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Fabrication of an Auricular Prosthesis: A Case Report

Abstract: The fabrication of ear prosthesis is considered by many prosthetists to be one of the more difficult replacements in maxillofacial reconstruction. The severe undercuts and pronounced convolutions of the ear's surface present a challenge in simulating a natural proportioned prosthesis. The mould for the ear is generally made by creating a three surface die to reproduce the unique configuration adequately and to allow retrieval of the finished prosthesis without damage. This article presents an outlined procedure in the basic fabrication of a prosthetic ear by a conventional technique where the wax pattern is fabricated from the impression of an individual with a similarly proportioned ear.

Clinical Relevance: Fabricating an auricular prosthesis may be part of the work of a maxillofacial department.

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Absence of all or part of the external ear may be either acquired (surgical resection or trauma) or congenital (microtia with hemifacial microsomia). To make an informed choice between autogenous surgical reconstruction and wearing a prosthetic ear retained by implants or skin contact adhesives, the patient should receive guidance and advice from an expert team committed to optimal care.[1–9]

At present, a satisfactory solution may be achieved with the fabrication of a prosthetic ear that copies the normal contralateral ear. With congenital defects, such as microtia, where often one ear is missing, existing facial asymmetry presents difficulty in determinig the size and location of an artificial ear that will maintain facial harmony. However, the success of the prosthesis depends upon the maxillofacial technician's artistry and ability to copy the normal contralateral ear. This is achieved using anthropometric measurements and visual assessment.[10–12] An artificial auricular/ear prosthesis restores a portion of, or the entire, outer ear. The artificial ear or auricular prosthesis provides a form of rehabilitation when surgical reconstruction is not viable or not preferred by the patient. Artificial ear prostheses can be attached to the patient, either via a skin adhesive or osseointegrated craniofacial implants, or by a spectacle. The artificial ear prosthetics are made of a medical silicone or acrylic, which is coloured to match the natural ear skin tissue. The prosthetic ear normally improves hearing by about 20%[13] and will retain spectacles, and a hearing aid, if needed. It also serves as a great psychological benefit in the rehabilitation of the patient.

The purpose of this paper is to present a technique that creates a wax model ear, identical in dimensions and shape to the existing ear that accurately fits the soft tissue contours of the deficient side of the face in a precise position.

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Figure 1. Defective ear.

Various strategies have been used in the attempt to fabricate a trial wax ear of the same form, dimensions and location on the face as the contralateral normal ear. In this paper, a trial wax ear was made from an impression made from another individual, who had almost the same morphology and dimensions as the patient's existing ear.

Case report

A 27-year-old male patient was referred to the Department of

Figure 2. Impression of the defective ear.

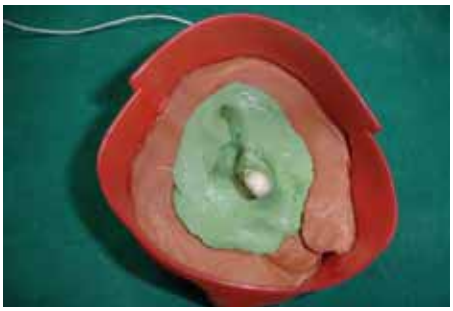

Figure 3. Boxing of the impression.

Figure 4. Master cast.

Figure 5. Wax pattern.

Figure 6. Wax pattern tried on master cast.

Prosthodontics and Maxillofacial Prosthetics, Manipal College of Dental Sciences, from the Department of ENT for the fabrication of auricular prosthesis. The patient had been involved in a road traffic accident and had suffered partial loss of his right external ear with intact tragus, antitragus and lobule (Figure 1).

Treatment options:

Surgical option

Surgical reconstruction was eliminated as the defect was quite large and autogenous reconstruction would be extremely complex.

Prosthetic options

There were two prosthetic options:

- Conventional technique;
- Digitizing imaging technology.

Digitizing imaging technology was eliminated as too expensive for the patient. Conventional technique, using acrylic resin, was selected as the patient could not afford the cost of silicone.

Retention of the prosthesis was planned using undercuts and spectacles, however, the option of implants was eliminated as too expensive for the patient.

Procedure

The patient was placed in a dental chair in a near supine position. The head was rotated so that the defect was presented on a horizontal plane and the patient was draped to protect his clothing during the impression procedure. The area around the ear was generously outlined with an indelible pencil.

Co-ordinates of the vertical and horizontal axis of the ear were made on the patient's skin. These markings were transferred with the impression to show on the working cast. These co-ordinates were of value in obtaining the proper orientation over the defect, while making a new ear form.

The patient's skin was boxed to the circumscribed outline with a collar of wax. A polyvinyl siloxane impression was made by injecting the material over the defect site. The impression material was allowed to set and then was carefully removed and inspected for accuracy (Figure 2). The impression was boxed with a wide masking tape and a working cast was poured (Figures 3 and 4).

Form contouring

Tin foil was placed on the working cast over the defect area. This facilitates the easy removal of the formed ear from the cast. An ear form was selected by choosing an individual with a similarly proportioned ear. The ear mould was created by boxing and pouring alginate impression. Molten base plate wax was poured into the ear mould. The solidified wax form was retrieved from the alginate mould and was checked for contour and size (Figure 5). The tissue surface of the wax form was softened and, with the marked co-ordinates, the form was seated on the defect area of the working cast (Figure 6). Covering prominent remnants of the defect with the wax form should be minimized to prevent over contouring and added weight.

The sculptured form was completed, achieving the most natural proportions, and checked for symmetry by removing the form from the working cast and placing it over the patient's defect site (Figure 7). The contours and alignment were compared with the natural intact ear (Figure 8). Shade selection was done by

Figure 7. Wax pattern try-in – side view.

Figure 10. Prosthesis in place – frontal view.

Figure 8. Wax pattern try-in – frontal view.

Figure 11. Prosthesis in place – side view.

Figure 9. Finished prosthesis.

Figure 12. Prosthesis retained with spectacles – side view.

mixing acrylic with different stains to match with the patient's skin tone. The wax form of the ear was flasked and acrylized by conventional means using a selected shade of acrylic. The prosthesis was finished and polished. Sandblasting of the prosthesis was done to give mat finish to the prosthesis to match with the skin tone (Figure 9). The prosthesis was placed on the defect and verified for the contour, alignment and shade (Figures 10 and 11). The patient was satisfied with the treatment results.

Retention and care

The patient was instructed to keep the skin surface clean and free of natural oil secretions to ensure proper adhesion of the appliance. The prosthesis was secured in place with the help of undercuts. Additional retention was gained with the help of spectacles (Figure 12).

Discussion

This article presents an outline of a procedure in constructing ear prosthesis by a conventional technique where the wax pattern is fabricated from the impression of an individual with a similarly proportioned ear. The prosthesis was fabricated from acrylic resin, which is cost-effective and reduces time spent carving. This technique relies upon the skill and individual ability of the technician.[14]

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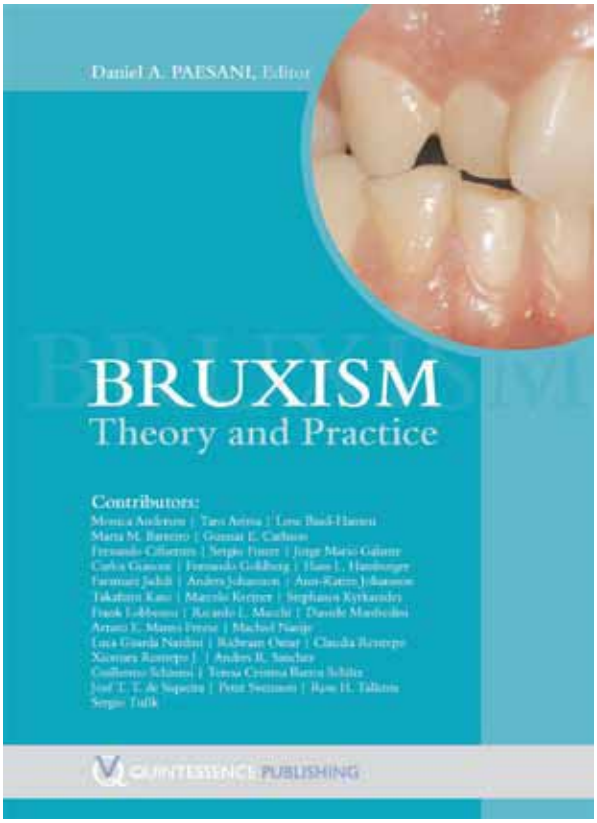
BookReview

Bruxism – Theory and Practice. Editor: Daniel A Paesani. London: Quintessence Publishing Co Ltd, 2010. ISBN-13:9781850971917.

This is a book of over 500 pages with 25 chapters written by over 30 contributors. It is a weighty tome covering bruxism in great detail over 3 parts entitled 'Overview', 'Effects on the masticatory system' and 'Clinical approaches'. There are excellent chapters on aetiology and the last section on clinical management is a thorough overview. This reviewer particularly enjoyed chapters 5 and 6 on 'The relationship with sleep' and 'Emotional factors'. Inevitably with so many authors, there is some degree of repetition and contradiction, but the message that bruxism is not just a dental problem but a wider medical problem is constant. Some chapters seem out of place in a book on bruxism, such as chapters 10 and 11 which cover 'Erosion' and 'Gastroesophageal reflux as a cause of erosion', respectively. The endodontic aspects are also discussed in chapter 13. The pharmacologic aspects were interesting to read, especially that Selective Serotonin Reuptake Inhibitors may trigger and even worsen bruxism, although the evidence has tended to be mainly from case reports. TMD and its relationship with bruxism inevitably takes up considerable space but the point that not all TMD patients brux and that not all bruxers have TMD is well made.

Complex modalities, such as implants and full mouth fixed and removable prostheses not really applicable to primary care, are discussed before simple management strategies, including splint therapy. It would have been a good idea to have had a more logical step-by-step increase from simple to complex, which the reader could follow more easily.

This is a Quintessence publication and therefore the quality of illustrations and presentation are excellent. This book fuses the scientific basis of related anatomy and pain physiology with bruxism research and its clinical management. Its publication is well timed given the likely increase in bruxism in these stressful times. It is a costly book at over £100 and is more of a reference book for the keenly interested clinician rather than the busy general dental practitioner.



Nonetheless, it has a wealth of information and will be a useful read for an aspiring specialist in a variety of dental specialties.

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