

## How to consider implant-prosthetic rehabilitation in elderly patients: a narrative review

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**With the beginning of the twenty-first century, population aging has emerged as a major worldwide phenomenon. The dentist must respond to this demographic change by taking into consideration the possibility of restoring oral function in the elderly patient with the use of dental implants. This article aims to provide a narrative review of the literature regarding the implant survival rate in geriatric patients and the relative importance and advantages of implant-prosthetic rehabilitation through a scientific analysis of the literature through online databases and dental journals. Tooth loss can have a significant impact on patients' oral function and significantly affects quality of life, self-esteem, and nutritional status. Although many studies in the past have reported that implant success is age-dependent, more recent studies suggest that they are safe and predictable for geriatric patients, improving quality of life, with similar results to those of younger age groups. Advanced age does not necessarily represent a contraindication for implant placement and osseointegration and success is influenced by patient and site-specific factors. Aging is a process that affects each patient differently, consequently, there should be a specific therapeutic approach for everyone, which must consider the functional and cognitive status of the patient, his medical condition, and his social situation-economic and motivational.**

The elderly population in the world is significantly increasing (1). This occurrence could be associated with in-depth study of multiple diseases and drugs and consequent improvement of the general health conditions and medical assistance (2). However, recently this has changed profoundly globally due to the Covid-19 pandemic, and we should review the world data once it is over (3).

Aging involves anatomical-functional and cognitive changes that could also have impact on oral cavity, affecting dental treatments (4, 5). According with the increase of average age, partial or total edentulism' rehabilitation could represent a an increasingly common procedure (6). the covid-19 pandemic certainly did not favor

this condition; in fact, a recent study points out that especially in the most severe cases, mostly elderly people, the salivary glands are affected by the new sars-cov-2. This causes an alteration in the normal function of the salivary glands, possibly resulting in a disruption of the salivary function that physiologically protects the oral cavity from external agents (7). The loss of dental elements determines the lack of a functional stimulus that is reflected on the jaw bones in terms of resorption (8, 9). As reported by Pietrokovski and Massler in 1967 and by Schropp in 2003, the process also occurs with the loss of the single element: the buccolingual/palatal dimension of the alveolar process is reduced by about 30% after 3 months and by 50%

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after 12. Furthermore, approximately one year later, at a vertical level there is a reabsorption of about 1.2 mm greater at the level of the vestibular wall, which is thinner, compared to the lingual/palatal one (10, 11).

In the case of total edentulism, the progressive reabsorption of the maxillary bones, which occurs in the centripetal direction in the upper jaw and in the centrifugal direction in the mandible, leads over time to an alteration of the inter-maxillary relationship and patient's vertical dimension (12).

In both cases, the loss of a single element, of more or of the entire arch, has an important impact both on the subject and on the rehabilitation difficulties of the dentist (13, 14, 15). The partially or totally edentulous subject is often induced to a reduction in social relations, caused by difficulties of a masticatory, phonetic and aesthetic type. From a rehabilitation point of view, the dentist should consider several factors: patient needs, degree of atrophy, inter-maxillary relationship, vertical dimension, and aesthetic appearance (16-18). Although the application of removable prostheses still represents a possible therapeutic alternative for replacing missing teeth, the use of fixed implant-supported restorations could be considered a possible alternative, giving the patient functional and aesthetic advantages (19).

The purpose of this study was to evaluate the importance of implant-prosthetic rehabilitation in geriatric patients, the advantages it entails on general health and their survival rates.

## MATERIALS AND METHODS

The following review includes all the studies carried out on humans and referred to geriatric patients ( $\geq 65$  years) with and without systemic conditions, undergoing rehabilitation with the aid of dental implants. The databases used for the bibliographic research were MEDLINE (PubMed), EMBASE and CENTRAL. Dental journals were searched for those articles that were not available on online databases. In addition, the ResearchGate research platform was used to maximize the number of significant studies. The results highlighted in this review were obtained from this literature search.

## RESULTS

### *The importance of oral rehabilitation in geriatric patient*

Although there have been advances in improving oral hygiene, both in patient education and motivation (20, 21), and in instrumental techniques (22, 23), restorative techniques (24) and health care improvement in developed countries, tooth loss is still frequent. For this reason, it is important to pay attention to the oral rehabilitation of the elderly patient, especially analyzing the possibility of considering implant-prosthetic rehabilitations as an effective therapeutic alternative (24). However, at present, dental implants in older people are minimally used.

Similar results were achieved in a study conducted in Switzerland on patients with an average age of 81, in which the attitudes of the elderly concerning dental implants were studied. The conclusion of the study was that the knowledge of dental implants by older people is limited, and the greatest concerns relate to the cost, the lack of perceived need and advanced age (25). Elderly patients, compared with younger patients, often place a different value on the potential benefits of treatment, based on medical, social, cultural, and economic considerations. It remains of fundamental importance to involve the patient in the therapeutic decision-making process as it increases the levels of satisfaction with the treatment (26). The real benefits of the treatments according to the patients could be evaluated with indices that allow to monitor improvement the quality of life in relation to oral health (OHRQoL). Compromised oral health affects self-esteem, self-image, causes other health problems, discourages social interaction, and leads to pain, stress, or depression, this can be measured (27).

The most used indices to measure the social impact of dental disease could be summarized as follows:

OHIP (Oral Health Impact Profile) questionnaire, used to assess the patient's perception of the social impact of poor oral health (28).

GOHAI questionnaire (Geriatric Oral Health Assessment Index), used to assess the impact of oral health problems in the elderly population (29).

As confirmed by OHRQoL it has been improved by providing elderly patients with rehabilitations with single crown prostheses, fixed partial prostheses, or fixed or removable total prostheses supported by implants (30, 31).

#### *Implant prosthetic rehabilitation advantages*

The advantages of implant-supported prostheses in elderly patients could be significant especially in completely edentulous individuals who have had traditional total prostheses for several years (32).

Over time, most edentulous patients with conventional total prostheses experience functional problems, especially this occurs at the level of mandibular prostheses. The same often report lack of stability and retention, as well as decreased chewing ability (33,34). Numerous clinical studies have affirmed that patients with implant-supported mandibular overdentures are significantly more satisfied than patients with a conventional total prosthesis, equally in the short and long term (35, 36). The principles that allow the stability of the conventional total prosthesis (physical retention, muscle control and occlusal stabilization) are enhanced when a conventional total prosthesis is converted into an implant-supported overdenture (IOD) (37).

Studies of several populations have shown that quality of life levels could be significantly higher in patients with IOD (38). The additional retention and stability provided by the implants replace the need for muscle skill and prevent displacement of the prosthesis during speech and chewing. In addition to the greater retention and stability provided by implant-supported prostheses compared to conventional full dentures, there are other advantageous aspects to consider, such as prevention of bone atrophy, effectiveness of chewing and occlusal strength, nutritional status, aesthetic aspects, and psychosocial aspects (39, 40). With careful diagnosis and treatment planning, elderly patients could excellent candidates for dental implants (41). Although implants-prosthetic rehabilitation success could be influenced by patient-related and site-specific factors, Advanced age could be not a contraindication for dental implant placement and osseointegration (42).

#### *Medical considerations on implant therapy in geriatric patients*

Thanks to improvements in health care and medical advances, life expectancy has increased, even in the presence of chronic diseases, resulting in a higher incidence of elderly patients with multi-organ diseases (43). With advancing age, progressive biological and physiological changes influenced by psychosocial, genetic, functional, and nutritional factors, physical and mental disabilities and side effects of drugs administered to treat several medical conditions could occur (44).

As suggested by a cross-sectional study of more than 162.464 people of all ages, more than one in ten of the total study population had two or more chronic conditions such as diabetes and cardiovascular diseases, which increase proportionally with increasing age (45). The increases in life expectancy could be associated with several chronic diseases such as diabetes mellitus, cancer, mental disorders, cardiovascular and neurological pathologies (46). According with the increasing incidence of these chronic conditions and a multimorbidity associated with the enhancement of average age, the administration of multiple drugs is an increasingly common condition (47, 48).

A study points out that the European population takes on average 6 drugs a day the dentist is required to consider the presence of any systemic diseases and associated drugs and to adapt the therapy to the patient's needs, his ability to maintain hygiene and compliance (49). The degree of control of systemic diseases, rather than the presence of such conditions, is the most important consideration in implant therapy' success and survival; the real contraindications to implants placement in elderly patients could be considered acute or decompensated diseases (50). Indeed, many studies demonstrated an outstanding success rate in patients affected by systemic disease, like HIV positive ones and Sjogren Syndrome (51-54). Moreover, preimplant bone augmentation techniques have to be considered also in elderly patients, due to the increased success rate in patients with severe atrophic maxilla (55-58). In the same way, some papers hypothesized the further use of stem cells, reporting encouraging results (59,

60). In the end, immediate loading techniques must be considered, due to the reduction of time of treatments and, consequently, less invasiveness (61, 62).

*Bibliographic data supporting implant-prosthetic rehabilitation in geriatric patients*

Implant success and survival are well documented for younger age cohorts, but less is known about the effect of age on osseointegration and long-term implants survival (63). Malm et al. in their retrospective case-control study shown several factors associated with implant failure. According with their results, systemic diseases, which could increase according with increasing age, could be considered as potential risk occurrence (64). Kondell and Al. compared the success rate of 284 implants in 53 elderly patients, with the success rate of 183 implants in 36 younger patients, aged 18 to 54 years. The implants mainly maintained partial or complete fixed prostheses and some overdentures. After an observation period of 1 to 6 years, the overall success rate in elderly patients was at least the same, even marginally better, than in the younger group (65). Boboeva et al (66), in their retrospective cohort study compared implant survival rate in the older ( $\geq 65$  years) and younger ( $< 65$  years) patients. A total of 628 implants in 308 older patients and 1904 implants in younger was evaluate. In addition to several conditions as smoking, systemic diseases and implants features were considered to obtain a uniform sample. At eleven years follow-up the implants survival rate was, in older and younger patients respectively, was 95.3% and 93.9%. No statistically significant differences identified between groups.

A retrospective study reported an implant survival rate of 95% over an observation period of up to 17 years for an elderly cohort (67). Etöz et al. Reported an implant survival rate of 95.4% in the elderly population over a 5 to 11-years observation period (68). These implant survival rates in the elderly population could be compared to survival rates published by Yang et al (69). As reported by Schimmel et al. in their literature review, a high implant survival rate in geriatric patients aged 75 years or older could occur (70) 1- and 5-year survival rates are like those reported in younger

cohorts (71, 72) regardless of clinical indication or loading protocol (73-76) 1-year survival rates relate to implants failing to osseointegrate and, therefore, it could be suggested that older age does not appear to adversely affect osseointegration.

## CONCLUSION

With the limitations of this study, implant-prosthetic rehabilitation in geriatric patients could be considered a predictable treatment option with a high implant survival rate. The functional and psychosocial benefits of such rehabilitation should outweigh the relative risks associated with common medical conditions and their respective therapies. However, clinical decision making must not be based only on survival rate, but rather on the patient's subjective gains in quality of life, comfort and overall well-being which should outweigh the associated risks.

Implant rehabilitation needs to be assessed in a relevant manner. In fact, an implant can be perfectly osseointegrated, but a patient with complex implant prostheses who depends on help for the activities of daily life may not have adequate care, since management is too complex. This could not be considered an effective treatment in this type of patient.

Further studies on the combined effect of age and chronic disease would be needed, as knowledge of the interactions of old age, medical conditions and implant survival would be essential for clinical decision making and meticulous reporting of medical conditions. in participants in elderly studies, it should be encouraged for future implant survival studies.

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