

Oral & Maxillofacial Prosthetics-I : Objectives & History

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Abstract

Restoration of facial defects is a difficult challenge for both the surgeon and the prosthodontist. Both surgical reconstruction and prosthodontic restorations have distinct limitations. The prosthodontist is limited by inadequate materials available for facial restorations, movable tissue beds, difficulty in retaining large prostheses, and the patient's capability to accept the final result. Patient acceptance and use of facial prostheses is not universal primarily due to unrealistic patient expectations. This article emphasizes upon the objective historical aspects of maxillofacial prosthetics.

Key Words: Maxillofacial Prostheses, Obturator, Ocular, Auricular, Nasal Prosthesis.

Introduction

The Glossary of Prosthodontic Terms (2005) defines Maxillofacial prosthetics as, "the branch of prosthodontics concerned with the restoration and/or replacement of the stomatognathic and craniofacial structures with prostheses that may not be removed on a regular or elective basis."

Facial defects can result from trauma, treatment of neoplasms, or congenital malformations. Facial defects referred to the prosthodontist for restoration are usually the result of surgical resection of epithelial tumors. Occasionally, however, remission of a tumor mass successfully treated with radiation therapy or chemotherapy can result in significant facial deformity. Congenital malformations of the head and neck region are usually habilitated with surgical reconstruction.

Restoration of facial defects is a difficult challenge for both the surgeon and the prosthodontist. Both surgical reconstruction and Prosthodontic restorations have distinct limitations. The surgeon is limited by the availability of tissue, the compromise of the local vascular bed by radiation in tumor patients, the need for periodic visual

inspection of an oncological defect, and the physical condition of the patient.

The prosthodontist is limited by inadequate materials available for facial restorations, movable tissue beds, difficulty in retaining large prostheses, and the patient's capability to accept the final result. Patient acceptance and use of facial prostheses is not universal primarily due to unrealistic patient expectations.

Objectives of Oral & Maxillofacial Prosthetics

The most important objectives of maxillofacial prosthetics and rehabilitation include:

1. Restoration of esthetics or cosmetic appearance of the patient.
2. Restoration of function.
3. Protection of tissues.
4. Therapeutic or healing effect.
5. Psychological therapy.

The restoration of esthetics in the patient with gross defects of the face and head is a valuable and often dramatic service provided by the maxillofacial prosthodontist. The replacement of missing parts such as a nose, eye, or ear or the construction of a device to rebuild facial or cranial contour requires the utmost in clinical skill and utilization of available materials.

The primary objective in each case is to construct a prosthesis which will restore the defect, improve esthetics, and thereby benefit the morale of the patient. The appliance may be temporary in the case of patients who will undergo plastic surgery for the replacement of parts lost through accidents, bullet wounds, or surgical removal; or it may be permanent, for in some cases plastic surgery is contraindicated, as in the case of certain cancer patients. In either instance, an appliance which gives the greatest comfort and security should be constructed.

In some situations, prosthetic devices are designed solely to protect the adjacent tissue, as in the radium-protective shield or various cranial implants or stents for skin grafts. They

may be designed primarily as therapeutic or healing devices, such as the radium needle carriers, stents and splints which are used during therapy or the immediate postoperative period.

The improvements in esthetics and function are not only essential to the patient's physical well-being, but they also contribute to his mental attitude. For example, the impact of cancer and of the physical defects that follow surgery or other forms of therapy often seems catastrophic, and the patient develops attitudes of resignation and hopelessness: It is not enough simple to institute definitive therapy to control or cure the patient's disease. Often, however, substantial efforts to restore him to a normal appearance and function are sufficient to restore hope and ambition to lead a useful life.

History of oral & Maxillofacial Prosthetics

Before 1600 A.D.: The origin of prosthetic reconstruction of facial defects has not been well documented by historians, archaeologists have found artificial eyes, noses, and ears constructed from waxes, clay, and wood in ancient Chinese culture, artificial eyes have also been found in Egyptian mummies; however, it has now been found that those eyes were placed postmortem.

Tycho Brahe (1546-1601): An interesting account of an artificial nose was quoted from the life history of Tycho Brahe, who used an artificial nose made from gold to replace his own nose, which was lost in a duel.

Ambroise Pare (1510-1590): Ambroise Pare, a famous French surgeon, appears to have been the first to describe fabrication of a nasal prosthesis using gold, silver, paper, and linen cloth glued together, he also described the fabrication of an auricular prosthesis. Pare has given us an excellent description of a simple but very practical obturator for closing a perforation of the hard palate. In one variation of this device, a dried sponge was attached to the upper surface of the obturator;

The advertisement features a central image of a dental chair with various attachments. To the left is the Olsen logo with the tagline "The Innovation has this brand". To the right is the Bosch logo with the tagline "Power Tools for Professionals". The main text describes the "QUALITY CROSS FLEX" dental chair, listing features such as "Direct Chair Over The Head Delivery Ultra Wide 3 Programmable Working Position - Zero Position", "All the rollers are made of metal with ceramic", "3 Working positions", "Auto return to Zero position", "Lower and 4th module with auto return system", "Automatic Bed rest", "Sitting and reclining of Back rest & Seat", "Chair light with 3 intensity (14000 / 23,000 / 14,000 Lux)", "Headrest adjustable", "Cushioned Back rest with pressure relief", and "Low & High Pressure monitor". A "dentomed Smilee" logo is also present. At the bottom right, the Dentomed Healthcare logo is displayed with the website "www.dentomedhc.com" and phone numbers "+91-9654350641, 9560223355".

when the sponge became moist it expanded and held the prosthesis in place. In another variation, he used a mechanical button to lock the obturator in place.

1600 to 1800

Pierre Fauchard (1678-1761): made a monumental contribution to prosthetic facial reconstruction; he made a silver mask to replace the lost portion of the mandible for a French soldier, Alphonse Louis. The silver prosthesis was painted with oil paints, and the margins of the prosthesis were made inconspicuous by covering them with facial hair.

1800 to 1900

William Morton (1819-1868): was credited with fabrication of a nasal prosthesis using enameled porcelain to match the complexion of the patient.

In 1880 Kingsley: described a combination nasal-palatal prosthesis in which the obturator portion was an integral part of the nasal prosthesis, and before the end of the decade.

In 1889, Claude Martin: described using a ceramic material to fabricate a nasal prosthesis.

1900 to 1940

Towards the end of the nineteenth century, vulcanite rubber was widely used by the dental profession and was adapted for use in facial prostheses, Upham described the fabrication of nasal and auricular prostheses made from vulcanite rubber.

In 1905, Ottofy, Baird and Baker all reported using black vulcanized rubber as a foundation for a nasal prosthesis, they processed pink vulcanized rubber onto the foundation, and painted it with artist's paint. The rigidity of the vulcanized rubber presented a problem when adapted to facial skin.

In 1913, gelatin-glycerin compounds were introduced for use in facial prostheses in order to mimic the softness and flexibility of human skin.

Bercowitsch described the technique of fabrication and coloring of gelatin-glycerin facial prostheses using water soluble dyes. Unfortunately, the life span of the gelatin-glycerin compound was too short for practical clinical application, the use of vulcanized rubber for facial prostheses continued despite its shortcomings; various methods of coloring were used.

Kazanjan described the use of celluloid paints for coloring vulcanized rubber facial prostheses. With the introduction of latex, which overcomes the rigidity of vulcanized rubber, techniques were described by Bulbulian and Clarke for the use of prevulcanized latex with water-soluble dyes for facial prostheses.

1940 to 1960

Acrylic resin was introduced to the dental profession in 1937, and it replaced the older vulcanite rubber in both intraoral and extraoral prostheses, its translucency,

colorability, and ease of processing was attractive to most clinicians in spite of its rigidity.

Henry Bigelow: Transparent photographic paints were used by Henry Bigelow for coloring of an acrylic resin facial prosthesis. To overcome the rigidity problem of acrylic resin.

Tylman: introduced the use of a resilient vinyl copolymer acrylic resin for facial prostheses. He used acrylic resin polymer stains for intrinsic coloring and water color for external tinting, the superficial tinting was further protected by a thin layer of clear acrylic resin, a wide variety of coloring materials were also described.

Adolph Brown used colorants certified by the food and drug administration for coloring facial prostheses.

Brasier used acrylic resin polymer stains (pink, clear, dentin, and enamel colored) for intrinsic coloring, and oil colors mixed with acrylic resin monomer for external tinting of facial prostheses.

1960 to 1970

The introduction of various kinds of elastomers resulted in major changes in the fabrication of facial prostheses, silicone elastomers have gained popularity among clinicians.

Barnhart was the first to use silicone rubber for constructing and coloring facial prostheses by combining a silicone rubber base material with acrylic resin polymer stains.

Tashma used dry earth pigments dispersed in colorless acrylic resin polymer powder for intrinsic coloring of silicone facial prostheses.

Ouellette mixed dry mineral earth pigments in a silicone base material thinned with xylene for external spray coloring of silicone facial prostheses. The final tinting was further protected by spraying a thin layer of catalyst on the prosthesis, and then allowing it to polymerize.

1970 to 1990

Different types of elastomers were also used for fabrication of facial prostheses.

Lontz used modified polysiloxane elastomers.

Gonzalez described the use of polyurethane elastomers.

Lewis and Castleberry described the potential use of siphenylenes for facial prostheses.

Turner documented the use of isophorone polyurethane.

Udagama and Drane introduced the use of silastic medical adhesive silicone type A, for fabrication of facial prostheses. The thin edges of the prostheses tear easily and, to overcome this problem, Udagama reported using prefabricated polyurethane film as a lining for facial prostheses fabricated using Medical Adhesive type A.

1990 to present

Advances in polymer chemistry have

renewed interest in developing new materials for facial prostheses.

Antonucci and Stansbury: New generations of acrylic resins are being investigated by Antonucci and Stansbury.

Gettleman described using polyphosphazenes for facial prostheses. Silicone block copolymers are also being evaluated.

Advanced technologies like Rapid prototyping, CAD-CAM technology are being introduced and extensively used in field of maxillofacial prosthetics.

Conclusion

This is the first article in the series of articles on maxillofacial prosthetics, which has covered the objectives and the historical aspects of the evolution of maxillofacial prosthetics to present era. Subsequent articles will extensively cover the material aspects, and clinical cases of various maxillofacial prostheses.

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