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Maxillofacial Implants... A Revolution in Retention of Maxillofacial Prosthesis

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Abstract

"The beauty lies in the eyes of the beholder". Hence if a prosthesis has to be appreciated that has to maintain its position and function appropriately. Earlier maxillofacial prosthetic retention was very challenging so as its esthetics. Thus the retentive aids used to be magnets, pins, buttons adhesives etc. which requires frequent replacement as well. But once maxillofacial implants are evolved the answer to these challenges found to be comprehensive. Though the design and size of the maxy implants used for mastoid and zygoma region differ from that of conventional dental implants, the mode of biologic adhesion for both are found to be the same through osseointegration after four to six months.

Keywords: Maxillofacial implants; Maxillofacial prosthesis; Mastoid and zygoma

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Introduction

As authors say "Art is an invention of esthetics, which in turn is the invention of philosophers". An esthetic and comfortable maxillofacial prosthesis alleviates patient's concerns and improves their quality of life. There has been a shift toward implant-retained maxillofacial prostheses over conventional prostheses. This narrative review addresses the current state of the treatment options and materials involved in the rehabilitation of maxillofacial defects. Possible treatment outcomes are reviewed, as is the impact of various treatments on the coping ability and quality of life of patients. As the osseointegration concept was conceived and has subsequently developed, bone-anchored implant support for external prostheses or combination of intra and extraoral restorations has become a most viable treatment option.

The location and orientation of extraoral implants is important to obtain an optimal prosthetic result. Pre-implant treatment planning is critical to coordinate the patient's surgical and prosthetic management because treatment planning should involve all members of the treatment rehabilitation team. An esthetic and comfortable maxillofacial prosthesis alleviates patients' concerns and improves their quality of life without the risks associated with surgery. Treatment of maxillofacial defects has evolved to incorporate a multidisciplinary approach with a combination of invasive and noninvasive treatment options. The treatment plan results from discussions between various members of the treatment team, including ablative surgeons, reconstructive surgeons, maxillofacial prosthodontists, and maxillofacial technicians. Maxillofacial prostheses can provide a natural-looking cosmetic situation. In many cases, the esthetic outcomes of maxillofacial prostheses are superior to those of surgical reconstruction. This review explores the current state of the treatment options and different materials involved in the rehabilitation of maxillofacial defects.

Innovations in this Field

In cases in which an extra oral approach is available in the course of complex maxillofacial procedures, direct surgical access to the site of a zygomatic implant allows direct visualization and improved retraction and protection of nearby vulnerable structures. It may be used to facilitate the predictable treatment of the atrophic maxilla, reducing the need for graft surgery and shortening the treatment time. The head is arguably one of the most important anatomical regions of the human body, accommodating the brain, eyes, ears, nose, mouth and muscles of facial expression. Facial aesthetics is intricately related to ego, self-esteem and body image, thus defects of this region can have a very negative impact on a person's quality of life[1]Surgical reconstruction is not always possible due to the size or location of the defect, the loss of vital anatomical structures, previous surgery or radiation therapy, non-healing, friable or cancerous surrounding tissues, or general debilitation of the patient. In these situations, prosthetic rehabilitation is the only alternative available to the patient.

Prosthetic Materials

a) Acrylics

b) Polyurethanes

c) Silicone Elastomers

– Room-temperature vulcanizing

– High-temperature vulcanizing

Types of Defects

a) Intraoral versus Extraoral

- Intraoral - mostly functional
- Extraoral - cosmetic

b) Palate Augmentation Prosthesis

c) Soft Palate

- Serves to intermittently couple and uncouple oral and nasal cavities

– production of consonant phonemes

– during deglutition

- May be better to remove all versus part unless needed for prosthesis retention Obturator
- Restores oro-nasal partition
- At times can be added to prior dentures

d) Maxillary ramp

e) Guiding flange

- Implants which are made of titanium have to be drilled at low speed. The Oxide on metallic surface is dipole were plasma proteins adhere.

Factors that Influence Success

a) Material

b) Macrostructure

c) Microstructure

d) Implant bed

e) Surgical technique

f) Loading conditions

Indications for bone-anchored prostheses are: The necessity of optimal tumour aftercare, e.g. in the case of a high risk of recurrence, if local or general contraindications concerning procedures of reconstructive surgery exist (e.g. in the case of severely damaged skin following radiation), poor general condition, during individual stages in plastic reconstructive surgery (interim prosthesis), following failed reconstructive procedures, the rejection of reconstructive procedures on the part of the patient, high aesthetic demands.

Osseointegrated implants have greatly improved the success of prosthodontic rehabilitation by counteracting the destabilising influence of the remaining tongue and muscles of mastication. The successful utilisation of dental implants depends on many factors including the availability and position of sufficient good quality bone, arch shape, inter-arch space, occlusion, degree of mouth opening, un-irradiated tissues, plaque control, patient motivation and affordability.

Discussion

Maxillofacial defects have been restored by surgery, prosthesis, or a combination. As the osseointegration concept was conceived and has subsequently developed, bone-anchored implant support for external prostheses or combination intra extra oral restorations has become a most viable treatment option. Treatment to date suggests that fewer implants may be needed to support craniofacial prostheses than thought initially. Prosthesis weight and exposure to torquing forces affect the treatment decision. An exception is the irradiated orbit, in which additional implants may be required to offset the possible loss because of nonintegration. The art and science of treating craniofacial defects has definitely been advanced in this osseointegration era. However, future treatment must be approached with care and caution in light of our lack of long-term experience and implant survival data. The craniofacial region is highly visible and psyche-sensitive, thus deserving our best professional effort in reconstruction and rehabilitation [1].

Replacement of a severely deformed or missing external ear may be satisfactorily accomplished by a highly cosmetic prosthesis anchored by implants integrated in the skull. The use of such implants is now a well-recognized method for creating a stable result in maxillofacial rehabilitation. In spite of recognized skull abnormalities resulting in thinning between the cortical plates, very few implants failed to integrate or sustain loads. Modified planning techniques have improved the likelihood of positioning implants in sufficient depth of bone. Successful integration of skull implants enabling the use of auricular prostheses has promoted effective rehabilitation of patients suffering microtia and anotia. Reaction of the skin cuff surrounding the abutment has been variable, depending on the surgeon's capacity to oppose the skin in tight contact with the periosteum and on the patient's hygiene technique. Color stability of Cosmesil silicone and its capacity to bond to an acrylic-resin substructure are deficiencies that require improvement [2]. The success of bone-anchored auricular prostheses was based upon the patients' acceptance, contribution to quality of life, and use of the prostheses as a replacement prosthesis for either a developmental defect or acquired defect. Ten patients had congenital or developmental defects, two lost the auricles due to trauma, and four defects were associated with tumor ablation [3].

With the aid of a digitally designed surgical guide, the planned implants were placed in close proximity to the preoperatively planned implant positions. These positions were more than satisfactory from the surgical and prosthetic points of view to allow for optimal implant retained prostheses [4]. Extraoral implants have been used for many years to provide anchorage

for silicone nasal prostheses, as an alternative to surgical reconstruction [3]. Conventional dental implants are generally used in nasal reconstruction. However, access to the prosthetic platform for prosthetic reconstruction can be difficult because of the positioning of the implant head within the piriform aperture. This case report describes the design and use of a specially engineered bifunctional implant with improved surgical and prosthetic handling characteristics that may be placed via an intraoral approach. The implant is able to provide anchorage at both of its ends, making it possible to simultaneously stabilize nasal and dental prostheses. CAD/CAM technology offers the opportunity to produce small numbers of bespoke components at a low cost. The bifunctional implant facilitated surgical and prosthetic management in this unique case. The provision of a fixed implant-retained denture avoided the need for a removable prosthesis, which in this case may have led to a disturbance in the seating of the nasal prosthesis if a labial flange had been provided. It may have also been difficult to wear following surgery. Regardless, the patient experienced the great benefit of a fixed oral rehabilitation [5].

Conclusion

The success of a maxillofacial prosthesis depends on the way it simulates the missing organ. Here not only the esthetics which matters but the way it restores the function of the lost structure as well. The intraoral implants more often retains the function whereas extraoral ones helps in maintaining the cosmetic appeal of the prosthesis. Hence revolution arising the retention of maxillofacial prosthesis using such implants gives a lot of hope in the field of rehabilitation of stomatognatic system. Researches are on to formulate new forms and designs of maxillofacial implants to give natural appearance for such patients and to alleviate the kind of social stigma due to this cause.

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