ElumMed
YOUR MEDICAL-DENTAL INFORMATION SUPPLEMENT
JANUARY 2015 N°1

Implantology

Editorial

Dear Colleagues,

Ours is a continually evolving profession, requiring constant adaptation to new demands.

Pierre Fabre Oral Care is well aware of this and wishes to build its presence alongside you, by offering a new service: ELUMED.

The objective of ELUMED is to propose scientific articles that are relevant to you (meta-analysis, literature reviews, recommendations/guidelines), providing an update (consensus/points of contention) on aspects of your daily clinical practice.

Issued twice yearly, the scientific and medical data in our features will help you to keep up with prolific scientific current events.

We would be delighted to receive your feedback and help ELUMED develop, so that in the long term it can become an integral part of your professional environment.

Dear Colleagues, it is therefore with great pleasure that we publish this first edition and look forward to seeing you next time.

Enjoy reading!

Jean-Philippe GATIGNOL MD,
PFOC Medical Manager.

How could we publish our first issue without broaching the subject of Implantology?

This "young" odontological discipline, which is ever more widely practiced in dental clinics, attracting numerous practitioners, is part of the therapeutic arsenal that is essential in caring for patients.

The main founding principle of implantology (osseointegration) considered as acquired and the significant "secondary" progress (implant surface, periodontal plastic surgery, x-ray examination, immediate implant placement, etc.) have guaranteed the "success" of this discipline.

For this reason, patient expectations in terms of functional and esthetic results, as well as durability, are today perfectly legitimate.

Numerous congresses, publications and scientific works are devoted to this discipline, thus fueling the medical-scientific rationale that is essential to safe, high-quality practice.

Yet, it is interesting to go through a selective sorting process. The scientific literature contributes to this, encouraging the emergence of "**the evidence of practices through scientific proof**".

In this first issue, we present four publications reviewing four important themes:

- **Implantology and bisphosphonates:** Best practice guidelines from the *Société Française de Stomatologie, Chirurgie Maxillo-Faciale et Chirurgie Orale* – SFSCMFCO (French Society of Stomatology, Maxillofacial Surgery and Oral Surgery).
- **Implantology failures**: the reasons identified.
- **The use of short implants** in the posterior regions.
- **Treatment of peri-implantitis.**

Implantology is major progress for both odontology and patients…

Let's be a part of making it grow.

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Pierre Fabre ORAL CARE

Implantology and bisphosphonates

The placement of dental implants requires a prior medical examination that is rigorous and exhaustive. It often concerns elderly patients, who may unknowingly have taken treatment containing bisphosphonates. It is the practitioner's duty, from both a medical and a medical-legal point of view, to carry out a background check and to objectively assess with the patient the risk-benefit ratio of implant treatment in this context. In July 2012, the French Society of Stomatology, Maxillofacial Surgery and Oral Surgery presented its best practice guidelines based on scientific data from the literature and validated by a group of experts. All of these guidelines are accessible on the Society's website: www.sfscmfco.fr (in French).

Prof. Pierre BRETON, maxillofacial surgeon, Chairman of the SFSCMFCO

The number of patients treated with bisphosphonates (BP) and concerned by the placement of dental implants is constantly on the increase due to longer life expectancy.
The objective of these guidelines is to provide the practitioner with decision-making support in caring for patients treated with BP.

1 ABOUT BISPHOSPHONATES

A. MAIN EFFECTS:

- Inhibit osteoclasts, prevent bone tissue destruction.
- Act on bone remodeling.
- Their resistance to enzymatic degradation allows them to remain for several years in the bone tissue.

B. INDICATIONS:

- **Malignant pathologies**

such as myeloma, malignant hypercalcemia, bone metastasis.

Method of administration:
intravenous (IV), at doses much higher than those advised in benign pathologies.

- **Benign pathologies**

such as osteoporosis, Paget's disease, fibrous dysplasia.

Method of administration:
oral but also, sometimes and more recently, intravenously .

C. COMPLICATIONS:

Spontaneous or induced osteonecrosis of the jaw (ONJ).

2 OSTEONECROSIS OF THE JAW

A. INCIDENCE:

- Patients treated with **BP in cancerology** = between 1 % and 10 %.
- Patients treated with BP **for benign conditions** = between 0.001 % and 0.10 %.

B. PATHOPHYSIOLOGICAL MECHANISMS:

Not completely clear.

C. CLINICAL MANIFESTATIONS:

Pain, localized edema, infection of soft tissue, tooth mobility, halitosis, suppuration and bone exposure.

D. RISK FACTORS

1. Type of molecule, duration of use, cumulative dose

For BISPHOSPHONATES IN IV FORM
Risk/type of molecule

- Over 90 % of ONJ cases in patients with cancer and treated with BP in IV form.
-The risk significantly increases with the length of treatment, and consequently, with the cumulative dose.
- Prospective data show that the incidence of ONJ is estimated at 1.5% in patients treated for malignant conditions for 4 to 6 months versus 7.7% for treatment lasting 37 to 48 months.

For ORAL BISPHOSPHONATES
Risk/type of molecule

- The prevalence is estimated at 0.21% for treatment lasting over 4 years. It is just 0.04% for treatment lasting under 4 years.
- Other studies have shown that the risk was multiplied by 2 after 2 years of treatment and by 5 after 5 years.

2. Local oral/dental factors

- Tooth extraction
- Poor hygiene
- Periodontal disease
- Prosthetic trauma…

3. Comorbidity factors

- Smoking
- Diabetes…

BEST PRACTICE GUIDELINES FROM THE **FRENCH SOCIETY OF STOMATOLOGY, MAXILLOFACIAL SURGERY AND ORAL SURGERY.**

July 2012

3 GUIDELINES CONCERNING PATIENTS ON BISPHOSPHONATES AWAITING AN IMPLANT

A. PATIENTS ON BP FOR A MALIGNANT CONDITION

Remember...

- Implants are not recommended for patients treated with intravenous BP for a malignant condition

B. PATIENTS ON BP FOR A BENIGN BONE CONDITION (or having previously received BP treatment for a benign bone condition)

1- ONJ risk

The risk seems low and non-predictive
Occurrence:
- Quickly after the implant surgery, directly linked to the surgical procedure.
- Delayed, several years after the implant surgery.

2- Implant prognosis

The case of oral BPs

- Success rate comparable to that obtained in untreated patients (but over short follow-up periods).
- A retrospective study concerning women treated for osteoporosis for between 1 and 3 years and having received implants (without interrupting their oral BP intake), showed a success rate comparable to that in untreated female patients (93.5 % versus 95.5 %).
- Early failure of bone integration is attributed to the surgical procedure.
- Late failure (implants already osseointegrated) have however been reported.

The case of intravenous BPs (ex: an annual injection)

No current data allow us to assess the risk linked to implant surgery.

Remember...

Implant surgery is possible but only after strict risk assessment.

Risk Assessment Criteria

- **Type of molecule**
- **Duration of treatment**
- **Aggravating factors:**
  - periodontal disease
  - poor oral hygiene
  - prosthetic trauma ;
- **Other factors (suggested as possible risk factors):**
  - age over 65
  - female
  - concurrent therapy (chemotherapy, antiangiogenics, corticosteroid therapy, etc.)
  - comorbidity (diabetes, smoking, obesity, etc.).

The ONJ risk seems extremely low, and is not predictable. However its onset cannot be excluded.

3- Protocol (Benign conditions)

- Precise information concerning the risks linked to implant surgery (possible, low, not predictable).
- It is not recommended to interrupt treatment before and after implant surgery.
- The surgical operation will limit trauma as much as possible.
- Antibiotic treatment as well as the use of local antiseptic mouthwash are recommended from the eve of the intervention until the mucosa are completely healed.
- Healing of the bone will be monitored for a prolonged period.
- In the case of multiple implants, it is recommended to start with a localized implant and to take the tissue response into consideration before intervening in other areas.
- Periodontal follow-up is obviously recommended twice yearly.

C. RECOMMENDATIONS IN THE CASE OF PERI-IMPLANTITIS

- **First line:**

A non-surgical approach is recommended (mechanical treatment, disinfection and drug therapy) with a monthly follow-up.

- **Second line:**

Peri-implant surgery will be proposed by keeping exposure of the bone tissue to a minimum.

- **In the case of failure:**

The implant will be removed by minimizing bone exposure associated with tension-free primary closure.

- **From the eve of the intervention until the mucosa have completely healed:**

Antibiotic therapy and a local antiseptic mouthwash will be introduced.

- **In the case of the onset of ONJ:**

It is advisable to consult a specialized service.

4 RECOMMENDATIONS CONCERNING PATIENTS WITH IMPLANTS AWAITING TREATMENT WITH BP

By carrying out an oral/dental assessment (clinical and radiological, follow-up of necessary treatment) before starting treatment with BP, the risk of ONJ is significantly reduced.
The removal of osseointegrated implants is totally unjustified and is not recommended for the reason of future BP therapy alone.
The dental care specialist should inform the patient of the need for rigorous oral hygiene, to report any abnormal clinical manifestation and to have regular follow-ups **(at least twice yearly)** for early detection and treatment of any peri-implant pathology.

Review: Reasons for failures of oral implants

This literature review details the factors responsible for failures of oral implants

- Some 311 articles published between 2004 and 2013.
- Only the "conventional" implants were considered: osseointegrated titanium implants to replace missing teeth.
- Therefore, excluded from the study are implants supporting maxillofacial prostheses, zygomatic implants, filler techniques and irradiated patients.

Implant loss may be:

- **Primary** (1 to 2 % of cases) related to non-osseointegration, linked in general to a poor surgical technique but also perhaps to unknown causes (the organism's response to a foreign body).
- **Secondary** (majority of cases) related to marginal bone loss, linked in general to peri-implantitis observed mainly **after one year**.

Criteria identified as being related to implant success/failure

1 CRITERIA RELATED TO THE IMPLANT

A. SURGICAL ENVIRONMENT

- **Preventive antibiotic therapy**

Improves the success rate of implants, according to certain studies on pre-operative antibiotic therapy versus placebo. This can be explained by the increased level of local asepsis during the surgery phase, leading to better healing and to better osseointegration in the long term. However, other studies do not show any difference between pre- and/or post-operative antibiotic therapy.

- **Access flap surgery or transgingival implant surgery**

No difference observed.

- **Drilling method adapted to bone density**

The lower the bone density, the more the drill bit should be undersized in relation to the diameter of the implant in order to increase primary stability.

- **Importance of torque** (torsion torque exerted on inserting the implant). The risk of failure significantly decreases with the increase in the moment of torque, especially in the case of immediate loading of the implant. This should be higher than 32Ncm: increased primary stability and better osseointegration.

- **Primary stability**

This is vital for implant success.

- **Submerged or non-submerged implant:** one-step or two-step procedure. Certain studies do not show any difference in implant survival rates. But other works show better survival rates in the two-step conventional procedure (deferred load).

- **Per- or post-operative complications**

The onset of complications (perforation of the nasal or sinus floor, loosening of sutures, major edema, infection, etc.) multiplies the risk of losing the implants by three or even four.

- **Immediate implant placement after tooth extraction or implant surgery postponed by several months.**

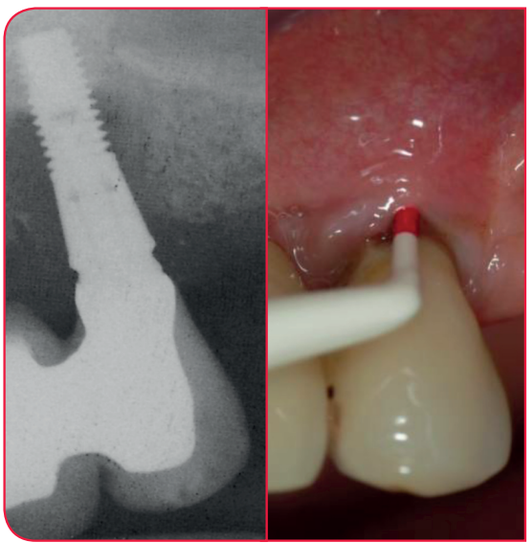
Most studies do not show a difference in implant survival rates. However, certain works observe a higher failure rate in the case of immediate implant placement.

- **Ridge expansion osteotomy**

The failure rate is high (one study cited observed 11 failures out of a total of 80 implants in 40 patients).

- **Surgeon's experience**

One self-evident fact is specified in this article: an inexperienced surgeon has a higher failure rate.



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Journal of Oral Rehabilitation, 2014

B. IMPLANT CHARACTERISTICS

• Length
Generally, the longer the implants (longer than 10 mm) the higher the success rate.

• Diameter
Studies are contradictory concerning wide or narrow implants of the same length.

• Number of implants
The higher the number of implants (in the same part of the body) the higher the failure rate. Assumptions: broader openings first of all compromising correct vascularization, increased surgery time and increased contamination of the wound.

• Implant surface
It would seem that commercially pure titanium, an oxidized surface, titanium with plasma-sprayed coating, with hydroxyapatite or a rough surface improve osseointegration.

2 CRITERIA RELATED TO PATIENTS

A. LOCAL CONDITIONS

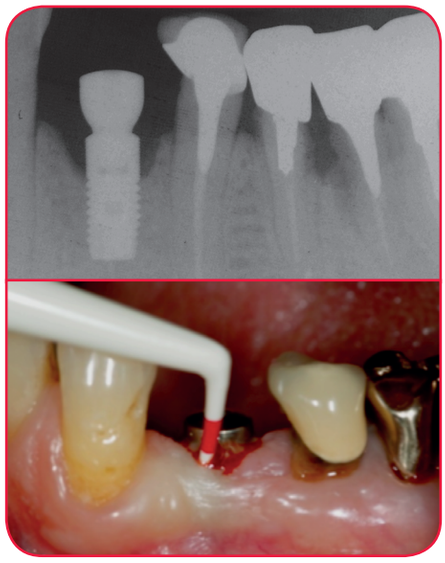
• Periodontal diseases
Patients presenting with a history of periodontitis experience more implant failure than patients with healthy gums. This is all the more true in those with a history of aggressive periodontitis than for chronic periodontitis. Failure rates are especially high in the case of a high incidence of plaque.

• Bruxism
Patients presenting with parafunctional habits have higher failure rates: 41% versus 12% in a cited study, especially in the case of immediate function.

• Level of edentation
Globally, the failure rates are higher for implants placed in fully edentulous patients (anchors for complete prostheses) than for implants in partially edentulous patients, especially in the case of short implants.

• Maxilla versus mandible
Most studies show a higher failure rate for maxillary implants in relation to mandibular implants (lower bone density, thin cortical bone, implants often shorter in the maxillae in the posterior regions due to the maxillary sinus volume).

• Bone density
This is a key element that determines early failure. The failure rate is increased in type III and IV bone.



B. GENERAL CONDITIONS

• Age
Most studies do not show any difference according to age except in the case of osteoporosis which increases with age.

• Smokers versus non-smokers
22 studies out of 27 show that smoking has a very negative impact on the survival rate of implants.

• Oral hygiene
The failure rate is higher in the case of poor hygiene.

• Medical status
The relationship between medical status and failure rates is poorly documented. In the case of diabetes, the rare studies available are contradictory. However, failure rates are higher in the case of metabolic syndrome.

Remember...

The highest failure rates have been observed for:

- Low torque during insertion.
- Inexperience of the surgeon.
- Maxillary implants (versus mandibular).
- Implants situated in the posterior regions of the jaws.
- Implants in heavy smokers.
- Type III or IV bone (especially with short implants).
- Short implants.
- Lack of primary stability.
- Too many implants in the same region.
- Implants of the non-screw type.
- Anchors for removable complete prostheses.
- Non-submerged technique.
- Immediate loading.
- Immediate implant placement after tooth extraction.

Meta-analysis of single crowns supported by short (<10 mm) implants in the posterior region

L.A. **MEZZOMO**,
R. **MILLER**,
D. **TRICHES**,
F. **ALONSO**,
R.S.A. **SHINKAI**.

J Clin Periodontol 2014; 41: 191–213

This meta-analysis helped to assess the failures, complications and risk factors (systemic diseases, smoking, bruxism, poor local conditions, etc.) of an implant placement using short implants (≤10 mm) in partially edentulous patients presenting with severe bone resorption of the posterior region, versus long implants associated with bone grafts.
This meta-analysis targeted some 535 articles including 16 studies, 762 implants in 360 patients, assessed after one year and up to ten years later.

Implant characteristics:
- Length of implants: between 5 and 10 mm.
- Diameters between 3.3 and 6 mm.
- Surface quality of the implants: 85% had a rough surface.

1 PROBLEMATIC ISSUES

The posterior regions limit the placement of standard-length implants due to the fact of bone resorption (periodontal diseases, long-time edentation, atrophy), position of the inferior alveolar nerve, maxillary sinus volume, etc.

Several surgical techniques have been proposed to overcome these situations: sinus floor elevation, ridge augmentation, bone distraction, lateralization of the inferior alveolar nerve, etc.

These complex techniques **lengthen the duration of recovery, and increase risks and cost.**

Short implants are therefore **an alternative** to the more complex techniques.

Although short implants used to have higher failure rates than those of standard length, **things have changed in 10 years.**

This is due to changes in the profile of implants and their surface condition which increases bone-to-implant contact, leading to faster new bone formation.

In view of these facts, short implants are **currently recommended** for regions with low bone density coupled with high occlusal forces such as maxillary posterior regions.

2 IDENTIFIED RISK FACTORS

- **Patients with a history of periodontal disease** have higher failure rates than those without.
- Failure rates are higher among **heavy smokers**.
- The role of systemic disease remains unknown.
- **Low bone density:** this study concludes that the effects of low bone density on the prognosis of these short implants in the posterior region remains unknown.
- **The crown/implant ratio** (1.5 or higher) is not presumed to be a major biomechanical risk factor.
- Avoid lateral occlusal contact.
- A ratio between 0.5 and 1 is always preferable.

3 MAIN RESULTS OF THIS META-ANALYSIS

- **Implant failure:** 5.9 %.
- **Failure of a biological nature** (persistent pain, neuropathy, uncontrolled peri-implantitis, mobility, etc.): 3.8%.
- **Prosthesis failure** (fracture or loss of the crown coating component): 2.8%.
- **Marginal bone loss:** 0.83 mm.
- **Majority of implants lost** (89 %) were lost before the loading.
- The first year is a crucial period. This could be explained by a negligible deviation during drilling that will increase the peripheral area of the drilling thus having a negative effect on primary stability. And also by considering that low bone loss of 2 mm on a 6 mm implant is considerable in relation to a longer implant.
- Complications concerning these short implants are less frequent in the maxilla in relation to the mandible.
- Implants with a diameter of 3.75 to 4.3 mm (regular diameter) have a lower failure rate than those with a larger diameter.
- Increasing the diameter to compensate for the short length is not a solution.
- A rough surface increases the survival rate of implants in relation to a smooth surface.
- Surface quality is more important than the length of the implant.
- The surgical technique may have an impact: the submerged technique seems better than the one-stage technique.

4 CONCLUSION

The studies cited show comparable results for short implants in relation to those focusing on longer implants situated in the same regions and after bone volume augmentation.

As a consequence, short implants are a good alternative in these posterior regions compared to longer implants associated with advanced surgical techniques. And this includes a favorable risk/benefit ratio.

However, the results of this meta-analysis should be treated with caution due to the numerous risks of bias inherent to lack of details in the studies analyzed.

Remember...

- **Short implants are a good alternative in posterior regions compared to longer implants associated with advanced surgical techniques.**
- **Favorable risk/benefit ratio.**
- The first year is a crucial period.
- Some 89% of implants lost are lost before loading.
- Implants with a diameter of 3.75 to 4.3 mm (regular diameter) have a lower failure rate.
- **A rough surface increases the survival rate of implants** compared to a smooth surface.
- **The submerged surgical technique (two-stage) seems better** than the one-stage technique.
- Complications concerning short implants are less frequent in the maxillary than in the mandible.

The therapy of peri-implantitis: a systematic review

L.J.A. **HEITZ-MAYFIELD**, A. **MOMBELLI**.

The international Journal of Oral & Maxillofacial Implants ; Volume 29, supplement, 2014

This literature review aims to assess the efficacy of peri-implantitis treatment.
43 reviews were selected.

1 PERI-IMPLANTITIS

- **Peri-implantitis** is defined as an infectious condition of the tissues around an implant with bone loss.
- According to the study, **its prevalence** concerns 10% of implants and 20% of patients 5 to 10 years after implant placement.
- The number of patients with a history of periodontitis, those who are smokers and the frequency of aftercare, are factors that influence these percentages.
- **The field of research on peri-implantitis is relatively recent.**
- Several therapeutic approaches are proposed and no protocol has really been validated.

2 POINTS OF CRITICAL ANALYSIS

- **Diagnostic criteria of peri-implantitis have not been well defined and vary considerably according to studies.**
- The same applies for healing criteria; for example, is the recurrence of a disease after twelve months the sign of a therapeutic failure or is it a new pathological process?
- Exclusion criteria of patients also vary according to studies (smokers or non smokers, poorly controlled diabetes, pregnant patients, antibiotics taken in the months preceding the treatment, etc.)
- The duration of patient follow-up is also variable: from 3 months to 7 years.
- The studies also vary according to the type of implant, its surface, the presence of an adjacent implant, etc.
- The probing depth thresholds of the pockets or the level of inflammation are not homogeneous from one study to another in relation to the surgical indication or lack thereof.
- **No randomized study has been identified** (for example concerning the indication of a systemic antibiotic therapy or not).
- It is difficult to assess the advantages of one protocol over another. In addition, certain treatments are combined, making the assessment of a single procedure difficult.
- The authors report that all the studies assessed present a high level of bias that should be taken into account when interpreting the results.

3 THERAPEUTIC APPROACH: BENEFICIAL ELEMENTS

Although no data are in favor either of surgical or non-surgical treatment of peri-implantitis, the following elements seems to be beneficial:

- **Initial treatment**
  - Recommendation for oral hygiene.
  - Smoking cessation.
  - Quality of prosthetic reconstructions regarding access to plaque control and, if necessary, replacement of these reconstructions.
  - Non-surgical debridement with or without antiseptics.
- **Surgical treatment**
  (if there is not complete resolution of peri-implantitis after non-surgical treatment)
  - Mucoperiosteal flap allowing meticulous cleaning of the contaminated implant surface.
  - Stabilization of bone loss with filling material or a graft, covered or uncovered with a resorbable membrane.
- **Anti-infective post-operative protocol**
  - Per- or post-operative systemic antibiotic treatment.
  - Antiseptic mouthwash during the entire period of healing (several weeks).
- **Follow-up**
  - Between 3 and 6 months.
  - Recommendation for oral hygiene.
  - Elimination of the supra-gingival biofilm.

Remember...

- **Prevalence of peri-implantitis**: 10% of implants and 20% of patients 5 to 10 years after implant placement.
- **Absence of randomized studies identified as part of the therapeutic management of peri-implantitis**.
- **Difficult to assess the advantages of one therapeutic protocol over another**.
- **The beneficial therapeutic elements:**
  - **Initial treatment.**
  - **Surgical treatment.**
  - **Anti-infective post-operative protocol.**
  - **Follow-up on a three-monthly or six-monthly basis.**

Opinion

Currently, periodontal disease is a major cause of tooth loss in humans. Patients suffering from such problems frequently visit dental offices wishing to restore missing teeth with dental implants. Large number of such patients, many missing teeth and also patients' requests for rapid rehabilitation encourage the dentists to take a quick decision to insert implants. However, in such situations the patient should be taken under special care. Before the surgical procedure it should be diagnosed what type of periodontal disease s/he is affected by, and clinical, radiological and/or microbial or genetic examinations should be performed. Then a full spectrum of non-surgical treatment, and if necessary, periodontal surgery should be performed. Only after the completion of periodontal treatment, the implant treatment should follow. After the insertion of implants increased hygienization program should be instituted, using antiseptics solutions or gels (chlorhexidine) for perioperative care. The gel is particularly important. Applied in various stages of implantological treatment, such as open or closed healing phase, and also during fixation of healing screw or in the prosthetic stage, it can stay longer on the surface of the tissue what greatly reduces plaque accumulation. In the maintenance phase of treatment rinses in lower concentration can be used. Conducting such treatment offers best results in maintaining a high level of marginal bone around the implants. This prevents or minimizes the development of mucositis or periimplantitis.

The first edition of ELUMED articles highlights an important aspect of the combined treatment of perio-implant patients with missing teeth in the case of ongoing periodontal disease. Adoption of the team treatment approach seems to be the best method of intentional choice. Paying attention to this common problem is a very important mission of the ELUMED journal. Additionally, highlighting the role of everyday proper hygiene puts emphasis on the minimization of one of the leading reasons for the development of periimplantitis.

In this way we could highlight the fact that implant treatment in patients with periodontal disease is possible, but that if requires increased dental care and daily perfect oral hygiene.

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