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RESEARCH ARTICLE

THE SCIENTIFIC CONTEXT OF ZYGOMATIC IMPLANT IN BONE LOSS: A REVIEW.

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Abstract

Introduction: The lack of bone in the alveolar ridge represents a major problem in aesthetic recovery in patients who suffered dentoalveolar traumas, traumatic extractions, congenital absence of tooth involvement involving the maxilla and mandible, infections due to emotional consequences and the possibility of deformity. Thus, the zygomatic implant (ZI) is an alternative when there is bone loss.

Objective: to present the main considerations of the zygomatic implant in the context of bone loss, as well as to point out its main functions in the aesthetic and functional recovery of the patients' masticatory process and gain in the quality of life.

Methods: The present study followed a model of literary review presenting and discussing case series, prospective, retrospective, randomized, double-blind, placebo-controlled trials in humans with a publication time of the last ten years were selected and analyzed.

Major findings: In the bone loss scenario, zygomatic (ZI) implant, although it may also have complications and risks, is a strong alternative to achieve success in the dental implant process in patients with significant bone loss. The amount of zygomatic bone is intrinsic to each patient. Predictors of tooth loss such as caries, periodontal disease or trauma are the protagonists of bone resorption, leading to complex fitting problems. The studies of ZI placed in patients with severely atrophic and resected maxilla confirm that this approach is a predictable method to support fixed or removable prostheses up to 18 years, demonstrating high survival rates. Therefore, zygomatic implants present a high survival rate accumulated in 12 years, with most failures occurring in the initial stages postoperatively.

Conclusion: The present study confirmed that the ZI presents efficacy and safety for the functional and aesthetic treatment of the patients, as well as it makes possible an important gain in the quality of life.

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Introduction:-

Currently, the frequency of reabsorbed maxillary treatment is around 10.0% to 30.0% [1]. Thus, one of the main reasons is the lack of bone in the alveolar ridge, since it represents a great problem in aesthetic recovery in patients who suffered dentoalveolar traumas, traumatic extractions, pathologies of congenital dental absence involving maxilla and mandible, and the possibility of deformity [2]. This sense, dental implants are one of the options for dental replacement. The main predictor of implant success depends on the quality and quantity of bone available [2,3].

In this context, tooth loss negatively impacts the quality of life, compromising aesthetic functions, chewing and speech. Thus, the partial or total absence of teeth is a social and public health problem worldwide [4]. As a consequence, loss of teeth leads to progressive bone resorption. Moreover, the intensive forces generated during mastication further complicate the anatomical rehabilitation sector [4].

Thus, the zygomatic implant (ZI) is an alternative when there is bone loss [5]. The ZI is long, threaded, oxidized and moderately rough, with lengths ranging from 30 to 52.5 mm. They have a slanting head that is designed to allow placement of the prosthesis 45 along the axis of the implant, providing an excellent ability to retain, support and stabilize the prosthesis while minimizing leverage [5].

In addition, ZI also applies when there are poor bone quality and quantity, which is necessary when large bone reconstructions, in the case of the exacerbated pneumatized maxillary sinus or even if there are large recessions of the tumor. However, there may be complications with ZI, being classified as intra-oral and extra-oral [6].

Therefore, the present study aimed to present the main considerations of the zygomatic implant in the context of bone loss, as well as to point out its main functions in the aesthetic and functional recovery of the patients' masticatory process and gain in the quality of life.

Methods:-

Study Design

The present study followed a model of literary review presenting and discussing case series, prospective, retrospective, randomized, double-blind, placebo-controlled trials in humans with a publication time of the last ten years were selected and analyzed, with total of 23 articles.

Search Strategy and Information Sources

In general, as an example, the search strategy in MEDLINE / Pubmed, Web of Science, ScienceDirect Journals (Elsevier), Scopus (Elsevier), OneFile (Gale) followed the following steps: - search for mesh terms (Zygomatic Implant. Bone loss. Dental implant. Quality of life), - use of the booleans "and" between mesh terms and "or" among historical findings.

Development and Discussion

In the bone loss scenario, the zygomatic implant (ZI), although it may also have complications and risks, is a strong alternative to achieve success in the dental implant process in patients with the significant bone loss [1-4]. The amount of zygomatic bone is intrinsic to each patient. In this sense, the zygomatic has a compact and regular trabecular bone with 98.0% density [5-9]. The adequate occlusal stress caused by the forces is supported by the implant transferred mainly through the crest and below the zygomatic, divided into the zygomatic frontal and temporal bone [10].

In this context, contact and implant-bone are referred to as BIC (bone-implant-contact) and is correlated with implant survival [11-13]. An important variable that alters the zygomatic BIC is the angle at which the implant is placed [14]. According to the change of angle, the implant comes in contact with different anatomical portions of the fractured bone, which may lead to an increase or decrease of BIC [15-17]. The insertion angle can be estimated by computed tomography [19].

Predictors of tooth loss such as caries, periodontal disease or trauma are the protagonists of bone resorption, leading to complex fitting problems [19,20]. Moreover, the lack of alveolar bone may prevent the retention of a conventional prosthesis anchorage, which can only be achieved through osseointegration [21-23].

Thus, Branemark et al. introduced a technique called zygomatic attachment [1]. The aim was to reach these new implants with a fixation in the dense zygomatic bone and, thus, to rehabilitate these areas, in combination or not with other types of implants [1]. This was initially developed in a multicenter study and obtained a high survival rate. Thus, the ZI provides anchorage, as it crosses the maxillary tuberosity, passes through the pyramidal apophysis of the palatine bone and forms part of the pterygoid process of the sphenoid bone, making the implants successful [2,3].

Based on recent studies, new challenges have been presented. The management of patients with a severely atrophic or ZI-resected maxilla can be a surgical challenge. This retrospective cohort study assessed the percentage of survival of ZI placed over a period of 18 years [2]. In total, 88 IZ were placed in 45 patients aged 42-88 years. Of the 88 implants, 54 were immediately loaded. The implant survival rate was 94.32%, with five implants failing during the study period. Failures were not significantly associated with gender, surface finish, implant length, classification of the zygomatic approach guided by the anatomy or position of the implant ($p > 0.05$). All failed implants were fitted with fixed prostheses. Failures occurred between 6 months and 15 years after placement. This study of ZI placed in patients with severely atrophic and resected maxilla confirms that this approach is a predictable method to support fixed or removable prostheses up to 18 years, demonstrating high survival rates [2].

Thus, ZI placement requires surgical experience due to the proximity of vital anatomical structures [4]. In this way, the new surgical guide can provide the surgeon with visual control of the drilling protocol. The positioning of the guide near the entry point of the zygomatic body assists control of the drills to the vicinity of the exit point, significantly limiting the problems associated with angular deviation. Reduction of errors and complications is essential for ZI to remain a viable treatment alternative [4].

Furthermore, the development of the zygomatic thickness in the inferior area and the zygomatic length were insufficient in patients with oligodontia. Consequently, zygomatic hypoplasia presented difficulties for the "quadruple approach" to ZI in this group of patients [5].

Added to this, a meta-analysis study included sixty-eight studies, comprising 4556 ZI in 2161 patients with 103 faults [3]. The accumulated survival rate at 12 years was 95.21%. Most of the failures were detected within the post-surgical period of 6 months. Studies ($n = 26$) that exclusively assessed load showed a statistically lower ZI failure rate than studies ($n = 34$) assessing loading protocols ($p = 0.003$). Other studies ($n = 5$) evaluating ZI for the rehabilitation of patients after maxillary resections presented lower survival rates [3]. Postoperative complications were as follows: sinusitis, 2.4%; soft tissue infection, 2.0%; paraesthesia, 1.0%; and oroantral fistulas, 0.4%. However, these numbers may be underestimated because many studies have not mentioned the prevalence of these complications. Therefore, zygomatic implants present a high survival rate accumulated in 12 years, with most failures occurring in the initial stages postoperatively. The main complication observed related to zygomatic implants was sinusitis, which may appear several years after implant surgery [3].

Risk of bias

Considering the Cochrane tool for risk of bias, the overall evaluation resulted in 7 studies with high risk of bias and 3 studies with uncertain risk. Also, absence of the source of financing of companies. Only two articles did not present the source of funding, while 10 did not disclose this information in the conflict of interest statement.

Conclusion:-

The present study confirmed that the zygomatic implant presents efficacy and safety for the functional and aesthetic treatment of the patients, as well as it makes possible an important gain in the quality of life.

Competing interests

The authors declare queue they have no competing interests.

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