A Rare Case Series of Prosthetic Rehabilitation of Auricular Defect Category: Case Series

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Abstract

Loss of facial organs in an individual may be developmental anomalies or acquired. The missing parts of the face ear, eyes and nose are considered as maxillofacial defects which can be rehabilitated by the prosthesis and/or cosmetic surgeries. This art of science has developed into a more reliable and predictable process due to ever increasing development of materials and equipment used in the procedure. This article describes a simple technique to rehabilitate patients with auricular defects which are both aesthetically acceptable and economical for the individual.

Keywords: *Maxillofacial defects, Auricular prosthesis, Facial rehabilitation, Spectacle retention*

"Disfigurement is the sign telling the world that you have survived from what tried to kill you, well they will tell you all those sorts of solace, deep down humans are still run by societal laws and these laws are brutal they coerce you into adapting into their image of superficial beauty which rather controls your own understanding of self-esteem, so until the time the society acts on what it speaks we embrace the fact that satisfaction lies not in content but validation"

Introduction:

'The love of life is next to the love of our own face. And thus the mutilated cry for help."

Sushruta Samhita, India, 600 B.C.

The face is an extremely important symbol of man although not the only one. Facial deformities are concealed with great difficulty and jeopardize the appearance of a person more seriously than do similar defects in other parts of the body. Because of this fact they are the most common disfigurements which produce psychic distress. A slight facial deformity frequently produces a psychological effect out of all proportion to the extent or appearance of the disfigurement[1].Microtia is quite often categorised as congenital deformity where the external ear is underdeveloped. A completely undeveloped pinna is referred to as Anotia. Because microtia and anotia have the same origin, it can be referred to as Microtia-Anotia[2]. Microtia can be unilateral (one side only) or bilateral (affecting both sides). Microtia occurs in 1 out of about 8,000–10,000 births. In unilateral microtia, the right ear is most commonly affected.

The aetiology of microtia remains undefined but there are few cases that associate the cause with genetic disorders or with gestational diabetes[3]. Genetic inheritance has not been fully studied but in the few studies available, it has shown to occur during the early stages of pregnancy[3].

Despite remarkable advances in surgical management of oral and maxillofacial defects, many such defects, especially those involving eyes and ears cannot be satisfactorily repaired by plastic surgery alone. Maxillofacial Prosthodontists are highly skilled prosthodontist who have advanced training in complex oral rehabilitation. They carry these treatments of managing these facial defects or other in a multidisciplinary team comprising of maxillofacial surgeons, ENT surgeons, Plastic surgeons, neurosurgeons, speech therapists and clinical oncologists. The principle being enhancement of quality of life of the patient.

According to Chalian (1970) objectives of maxillofacial prosthetics include, 1) Restoration of aesthetic appearance[4], function 2) Protection of tissue 3) Therapeutic healing affects 4) Healing the Psyche[5]. Prostheses are made to replace hard tissues like bone and teeth, or soft tissue to restore oral function and form[6]. Prosthetics also include devices which protect and shield the soft tissue from radiation during the procedure. On account of all the services that a prosthodontist provides, maxillofacial Prosthodontists (MFP) are trained in working with a multidisciplinary setting together with maxillofacial surgeons; otolaryngologists; cosmetic surgeons; speech pathologists; etc[7,8]. The rationale stated above clearly qualifies the maxillofacial prosthodontist to rehabilitate deformities. Maxillofacial prosthetic rehabilitation is a justified alternative when surgical reconstruction is not feasible or desirable. The success of extra-oral prosthesis are dependent on the modes of retention, which may be using biological adhesive, utilization of undercuts, retention by other customized devices (e.g- spectacles),magnets, endosseous implants[9]. The following case series is regarding rehabilitation of lost ear with maxillofacial prosthetics which are retained by various modes of retention, providing an insight into the options the prostheticians have.

Case Series:

The artificial ear must be a mirror image of the natural ear, the impression of the natural ear must be made along with that of the defect to fulfil this criterion. Guide lines must also be drawn on the face of the patient to establish proper positioning of the prosthesis coinciding with the natural ear, also anatomical landmarks can be used as a stable guide. A set of three cases will be discussed simultaneously under the general headings of steps to be followed for fabrication. Informed written consent for case recording and photographs were obtained from the patient before the beginning of the procedure.

Step 1: Case evaluation and Planning (Figure 1

Figure 1 A, B: Preoperative photograph of the patient with missing ear defect.

Figure 1 C-Preoperative photograph with right ear missing; D- 3-Endo-osseous implants placed as a retentive aid planned for the prosthesis.

Figure 1 E; -preoperative photograph of the defect area; F- 2 implants were placed in the temporal region for bar attachment as a retentive aid planned for the prosthesis.

Case 1:

A 28-year-old Female Reported to the department of Prosthodontics and maxillofacial prosthetics, with a chief compliant of missing ear (Figure 1 A,B). On careful history recording and clinical examination it was deduced that the patient had a congenitally missing ear with a rudimentary lobe which consisted of cartilage. After all the option were explained to the patient, the patient opted for an auricular prosthesis which would be supported by customized silver attachments.

Case 2:

A 19-year-old male reported to the department of prosthodontics and maxillofacial prosthetics with a chief complaint of missing ear. The patient had a congenitally missing ear with the external auditory meatus opening near the angle of the mandible on the right side (Figure 1 C). Implant supported auricular prosthesis was planned keeping in view the young age of the patient. Using guide lines the new position of the ear was determined coinciding the natural ear. After radiographic examination

the positions of the implants were decided. Three 4mm EO implants (Straumann, AG, and Switzerland) were placed in the temporal region (Figure 1 D). After Osseo integration and healing. Ball and socket attachments were placed before impression making. The prosthesis was to be supported by a customized acrylic scaffold which would retain on the implant by means of socket type attachments.

Case 3:

A 33-year-old female reported to the department of prosthodontics and maxillofacial prosthetics with a chief complain of missing ear(Figure 1 E). The ear was congenitally absent with the external auditory meatus opening near the posterior border of the mandible. An implant supported prosthesis was planned after radiographic examination of the prospective site of the ear. Two 4mm EO implants (Straumann, AG, Switzerland) were placed in the temporal region. Castable abutments were used and were connected using inlay wax, later the entire assembly was casted and checked for fit over the implant. The prosthesis was to be retained on the implant with the help of bar-sleeve attachments connecting the two implants(Figure 1 F). The sleeves were embedded in an acrylic frame work to assist the retention.

Step 2: Impression Making :

The primary goal of impression is to record the defect site with maximum peripheral tissue coverage, if it is possible a facial moulage must be taken as it helps in reference for ease of sculpting for mirror image of the natural ear. Impression of a suitable donor ear is also taken, if donor ear is not available. The decision of the retention areas are then made whether to choose implant supported or mechanically retained prosthesis. For implant supported prosthesis, impressions were recorded after placement of implants and the abutments. The ear canals are blocked with cotton and petroleum jelly is applied around the hairy areas. The area to be recorded is boxed using cardboard scaffold. Irreversible hydrocolloid material (Zelgan, Dentsply) was used in a thin consistency and poured in the area, the impression was reinforced by pouring a layer of fast setting plaster on the impression. After careful inspection of the impression it was poured in dental stone (kalstone, kalabhai)

(**Figure 2 -** Explains the preparation for the impression making of the defect region using boxing wax to prevent the flow which was carried out in similar manner for all the mentioned cases.)

Modes of Retention:

The Methods of Retention and their peculiarities are presented in table 1 with photographs below:

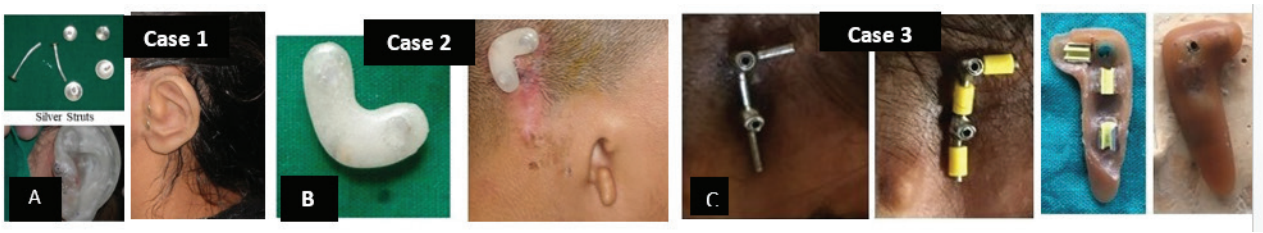


Figure 3-(Case 1), A-illustrates the customised silver struts and wire attachments used as a retentive aid; Acrylic mock trail substructure for evaluation of the efficacy of the retentive aids used. Definitive silicone prosthesis attached through the struts and customised silver wires as retentive aid.

Figure 3-(Case 2), B- Acrylic substructure over the attachment component; (Ball and socket type of attachment)

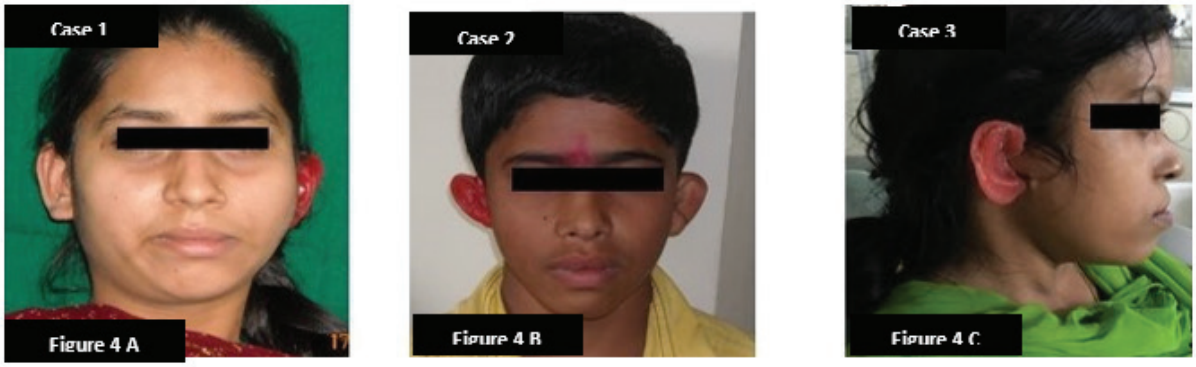
Figure 3-(Case 3), C- depicts the Bar attachment casted in cobalt-chrome; b illustrates the sleeves attached onto the bar used as a retentive aid for prosthesis; c acrylic substructure housing the sleeves of the bar and sleeve attachment assembly.

TABLE 1: Methods of Retention used in the cases.

RETENTION		Case 1 Figure 3, A	Case 2 Figure 3, B	Case 3 Figure 3, C
Before Impression Making	Type of Retention	Mechanical, soft tissue based	Mechanical Implant supported	Mechanical implant supported
	Form of assembly for retention	Customized silver attachments	Ball and socket type of attachment.	Bar and sleeve type of attachment casted in cobalt-chrome
	Surgical Procedure required	Minor surgery to establish channels in cartilage for placement of silver struts	Implant placement Three 4 mm EO implants (Straumann, AG, Switzerland)	Implant Placement Two 4 mm EO implants (Straumann, AG, Switzerland)
	Period post-surgery	After 3 weeks post-epithelization of the channels	Post soft tissue healing and osseointegration (3-months)	Post soft tissue healing and osseointegration (3-months)
After Impression Making	Use of substructure	NA	Acrylic substructure over the attachment component	Acrylic substructure incorporating sleeves
	Method of fabrication of substructure	NA	Acrylization of wax pattern over the models post abutment and attachment placement	Acrylization of wax pattern over the models post abutment and bar assembly placement with sleeves

Step 3: Wax Pattern Fabrication and Trial

Trial pattern can be fabricated using modelling clay or wax. Modelling waxes are preferred. A wax pattern was carved by using the remaining natural ear as reference using modelling wax. A wax trial was performed to ascertain the appearance of the ear. For case 1 two wax pattern trials were made to mark areas of the remaining lobe for making channels for the silver struts and check for the ability of the customized retainers to hold the prosthesis in place**.** In Case 2 & 3 the acrylic substructure is fabricated with wax and fabricated separately with attachments embedded in them. Wax patterns were retained on these substructures using boxing wax during wax trial



(Figure 4; A, B, C-trial insertion of the sculpted wax pattern on the patient for evaluation of aesthetics)

Step 4: Flasking, Coloration, Fabrication & Finishing of Prosthesis

Fabrication of mould for auricular prosthesis differs from fabrication of prosthesis for other defects. A three-piece mould is fabricated using dental stone (kalstone, kalabhai) and plaster (Neelkanth plaster) for packing of silicones. Shade matching is done and intrinsic stains (Functional Intrinsic II) are added to the room temperature vulcanizing silicone (RTV, Technovent). The mix is thoroughly spatulated to uniformity and packed into the moulds. After 12 hours of setting time, the prosthesis is retrieved. The excess is trimmed and the irregularities are grinded with a fine acrylic bur. The prosthesis is cleaned and a trial is carried out to check the fit of the prosthesis. Extrinsic shading (Technovent Extrinsic colours) is applied by dissolving shades in the RTV-silicone, the prosthesis is left to dry.

Step 5: Prosthesis Delivery

Case 1: (Figure 5 A)

Three holes were made corresponding to the ones made in the trail appointment in the prosthesis and the silver struts were inserted and closed through these holes, the rest of the margins were adapted to the adjacent skin and biological adhesive was used to blend the prosthesis with the surrounding skin.

Case 2 & 3: (Figure 5 B,C)

The acrylic substructure was glued to the prosthesis using cyanoacrylate adhesive and adapted on the implant.

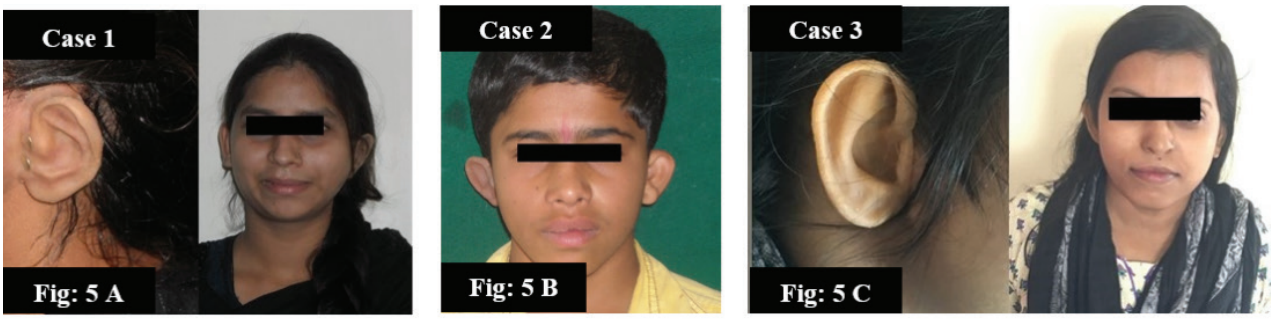


Figure 5: Post-operative photographs of the patients of the above mentioned cases:

(A-Case 1; B –Case 2 ; C- Case 3)

Step 6: Prosthesis Post-Operative Care

The patients were taught how to handle the prosthesis and how to wear it. Use of mild soap was advised to clean the prosthesis. Instructions regarding follow-up and shelf life of the prosthesis were given to the patient.

Discussion

Cosmetic re-construction is one sure way to restore the original tissue, but many times the facial defects are extensive and surgery does not yield good result. Maxillofacial prosthesis is an effective and economic way of rehabilitating facial defects. Maxillofacial silicone is an aesthetic material which can be coloured or stained according to the complexion of the patient, it is easy to manipulate and has a close-to-natural texture[10]. Intrinsic colouration is more stable than extrinsic but they are un-aesthetic as they are homogenous, humans have skin tone differences due to thickness of mucosa, vascularity, presence of cartilage [11]. These are the rationales on which the decision to use RTV-Silicone and extrinsic coloration are based.

Facial defects cripple the patient in a psychologically more than any other aspect. The acceptance of the prosthesis plays a major role. Retention provides psychological comfort to the patient and thus by relation is one of the most important necessity[12]. Literature has discussed numerous ways to retain extra-oral prosthesis.

Adhesives are one of the most popular retentive aid in maxillofacial prosthesis retention[13]. Silicone adhesives are basically RTV-Silicones which are diluted in volatile solvents. On the evaporation of these solvents the set adherent silicone is left which helps in retention. In case 1 there has been use of custom-made silver attachments along with adhesives, the adhesives blend in the thin margins of the prosthesis while the attachments provide the major share of retention[14]. It was a less invasive and economic method for rehabilitation.

Craniofacial implants are used for retention of extra-oral maxillofacial prosthesis as they provide excellent support and retention, this leads upto the improvement in patients appearance and quality of life [15–17]. According to clinical studies, a minimum of two implants are required to retain an auricular prosthesis[18,19].

Ball and socket type of attachment are also effective way of retaining the prosthesis, it is easy for the patient to wear such a prosthesis. the ball and socket type of assembly require the abutments to maintain parallelism so as to facilitate single path of insertion for the prosthesis without shear stress on the implant[20].

Bar-clip retention is one of the forms of retention used in the auricular region[18,19]. The limitations of such attachments are that they limit access for cleaning the implant area and patient faces difficulty in insertion and removal of prosthesis. Thus this case series of rare defects found gives us the insight about the multidisciplinary team involved and pivotal role of each member. Role of a Psychiatrist post rehabilitation also contributes to a major extent, the patient is counselled for the same. Rehabilitation of these defects boosts the confidence in the patients and thereby developing a feeling of completeness. Patients become socially active gradually and carry out their routine effectively without denial, hesitation or self-doubt. Thus, the prosthesis not only restores the anatomical defect but also relieves psychological distress.

Conclusion

Facial defects are psychologically traumatising, it is a social stigma. Rehabilitation is not the only treatment which solves these problems. The inflictions of this trauma are deeper than the defects itself. Communication is the key to alleviate this issue. A good quality of life does not stem from treating the problem but helping the patients to recognise that life is beyond the defect. Comprehensive care is deliverable by the dentist as it is him/her who the patient has opened up to.

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Ethical Clearance: not applicable

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References

1. Epsteen CM. Psychological impact of facial deformities. The American Journal of Surgery. 1958 Dec 1;96(6):745-8.
2. Alasti F, Van Camp G. Genetics of microtia and associated syndromes. Journal of medical genetics.

2009 Jun 1;46(6):361-9.

3. Luquetti DV, Heike CL, Hing AV, Cunningham ML, Cox TC. Microtia: epidemiology and genetics. American Journal of Medical Genetics Part A. 2012 Jan;158(1):124-39
4. Pisulkar S, Agrawal Ruchi, Bekhode V, Nimonkar sharayau, Borle Anjali, Godbole SR. Perception of Buccal Corridor Space on Smile Aesthetics among Specialty Dentist and Layperson. J Int Soc Prev COMMUNITY Dent. 2019;9(5):499–504.
5. Chalian V, Drane J, Standish SM. Maxillofacial Prosthetics Multidisciplinary Practice. Baltimore: The Williams & Wilkins; 1971.
6. Ariani N, Reintsema H, Ward K, Sukotjo C, Wee AG. Maxillofacial prosthodontics practice profile: a survey of non-United States prosthodontists. J Otolaryngol - Head Neck Surg [Internet]. 2017 Dec [cited 2020 Apr 8];46(1). Available from: http://journalotohns.biomedcentral.com/articles/10.1186/s40463-017-0211-5
7. Salinas T. Prosthetic rehabilitation of defects of the head and neck. Semin Plast Surg. 2010;24:299–308.
8. Belkhode V, Nimonkar sharayau, Agrawal Aashika, Godbole SR, Sathe Seema. Prosthodontic Rehabilitation of Patient with Mandibular Resection Using Overlay Prosthesis: A Case Report. J Clin Diagn Res. 2019;13(2).
9. Kati F. Retention methods for extra-oral prosthesis. Review article on methods of retention. World J Pharm Med Res. 2019;5(2):227–31.
10. Ciocca L, Gentile L, Scotti R. New aesthetic results with auricular prosthesis: two case reports. Minerva Stomatol. 2003;52:435–40.
11. Singh A, Ghosh S, Kar S, Ahmed I. Silicone prosthesis for a patient with unilateral ear defect: A clinical case report. Eur J Gen Dent. 2013;2(3):315.
12. Jacobson TE, Krol AJ. A contemporary review of the factors involved in complete denture retention, stability, and support. Part I: Retention. J Prosthet Dent. 1983 Jan;49(1):5–15.
13. Kanathila H, Pangi A. THE CHANGING CONCEPTS IN THE RETENTION OF MAXILLOFACIAL PROSTHESIS FROM PAST TO PRESENT- A REVIEW. J Evol Med Dent Sci. 2017 Oct 19;6(84):5879–83.
14. Yeshwante B, Patil SJ, Baig N. Retentive aids used in maxillofacial prosthesis. IJCDS. 2014;5(2):12–20.
15. McCartney JW. Osseointegrated implant-supported and magnetically retained ear prosthesis: a clinical report. J Prosthet Dent. 1991;66:6–9.
16. Chung RWC, Siu ASC, Chu FCS, Chow TW. Magnet-retained auricular prosthesis with an implant-supported composite bar: A clinical report. J Prosthet Dent. 2003;89:446–9.
17. Arora. A, A.N. Datarkar, R.M. Borle, A. Rai, D.G. Adwani. Custom-Made Implant for Maxillofacial Defects Using Rapid Prototype Models. J Oral Maxillofac Surg. 2013;71(2).
18. De Vale V, Faulkner MG, Wolfaardt JF, Rangert B, Tan HK. Mechanical evaluation of craniofacial osseointegration retention systems. Int J Oral Maxillofac Implants. 1995;10:491.
19. Wolfaardt JF, Wilkes GH, Anderson JD. Taylor TD. Clinical maxillofacial prosthetics. In: Craniofacial osseointegration: Prosthodontic treatment. Chicago: Quintessence; 2000. p. 285–7.
20. Amer MM, Rashad HA, Abdallah S. Stress distribution of implant retained obturators using different types of attachments: A three dimensional finite element analysis. Tanta Dent J. 2015 Dec;12:S30–40.