

Effect Of Application Of Multi Wall Carbon Nano-Tubes (Mwcnts) On Implant

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ABSTRACT

Dental implants are the most predictable therapeutic option for replacement. partial or total missing teeth, however, there may be inherent factors the patient, implants or surgical technique that may increase the risk failure of implant treatment and that should be taken into consideration. The objective of this article is to carry out a review of the current literature with the in order to show the risk factors that can lead to the loss of implants dental and, therefore, the failure of implant treatment. The complexity of treatment with dental implants due to accumulated pathology, medications associated and various factors that may increase the risk of treatment failure should to be valued. By it, is important perform a Right diagnosis with he end of identify factors of risk what may drive to the failure of the implants with he end to achieve reestablish the Health, the esthetic and the function from our patients by Many years.

Keywords: Dental implant failure; loss of implants; risk factor's; dental implants, implant complications.

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INTRODUCTION

Dental implants are the therapeutic option more predictable in the total or partial replacement of teeth lost, with very high survival rates (around 95%) both in pristine bone and in regenerated bone. However, certain risk factors may predispose to lower success rates (1-4). The used to evaluate the success of dental implants they have been varying over the years. At present include lack of mobility of the implant at the beginning of the prosthetic phase, the absence of radiolucency at the junction implant-bone, absence of peri-implantitis and discomfort manifested by the patient (5). Implant failure has been defined in various ways. more in the scientific literature. Chrcanovic *et al.* (2) defined it as those signs and symptoms that lead to the explanation implant, therefore, failure is equivalent to loss of implant. The described failure rate in oral implantology about 0.7-3.8% has been reported. The failures have classified into early or late, depending on whether occurs before or after functional loading of implants with a prosthetic superstructure, respectively (5). This differentiation is important since depending on the moment of failure, different factors are associated. In this sense, the early failure occurs as a result of failure in osseointegration derived from local factors and / or systems thermic and represent approximately 5% of the total failures, affecting women and patients to a greater extent young (2-3,6). In contrast, late failures are usually produced by bacterial factors, parafunctional habits les or mechanical factors related to the prostheses that support implants and affect 95% of implants reaching osseointegration (3,7). In summary, the Early failures occur before placement of the prosthetic restoration, while late failures, to posterior (6). Cakarer *et al.* 4 classified risk factors in oral implantology in two groups: in the first group included those related to the

patient; and in the second group, those related to surgical techniques and prosthetics.

Related Risk Factors with The Patient

One of the key factors for the success of dental implants Such is the appropriate selection of candidate patients this treatment through a complete medical history with in order to detect possible risk factors. With the increase in life expectancy, there are many patients with systemic conditions that can complicate or contraindicar implant surgery (1). These conditions not only they increase the risk of failure if not to perform surgery Without a medical control it can endanger general health. In this sense, the procedures should be contraindicated surgical cough to patients who have suffered a heart attack heart attack or stroke makes less 6 months; wearers of prosthetic heart valves or organic transplants less than 6-12 months ago; recall INR (*International Standard Index*) > 3 - 3.5 or with platelet counts <50,000 / mm³ due to presenting a increased risk of bleeding; patients with immunosuppression significant sion (white cell count <1,500 - 3,000 cells / mm³); in cancer treatment; or in treatment with intravenous (IV) bisphosphonates. In addition, patients with psychiatric disorders may not understand correct-the purpose of the treatment and is usually associated with a poor oral hygiene (1).

Age

As a patient ages, there is usually a greater risk of suffering from chronic diseases and usually present a wide variety of adjuvant medications. The dis-improvement in manual dexterity as well as acuity visual and cognitive alterations, make oral hygiene in many cases is compromised by the patient or relegated given to be performed by caregivers. In a recent meta-analysis it was concluded that implant treatment in patients totally or partially edentulous elderly is an option therapy with

predictable long-term results, in terms of implant survival minus, with clinical changes marginal bone level and minimal complications more, so that age cannot be considered a limiting factor in dental implant treatment (8). Age is an important factor for bone maintenance since its increase is associated with a decrease in bone metabolism and a weakening of the immune system, conditioning a lower bone mass. The biggest loss age-related bone is produced to a greater extent Damage to the trabecular bone due to increased stress oxidative and by increased activity of osteoclasts compared to cortical bone (9).

Sex

There are several factors that can create the hypothesis that there are differences in the success of implants depending giving the sex of the patient. One of them is osteoporosis, which is more affected in women due to a decrease in estrogen levels required for differentiation osteoblastic, so bone mass decreases drastically mind. In addition, women naturally have a lower bone mass compared to men (10). On the other hand, in men there is long evidence that supports a higher prevalence of periodontal disease severe (importance of tobacco) and a greater predisposition Genetics to suffer aggressive periodontitis (11-12). Also, Due to anatomical differences, the chewing force is greater (up to a third more) which can lead to overload on implants. In a meta-analysis carried out by Chrcanovic *et al.* (13) concluded that in men there is 21% increased risk of implant failure, not being able to establish a relationship between sex and marginal bone loss due to that few studies evaluated this relationship.

Systemic diseases

Mellitus diabetes

Diabetes mellitus is a metabolic disease characterized by hyperglycemia resulting from a less secretion and / or an altered action of insulin. The hyperglycemia has a negative effect on metabolism bone (called diabetic osteopathy) which has been associated with lower density and mechanical properties bones among others, increasing the risk of fractures (1). Other associated complications are micro / macro alterations angiopathies (diabetic angiopathy), neuropathies and a risk increased infections such as peri-implantitis (14-15). Chen *et al.* 16 in a meta-analysis did not observe an association between diabetes and implant failure, however go, due to the high incidence of complications in these patients, it is recommended to take a series of such as monitoring of hemoglobin values glycosylated (HbA1c) to know if there is a control of the disease (1,16). It may be advisable to carry out antibiotic prevention, advise the use of antiseptics topical (chlorhexidine) pre and postoperative to reduce the risk of infections; insist on the cessation of smoking (if it exists); and carry out a stricter protocol of visits in order to achieve correct habits of oral hygiene (14).

Cardiovascular diseases

Cardiovascular disease can alter blood flow lining and cause a certain hypoxia in the tissues that can affect the healing process of dental implants. To Despite this hypothesis, there are no significant differences in implant treatment failure in these patients. It is recommended to carry out an antibiotic prevention against Bacterial endocarditis in cases where it is indicated (1). Despite these results, the literature on the matter is controversial

so clinical trials would be necessary randomized controlled with homogeneous criteria (18).

Osteoporosis

Osteoporosis is a skeletal disease characterized due to a reduction in bone density and alterations in the bone microstructure which carries a higher risk of fractures (19). The hypothesis that osteoporosis affects negatively to bone metabolism and that can alter the bone healing around dental implants and compromising osseointegration is biologically possible but controversial. There is not enough evidence in the literature to consider osteoporosis as an absolute contraindication for implant placement(1). In a recent meta-analysis it was concluded that there is no statistically difference significant between patients with and without osteoporosis res-

Regarding the failure rate of dental implants (13). I weighed Therefore, it must be taken into account that osteoporotic bone may be equivalent to a D4 bone, so it must be considered longer osseointegration times, not reducing the immediate burden in these patients (1,20). These patients are usually treated with bisphosphonates, which increases the risk of osteonecrosis of the jaws (1, 13).

Head and neck cancer

60-80% of head and neck cancer patients are treated with radiotherapy (1). This treatment reduces the cellular and vascular growth, and can alter osseointegration of dental implants, increasing the risk of complications (such as osteradionecrosis)(21). More specific- Mind you, the risk of failure associated with radiation therapy can increase up to 12 times. Chambrone *et al.* (22) established mean survival rates of 46.3 to 98%, in particular in the maxilla. Early complications can affect the salivary glands, the skin and oral mucosa. The late complications lead to demineralization, fibrosis, avascular necrosis of the bone and increased risk of infection (21).

Antibiotic prevention and maintenance is recommended surgical field under the most aseptic conditions possible, as well as waiting 9 months after radiotherapy before implant surgery. Total radiation doses should stay below 50 Gy to reduce the risk of failures in osteintegration (15). Chemotherapy doesn't seem affect implant success (1).

There is a strong association between patients who have had radiation therapy before or after surgery of implants and their failure (70% more than risk). This risk is greater in maxillary implants than in mandibular and may be due to osteoblastic function and altered osteoclastic during repair and remodeling bone damage, a decrease in tissue perfusion and fibrosis of tissues. If implant placement is considered in these patients, it is recommended: do not load the implants early; maintain radiation doses, yes it is possible, below 50 Gys; avoid treatment elective dental implant and, if necessary, the best time for insertion would be at least 21 days before and 9 months after radiotherapy (13,23). Treatment with Hyperbaric oxygen is controversial, but it is believed that it may increase the regenerative capacity of damaged tissues (13). The effect of chemotherapy on osseointegration and the survival of dental implants is not well understood. In a meta-analysis, Chrcanovic *et al.* 7 did not find older failure rates, however, the number of studies in this regard is very limited, with a low level of

specificity, sizes small samples and in many cases, without a control group.

Immunosuppression

In patients with HIV there are no long-term studies about of predictability in the success of dental implants so it would be prudent to carry out implant surgery tests only when the patient is undergoing anti- retroviral and CD4 levels are high (if lower at 400 cells / mm³ there is significant risk of infection)(15). In a similar way, one should proceed in patients treated two with immunosuppressive drugs, as for example, in the case of organic transplants. It has been suggested that cyclosporine causes alterations in bone quality and peri-implant bone healing. Despite this, series of cases have shown success in treating patients transplanted (24-25). Therefore, there is not enough evidence scientific science about it. It is recommended to consider the use of prophylactic antibiotics and antiseptics in order to minimize the risk of infections (1).

Mental disorders

There is not enough evidence to support an increased risk of implant failure in patients with mental disorders lesions, such as behavioral disturbances, brain injuries, severe dementia, anxiety and / or alcoholism, and abuse of drugs. Despite this, there are studies that expose cases of implant failure in these patients due to less oral hygiene, parafunctional habits and pro-behavior problems. That is why it must be achieved a control of oral hygiene, of secondary xerostomia drugs and professional surveillance, analyzing each case in particular and avoiding the insertion of implants in patients unable to perceive and realize the object of the treatment (26).

Hypothyroidism

Thyroid hormones are involved in bone metabolism. In hypothyroid patients, activity, recruitment, and maturation of bone cells are diminished, existing lower rates of implant osseointegration. The hypothyroidism is not a contraindication in the treatment implants, but should be postponed until achieved a correct metabolic control (23).

Sjogren's syndrome

Sjögren's Syndrome is an autoimmune disease that affects the function of exocrine glands such as glands salivary, causing xerostomia (1). There is no evidence that contraindicate implants in these patients but should We must assess the severity of the pathology, especially in secondary forms associated with rheumatoid arthritis where the impaired movements and manual dexterity can impair oral hygiene procedures (27).

Medicines

Antidepressants

An association between drug use has been suggested antidepressants and an alteration in bone metabolism. From a biochemical point of view, the neural mechanisms neuroendocrines related to the serotonin system could regulate osteoclast activation / differentiation. Some studies have identified serotonin transporters and multiple receptors expressed both in osteoblasts as osteoclasts. This finding makes us wonder to what extent drugs that antagonize reuptake Serotonin can influence bone metabolism. It has been postulate that they may have an anti-aging skeletal effect direct(7). Furthermore,

it has also been seen that the mass bone may be negatively associated with symptoms of depression. In this sense, Williams *et al.* (28) observed a relationship between poor bone quality and a history of alterations in the mood.

Corticosteroids

Systemic corticosteroids are used to treatment of autoimmune diseases and transplants organic. Its consumption increases the risk of osteoporosis, epithelial fragility and the capacity of the immune system, being able to compromise osseointegration. At present, are not considered a contraindication, but should be evaluate the rate of adrenal gland suppression and supplement the dose of corticosteroids in advance and after implant treatment if they have steroid treatment longer than 3 weeks, in situations stressful (such as surgeries, after trauma or infection) and in cases of adrenal suppression. In patients treated with less than 10 mg prednisone / day supplementation is not necessary Mention the dose (23).

Bisphosphonates

Bisphosphonates are potent inhibitor drugs of the osteoclasts that can interfere with bone remodeling that occurs at the bone-implant interface and increase the risk of osteonecrosis of the jaws (Figure 1). These drugs can be administered orally (mainly for the treatment of osteoporosis) or intravenously (in the treatment of multiple myeloma or other disorders malignant)(29). There is a general consensus in contraindicating surgery implant surgery in patients treated with bisphosphonates intravenous (15). In patients treated with bisphosphonates orally, it is necessary to inform them of the possible complications cations and include them in the informed consent; reduce surgical trauma as much as possible; perform an antibiotic prophylaxis; and use topical antiseptics (30). In patients already treated with dental implants, to produce osteonecrosis of the jaw although the beginning pharmacological treatment was later in the time (18).

Habits

Alcohol

Daily consumption of alcohol can induce a delay in scarring of surgical sites due to deficiencies in the complement system and to the suppression of activation and proliferation of T lymphocytes. There are also alterations on the adhesion, mobility and phagocytic activity of monocytic cough, macrophages and neutrophils. Some alcoholic beverages may contain ethanol and nitrosamines in their composition that cause bone resorption and interfere with the formation that is. Therefore, alcohol is associated with an increased risk of implant treatment failure (17).

Tobacco

Tobacco has a dose-dependent effect on osteoin integration with no consensus on the number of ciga-rolls needed per day to produce it (5). In a meta-recent lysis in which more than 100 studies were analyzed The authors concluded that there is a (2.23) higher risk of implant failure in smokers (10). More concretely, maxillary implants have a significant risk larger compared to the mandibular ones, so the tobacco is considered a risk factor in early failure implant (31). Although the true underlying causes are not known completely, various explanations have been proposed among which is an

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alteration in healing or an increased risk of post-surgical complications, such as infections and peri-implantitis (16). These factors are related to alterations in osteogenesis and in angiogenesis. In relation to osteogenesis, nicotine inhibits gene expression of BMP-2,

TGF- β 1, PDGF-AA and VEGF in osteoblasts, important in the formation and bone remodeling, which can contribute to producing a failure in osseointegration of implants (32).

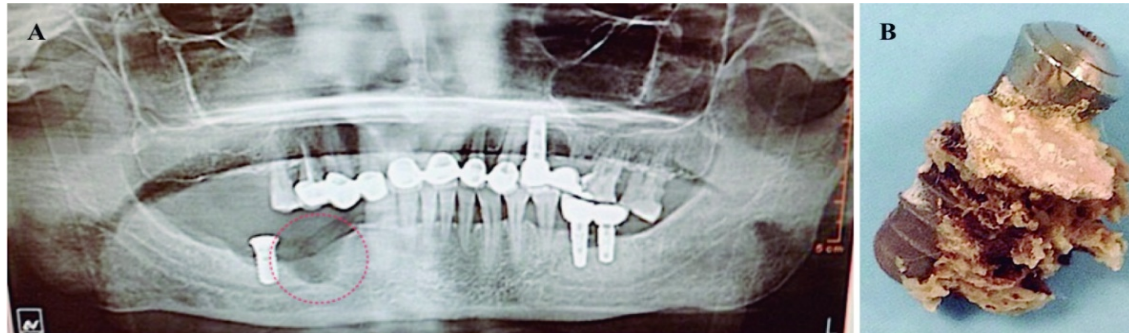


Figure 1. Woman in treatment with intravenous bisphosphonates from 5 years ago for treatment of osteoporosis. Note maxillary necrosis at the level of 45 and the bone defect resulting. B) Image of lost implant.

On the other hand, angiogenesis plays an important role in the formation of and bone repair by mediating interactions between osteoblasts, osteocytes, osteoclasts and vascular cells. The nicotine contained in tobacco induces a vasoconstrictor systemic traction and venoconstriction, decreasing blood perfusion, a lower blood supply and ischemia (2). In this sense, nicotine decreases aggregation platelet, microvascular levels of prostacyclins and it inhibits the function of fibroblasts, erythrocytes and macrophages. Also, carbon monoxide binds to hemoglobin more easily than oxygen, so it displaces it decreasing the oxygen tension in the tissues (31).

Related Risk Factors with Implant Treatment Bone quality

Bone quality or density influences initial stability presented by the implant. Bone quality is defined by the amount of cortical and trabecular bone that contains the implant receptor bed (33). Baqain *et al.* (5) in a studio prospectively concluded that bones D1 and D4 are more prone to early implant failure. Manzano *et al.* (31) also observed higher failure rates so early in implants inserted in D4 bones, due to their low biomechanical properties that complicate the ensuring proper primary stability. On the other hand, implants inserted into very dense bone (D1) can have higher failure rates compared to bones D2 or D3 due to overheating may occur. Lining of the surgical bed, impairing the healing potential bone, slowing down the osseointegration process and resulting in mobility of the implant (34).

Implant location

Usually the posterior sectors of the jaws are associated with poorer bone quality, however, in a cohort study conducted in 2012 did not observe differences in failure rates between implants in areas anterior and posterior (17). Cakarar *et al.* (4) observed that the 80% of the failed implants in their study were located in the maxilla. At 5 years, the survival rate described it was 99.3% in the mandible and 97.8% in the maxilla. In a systematic review carried out by Chrcanovic *et al.* (34) observed that most of the studies described

higher failure rates in implants located in sec-posterior tores of the maxillae. This finding may be explained because these locations usually present higher resorption, lower bone quality and strength older functional. The best survival rates have been found in the canine and / or maxillary premolar area and, the mandibular premolar area presents twice as many failures than the maxilla. Regarding the marginal bone level, Negri *et al.* (9) did not observe differences in implants placed in the mandible while those inserted into the maxilla presented a higher rate of marginal bone loss. Absence of keratinized gingiva Baqain *et al.* (5) established a significant association between the absence or presence of a narrow band of gingiva keratinized surrounding dental implants and a failure early in osseointegration since it has been associated with increased gingival and plaque indices, probing depths and probing bleeding, therefore that a minimum of 2 mm keratinized gingiva is recommended in the vicinity of dental implants (35). However, in the current literature there is no consensus. Intra or postsurgical complications A recent systematic review concluded that those implants that suffered intra- or post-surgical complications have a significant risk of failure, more specifically 3-4 times greater (34).

Implant prostheses

There are no differences in failure rates between rehabilitation on cemented or screwed implants, as long as when correct technique is used. While it is true, Cemented restorations have the risk of causing complications such as peri-implantitis that can act as a foreign body and lead to long implant failure term if not detected and removed. This is especially complicated if the cement is located on the free faces of the implant. The implant / crown relationship is also important in oral implantology. The trend has always prevailed to place implants as long as possible, in this way, the implant length was greater than that of the crown than supported it, this was considered a crown ratio "favorable" implant. With the development of implants used in cases where there is a large reabsorption bone formation after tooth loss, this proportion in many cases is reversed. The available studies in this regard have not found lower survival rates in implant-supported implants with unfavorable crown / implant ratios (3). The chewing forces are transmitted to the restoration-implant ratio, transforming into energy and dislodging itself by the restoration-implant complex towards prosthetic

framework, cement, abutment, screws, implants and peri-implant bone (37). The failures in dental implants due to mechanical causes can affect both to the implant and its components or to the prosthesis (38).

These failures are time-dependent and are due primarily to especially to fatigue (stress) and / or corrosion. Therefore, they are related to the nature and extent of occlusive forces. you go out so the type of restoration on implants will influence both factors, as well as parafunctional habits like bruxism or grinding. The mechanical failure of implants made of titanium pure is mainly due to metal fatigue. Shemtov-Yona and Rittel (39) in an analytical multicenter study 100 dental implants extracted for biological reasons and observed that more than 60% of the implants they had microcracks, the prelude to a posterior fracture. The pure titanium implants contained more microcracks than those made of titanium alloys.

CONCLUSIONS

Currently, implant therapy is the treatment of choice in edentulous patients. Carrying out the techniques surgical and prosthodontic procedures implies the possibility of existence of complications that in certain cases can lead to failure of implant therapy. To reduce its incidence requires knowledge of the structures anatomical maxillofacials, establishing a diagnosis clinical examination with careful clinical, radiological examination and, in certain cases, also biochemist with laboratory tests ratory, for the realization of an individual treatment plan in which possible risk factors are identified, as well as such as performing the most atraumatic surgery possible and proper monitoring and maintenance of implants.

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