant soft tissue condition. Clin Oral Implants Res 1994; 5:1–8.

369 Winkler S, Morris HF, Ochi S. Implant survival to 36 months as related to length and diameter. Ann Periodontol. 2000 Dec; 5(1):22–31.

370 Wittneben JG1, Buser D, Salvi GE, Bürgin W, Hicklin S, Brägger U. Complication and Failure Rates with Implant-Supported Fixed Dental Prostheses and Single Crowns: A 10-Year Retrospective Study. Clin Implant Dent Relat Res. 2013 Apr 2. doi: 10.1111/cid.12066.

371 Wood DL, Hoag PM, Donnenfeld OW, Rosenfeld LD. Alveolar crest reduction following full and partial thickness flaps. J Periodontol 1972; 43:141–144.

372 Xu L, Wang X, Zhang Q, Yang W, Zhu W, Zhao K. Immediate versus early loading of flapless placed dental implants: a systematic review. J Prosthet Dent. 2014 Oct; 112(4): 760–9. doi: 10. 1016/j. prosdent. 2014. 01. 026. Epub 2014 May 13. Review. PMID: 24831750

373 Xu L, Wang Y, Nguyen VT, Chen J. Effects of Topical Antibiotic Prophylaxis on Wound Healing After Flapless Implant Surgery: A Pilot Study. J Periodontol. 2016 Mar; 87(3): 275–80. doi: 10. 1902/jop. 2015. 150464. Epub 2015 Nov 5. PMID: 26537369

374 Yadav R, Agrawal KK, Rao J, Anwar M, Alvi HA, Singh K, Himanshu D. Crestal Bone Loss under Delayed Loading of Full Thickness Versus Flapless Surgically Placed Dental Implants in Controlled Type 2 Diabetic Patients: A Parallel Group Randomized Clinical Trial. J Prosthodont. 2016 Oct 12. doi: 10. 1111/jopr. 12549. PMID: 27731955

375 Yamada J, Kori H, Tsukiyama Y, Matsushita Y, Kamo M, Koyano K. Immediate loading of complete-arch fixed prostheses for edentulous maxillae after flapless guided implant placement: a 1-year prospective clinical study. Int J Oral Maxillofac Implants. 2015 Jan-Feb; 30(1): 184–93. doi: 10. 11607/jomi. 3679. PMID: 25615924

376 Yang W, Ouyang XY. Radiographic and Clinical Outcomes of Ridge Augmentation in Molar Extraction Sockets with Severe Bone Wall Defect. Chin J Dent Res. 2015; 18(4): 221–8. doi: 10. 3290/j. cjdr. a35146. PMID: 26629555

377 You TM, Choi BH, LI J, Xuan F, Jeong SM, Jang SO. Morphogenesis of the peri-implant mucosa: A comparison between flap and flapless procedures in the canine mandible. Oral Surg Oral Med Oral Pathol Otal Radiol Endod 2009; 107: 66–70

378 Zetterqvist L, Feldman S, Rotter B, Vincenzi G, Wennström JL, Chierico A, Stach RM, Kenealy JN. A prospective, multicenter, randomized-controlled 5-year study of hybrid and fully etched implants for the incidence of peri-implantitis. J Periodontol. 2010 Apr; 81(4):493–501. doi: 10.1902/jop.2009.090492.

379 Ziegler A, Lange S, Bender R. [Survival analysis: properties and Kaplan-Meier method]. [Article in German] Dtsch Med Wochenschr. 2007; 132 Suppl 1:e36-8. 62

380 Zupnik J, Kim SW, Ravens D, Karimbux N, Guze K. Factors associated with dental implant survival: a 4-year retrospective analysis. J Periodontol. 2011 Oct; 82(10):1390–5. doi: 10.1902/jop.2011.100685. Epub 2011 Mar 21.

381 Zweers J, van Doornik A, Hogendorf EA, Quirynen M, Van der Weijden GA. Clinical and radiographic evaluation of narrow- vs. regular-diameter dental implants: a 3-year follow-up. A retrospective study. Clin Oral Implants Res. 2013 Dec 20. doi: 10.1111/clr.12309.

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