

Dental Implants in Patients with Osteoporosis – A Review

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ABSTRACT

Osteoporosis is a systemic skeletal disease affecting the bone strength which deteriorates the bone mass, strength and affects the micro-architecture of the bone thus increasing the bone turn over and bone fragility. Osteoporosis also affects the jaw bones and Bisphosphonates are the first line of therapy. Hence, Osteoporosis is considered as a questionable condition for dental implant placement. However literature states that patients with osteoporosis do not appear to be at a significant risk of implant failure. Patients with Osteoporosis are not a contraindication for dental implants. This paper presents a review on Dental implants in patients with Osteoporosis.

Keywords: Dental Implants, Bone density, Osteoporosis, Implant stability.

INTRODUCTION

Dental implants have become a common and frequent treatment option for tooth replacement. Assessment of patients' medical condition is essential before treatment planning. Patients may present various systemic conditions as a challenge to dentists. Osteoporosis is a systemic skeletal disease affecting the bone strength. Around 300 million people are affected with Osteoporosis worldwide¹. The condition is more common in women, especially post-menopause. The occurrence of Osteoporosis increases with age. Osteoporosis deteriorates the bone mass, strength and affects the micro-architecture of the bone thus increasing the bone turn over and bone fragility. The success of dental implants largely depends on Osseointegration. Factors that interfere with Osseointegration act as a potential threat to the

implant prognosis. Osteoporosis also affects the jaw bones and bisphosphonates are the first line of therapy². Hence, Osteoporosis is considered as a questionable condition for dental implant placement. With more number of patients receiving oral bisphosphonates, it is quiet normal to expect few of them requiring dental implants. This paper presents a review on Dental implants in patients with Osteoporosis.

Osseointegration of dental implants

The direct structural and functional relationship between ordered living bone and the surface of a load bearing implant is termed as osseointegration. Ordered living bone is an environment of constant remodeling. This dynamic process represents the balance between bone resorption and formation around the dental implant³. A sequence of events occurs in the osteotomy site

after dental implant placement. Initially hematoma formation is seen followed by woven bone formation which finally leads to lamellar bone formation. Thus osseointegration occurs around dental implant. Bone remodeling continues after implant placement^{3, 4}. Knowledge on effect of systemic conditions like Osteoporosis on implant osseointegration is vital for good prognosis.

Osteoporosis

Osteoporosis is a systemic skeletal condition diagnosed based on the Bone Mineral Density with bone densitometry. Osteoporosis results in increased bone turn over. The rate of bone resorption exceeds the bone formation rate thus leading to bone loss. Osteoporosis is common in post-menopausal women. The condition increases bone fragility and the risk of bone fracture is high. Osteoporosis affects the quality of life and increases morbidity^{1, 5}.

Treatment for osteoporosis – bisphosphonates

Bisphosphonates are the drug of choice for Osteoporosis. Bisphosphonates are being used for the past 40 years for treatment of Osteoporosis, Paget's disease and few other conditions. Bisphosphonates reduce the osteoclastic activity and suppress bone remodeling and turnover^{3, 6}. The mechanism of action of Bisphosphonates is that they accumulate in the osteoclastic sites of the bone due to its high affinity for bone minerals. The Bisphosphonates are then incorporated into the osteoclastic cells and bone resorption is interrupted. The number of osteoclasts is also reduced thus decreasing bone resorption. The aim of bisphosphonates is to achieve normal bone remodeling level⁷. Bisphosphonates remain in the bone for years and have a long lasting effect. Bisphosphonates also cause delayed wound healing due to reduction in collagen expression by the fibroblasts. Prolonged usage of Bisphosphonates might lead to adverse effects such as Bisphosphonate Related Osteonecrosis of the Jaw (BRONJ)⁸.

Implants in osteoporosis with bisphosphonates

Osseointegration is percent contact between surface of implant and bone. Prognosis of dental implants is not only dependent on implant placement and the surgical procedure. It is also determined by the patient factors such

as bone quality and systemic health. Certain experimental model suggests that osteoporosis affects osseointegration^{9, 9}. However literature states that patients with osteoporosis do not appear to be at significant risk of implant failure. Osteonecrosis of the jaw is the adverse effect of Bisphosphonate therapy. Frequently patients under i.v Bisphosphonate therapy for malignant diseases are affected with osteonecrosis. Osteoporosis is treated with oral Bisphosphonates and hence not a contraindication for dental implant placement¹⁰.

Successful dental implants rely on a series of clinical and biological factors such as bone architecture and initial primary stability. Tactile evaluation of the bone quality, preparation of the implant site, achieving primary stability will help predict the prognosis of implant placement.

Chances of implant failure

Implant failure is manifested as implant mobility. Early implant failure occurs due to poor bone – implant surface contact. Interruption of osseointegration due to over loading can also cause implant failure^{3, 11}. Osteonecrosis induced by Bisphosphonates (BRONJ) results in implant failure due to reduced bone turn over. However, Osteonecrosis commonly occurs in patients under i.v Bisphosphonates. Systemic diseases, steroids, immunosuppressant, trauma and poor oral hygiene are the trigger factors for osteonecrosis¹².

DISCUSSION

Osteoporosis is a systemic disorder characterized by generalized decrease in bone mineral density. Dental implantology is a specialty with high predictability when both quantity and quality of the bone are respected. Therefore, the diagnosis and the implant treatment in patients with osteoporosis are important. In the current study, a literature review about osteoporosis and dental implant therapy was conducted. Success rate of dental implants in osteoporosis patients is comparable to healthy patients. Dental implants can be placed and managed with predictable prognosis in osteoporosis patients under oral Bisphosphonates. Discontinuation of oral Bisphosphonates is not mandatory during implant placement¹³. Osteoporosis patients require no specific protocol however have

special considerations, such as: a. Proper Oral hygiene b. Appreciable oral health before treatment c. Preparation of implant site d. Periodic reviews e. Antibiotic prophylaxis

Not all patients under intravenous bisphosphonates develop osteonecrosis. Presence of other systemic factors, trauma, periodontal disease, corticosteroids triggers osteonecrosis of the jaw¹⁴. Some authors stated that the osteoporotic bone is similar to the proposed model of bone type IV. Randomized clinical studies reported implant failure in patients with osteoporosis after menopause. Studies that contraindicate the use of implants in patients with osteoporosis infer that the impaired bone metabolism led to reduction of bone healing around the implants. Nevertheless, other authors believe that the presence of osteoporosis is not a definitive condition to contraindicate the therapy with dental implants. In these cases, the dentist should perform a proper treatment planning, modifying the implant geometry, and use larger implant diameter

and with surface treatment. Thus, osteoporosis is not a contraindication for implant surgery because an accurate analysis of bone quality by means tomography is performed.

CONCLUSION

Patients with Osteoporosis are not a contraindication for dental implants. The risk of Osteonecrosis is low with oral bisphosphonates. However patient must be explained regarding their systemic condition and informed consent to be obtained before procedure. Osteoporosis should not preclude implant treatment option for patients seeking dental care. Individual benefit – risk assessment will lead to a predictable prognosis.

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