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PREDICTABILITY AND SUCCESS RATE OF SHORT IMPLANTS

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ABSTRACT

In oral rehabilitation with dental implants, severely resorbed alveolar ridges are a challenging problem due to the reduced height of the residual bone. Continuous search for minimally invasive procedures has resulted in the conception of reduced-length dental implants, decreasing the necessary amount of bone for implantation, thereby reducing the need of bone-grafts. Given the growing demand in the field of implant dentistry and the continuous development of surgical techniques, this study aimed to review the current literature on the predictability and success rate of short implants. Relevant articles published in the PubMed database between the years of 2004 and 2014 were selected using the following key-words: short dental implants, extra-short implants, survival rate, implant, mandible, maxilla, prognosis, implant survival, implant length. Based on the literature review, we concluded that short implants showed high predictability and high success rate in the short term, therefore they are one of the current options for the rehabilitation of atrophic alveolar ridges. Further longitudinal studies are necessary to define more reliably parameters for their proper use, ensuring the achievement of high success rates and survival rates with the use of this type of implant.o assess the attitude and practice of dental professionals towards using of advance radiographic technique.

KEYWORDS: dental implants, maxilla, mandible, prognosis, survival rate http://dx.doi.org/doi: 10.19177/jrd.v5e2201728-31

INTRODUCTION

Currently, a large number of total or partially edentulous patients has searched for dentistry treatment to restore function and esthetics appearance. Along years, total and or partial removable prosthesis were the main rehabilitation modalities available for these patients.¹ However, conventional prosthesis has been associated to reduction capacity for mastication and taste sense, to insecure feelings and low self-esteem, which may also affect social and intimate activities.² Therefore, the treatment with dental implants has been searched a lot, and well accepted due to their high success rates and predictability³. It consequently has improved the quality of life for several patients.^{1,2}

Diverse clinical situations with great anatomic limitation, like cases maxillary sinus pneumatization and reduction of bone mass due to extractions^{3,4}, generating challenge problems in long osseointegrated implant rehabilitation. Therefore, advanced bone augmentation procedures are necessary, such as guided bone regeneration, osteogenic distraction, maxillary sinus augmentation, alveolar nerve motion, inclined implant placement, and use of bone grafts.^{3,5,6} Despite these procedures achieve relatively great clinical success, they present high cost and considerable morbidity degree associated.³ For example, the autogenous graft is considered golden standard for these type of procedure^{5,6}, further to be associated to morbidity, requires greater time for implant-support prosthesis placement increases the operational cost for the procedure⁷ and offers possibility for bone resorption⁶.

Due to these limitations, there is the need to search alternatives minimally invasive which allow implant installation with less surgical complications, in shorter time and low cost. Thereunto, the conception for short implants was proposed, once time which decrease the bone volume necessary for implantation^{3,7}.

The term *short implant* is subjective and there is no consensus about its definition in the literature.^{3,4} Once the minimum standard length for clinical success of implants is considered at 10 mm, it is possible suggest that short implants are those in any size below this. ^{3,4,8} Some authors suggest as those lower than 7 mm, and other, below than 8 mm.³

The short implants use seems to be benefit both for patients and surgeons.³ This alternative simplifies the treatment and reduces the need for additional bone augmentation procedures, which decreases the cost and the morbidity associated.4 The disadvantages of use this type of implant include reduction of the surface area in bone contact and also reduced crown/ implant, what may increase the stress on the alveolar bone around the implant.8 According to Kim et al., 20159, short implants present other advantages: (1) minimizing overheating during the perforation; (2) minimizing the chance for canal mandibular invasion; (3) preventing root damage in cases which involve root curvatures of adjacent teeth; (4) preventing bone perforation because of bone defect or concavity; (5) clinical simplification for the surgeon due to the operation time and minimum need for materials.

Despite, short implants use had been associated to a greater risk of failure^{10,11}, recent studies^{1,3,4,7,9,12-14} demonstrated the short implants may be so well succeeded than the conventional implants.

Thus, short implants have been more and more indicated for oral rehabilitation, because of the increasing demand on implantodontics area and the constant evolution of materials and surgical techniques. Therefore, this study had as aim a current literature review on predictability and success rate of this type of implant.

MATERIAL AND METHODS

Based on the frequent necessity for rehabilitation on edentulous dental arches in maxilla and/or atrophic jaws, and the increasing search for implantodontics, this study aimed to a current literature review on short implants, searching for their predictability and success rate. The search for articles was performed in the PubMed data base, using the following key-words: short dental implants, extrashort implants, survival rate, implant, mandible, maxilla, prognosis, implant survival, implant length. Only articles published between the years 2004 and 2014 were selected, in a total of 24 articles included.

DISCUSSION

The introduction of reduced length implants, also known as short implants, was initially controversial on implantodontics. The trend was thinking long implants would demonstrated better clinical results, presenting better anchorage to the subjacent bone and better load distribution for occlusal loads, due to their greater length.¹⁰ However, studies have demonstrated good success rates and survival, bringing evidences which short implants may be placed successfully in atrophic edentulous arches.^{1,3,7,8,11-16} Therefore, short implants application has achieved large acceptation in implantodontics, characterizing an innovative option apparently viable for treatment of edentulous arches with bone mass reduction.

Despite the natural doubtful trend on the effectivity of short implants, studies demonstrated that success rates and results of treatment associated to the use of this type of implant depend on multifactorial parameters.3,4,10,17 Regarding to the presence of premature failure, evidences in human beings demonstrated greater loss as lower the implants used.^{10,11} On the other hand, a study conducted in dogs did not verify difference to the osseointegration of implants with 6 mm, when compared to implants with 11 mm positioned in alveolus immediately after exodontia.18 Wherefore, we can suggest that adverse outcomes with short implants are related not exactly to the length and diameter, but other factors, like different design of manufacturers, surgical techniques used, bone quality on the receiver bed, smoking history and systemic changes, even so the learning curves and operators experience.3,4,10

Regarding to the dental arch in which the short implants are placed, a recent systematic review demonstrated initial survival rates very high for these implants, both in maxilla and jaw, and concluded that they can be a viable alternative to long implants for both arches.¹² Nevertheless, once posterior regions from maxilla and jaw are subject to great occlusal load and may demonstrate low quality and quantity of bone, the literature seems showing the placement in jaw with better prognostic^{3,11}.

Unbalance between crown and implant lengths are also frequently problems observed in prosthetic rehabilitation, mainly when short implants are involved.^{8,9} Although this concern, a study demonstrated there was no statistically significant difference regarding to the mass bone loss around the implant in relation to the crown/ implant, with a success rate observed of 97.83% in a year.9 On the other hand, a recent study demonstrated through Photo elastic analysis that this proportion crown/implant may influence on stress distribution around the implant only with oblique loads.19

When compared short implants and long ones, the first reduced stress and bone tension in non-axial loads around the implant, which can prevent reabsorptions in bone crest and consequently loss of implants after placement of implant-supported fixed prosthesis.⁴ A recent study through finite element analysis also demonstrated there is more effective effort distribution on atrophic maxillary residual ridges around short implants regarding to the conventional implants.⁸ Special attention also must be addressed to avoid possible lateral loads caused by inappropriate occlusal relations during the confection of definitive prosthesis.13

Further the factors discussed, short implants success and increasing improvement on survival rates observed may be related to the surface treatments that they have received currently, which also can favor a better osseointegration in posterior zone, where bone quality is not considered appropriate.¹⁵ A literature review demonstrated that implants from 6 to 7,5 mm length with surface slightly rough seem present more favorable survival rates, which contributes to simplify the rehabilitation with implants on posterior segments of atrophic arches¹⁷.

Commonly, severely atrophied bone ridge may preclude the installation, even for short implants. Therefore, different clinical protocols were developed to favor the guided bone vertical augmentation around short implants. Authors have suggested low velocity perforation to collect bone particles, enough to cover the vertical defect around the short implants. It avoids the need for an additional surgery to collect autologous bone.7 Particularly, and when the bone residual height until the mandibular canal is very limited (between 7 and 8 mm), a study demonstrated which the use of short implants is preferable regarding to bone augmentation procedures.²⁰ Another study showed that stress absorption capacity of bone grafts is not enough and is much lower than in other support tissue.²¹ Then, the finite element analysis demonstrated that short and large implants usage may reduce the stress transmitted to the adjacent bone in fixed prosthesis, when compared to large implants on grafts or angulations in the residual bone.²¹ Future investigations evaluating the effects of short implants length and width must be performed to help clinic to decide the best therapy indicated for usage in each case.4,21

In short term, the literature on the short implants survival seems encouraging, but currently there are few evidences on the long term following the short implants.^{3,13,14,22} A study demonstrated good results for short implants usage and unity prosthesis in the posterior region after 5 years, detecting low marginal bone reabsorption.²³ On the other hand, a recent study of 90 days following demonstrated the short implants survival rate was lower when compared to conventional implants.²⁴ Therefore, although the good results described, more prospective studies are necessary to define the best condition in which this type of implant is indicated, and the minimum parameters for they achieve higher success indexes and survival.¹⁵

Regardless the installation technique, deployment depth or proportion crown/implant, we also highlight the importance of prevention of peri-implant tissue diseases on the implant maintenance in long term.⁹ Wherefore, mostly is important each patient being analyzed individually to base on the literature, and surgeons may prevent properly when the high success rates are expected for this type of implant.

CONCLUSIONS

Based on the literature surveyed is possible conclude that short implants present high predictability and great success rate in short term, and those are the reasons to be one of the current options for rehabilitating treatment of atrophic alveolar ridges. Although, longitudinal studies are still necessary to define indispensable parameters with greater security, ensuring to obtain high successful indexes and survival rates for this type of implant.

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