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Localized peri-implantitis management around auricular implant followed by fabrication of silicone prosthesis in patient of congenital bilateral microtia

[1]Dr. Kumari Deepika, MDS, Senior Resident, Department of Prosthodontics, Maulana Azad Institute of Dental Sciences, New Delhi-110002, India.

[2]Dr. Atul Bhatnagar, MDS, Professor, Unit of Prosthodontics, Faculty of Dental Sciences, Institute of Medical Sciences, Banaras Hindu University, Varanasi-221005, U.P. India

Corresponding Author: Dr. Kumari Deepika, MDS, Senior Resident, Department of Prosthodontics, Maulana Azad Institute of Dental Sciences, New Delhi-110002, India.

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Abstract

Auricular defects can be congenital or acquired due to trauma or malignant disease. There are many prosthetic options available to restore the function and aesthetics of any congenital or acquired auricular defects out of which implant retained auricular prosthesis provides better restoration of the defect area and prosthesis retention. The long term survival of implant retained prosthesis requires increased hygiene needs and the maintenance of soft tissue health around the implant is more critical to prevent peri-implantitis. The aim of this article is to present a case report of management of peri-implantitis around auricular implant followed by fabrication of bilateral silicone prosthesis for a patient with a congenital bilateral microtia.

Keywords: Periimplantitis, microtia, auricular implant, bilateral auricular prosthesis

Introduction

Auricular defects may be congenital or acquired due to trauma or malignant disease, which create esthetic, functional and psychosocial problem to the patient. Congenital missing ear termed as "Microtia" may be unilateral or bilateral. Bilaterally missing ears has been reported fewer than 10% of all cases while other deformities account for three in every 10,000 births.[1] Rehabilitation of auricular defect is a difficult challenge for the prosthodontist. In the past, prosthodontic restorations had distinct limitations because of movable tissue beds, lack of retention of large prosthesis, and the patient's reluctant acceptance of the prosthesis. Today, the use of osseointegrated implants has made it possible to produce effective bone-anchored ear prosthesis that the patient will accept. [2] Extraoral implants have been used for

better retention of the auricular prosthesis as compared to adhesives or frameworks. However, the main limitation with extraoral implant retained auricular prosthesis is the need for maintenance especially of the soft tissue around the implants. Implant bar retained design limits access for hygiene procedures. Though the failure rate for extraoral implants due to peri-implantitis is less, it can lead to failure of treatment due to associated pain and discomfort.[3]This clinical report presents a case of peri-implantitis associated with an implant-retained bilateral auricular prosthesis due to poor hygiene maintenance and its successful management.

Case Report

A 14 year old male child having bilateral auricular prosthesis accompanied by his parents reported to our Department of Prosthodontics, Faculty of Dental Sciences with chief complaint of pus discharge around auricular implant and mild intermittent pain in ear since 5 years. Patient's parents reported that pus discharge occurring around auricular implant is more during hot weather and with no problem during winter season and had undergone treatment for this many times. On clinical examination, patient was having bilateral microtia with bilateral implant bar retained silicone prosthesis and there was crust deposited around implant abutment interface (Figure 1.). Patient was wearing same silicone prosthesis since 5 years and also wants new prosthesis due to color fading and tearing of prosthesis. Past history of patient revealed of pre-mature birth (wt. 1kg 400gm, in the fifth and a half month of trimester) with bilateral microtia. Growth was uneventful however patient developed 50% hearing loss. Patient had pneumonia at 2 month of age. At the age of 3 years, the parents sought medical consultation for patient's diminishing hearing of both ears. No treatment procedure was initiated at that time. At the age of 7 years, patient had undergone investigations to rule out ear deformity and hearing loss. Volumetric scanning of maxillofacial region had done in 64 slices MDCT scanner & images were evaluated in PACS Workstation. It was found that in external ear, bilateral external auditory canals were not visualised, only soft mould of soft tissue was seen on left side. Bilateral rudimentary dysplastic incus and malleus was placed more superolaterally. Stapes was not seen on either side though rudimentary on right side. Tympanic membrane was not seen bilaterally.

Past surgical history- Recanalisation for external auditory meatus 7 years back and underwent BAHA (BONE-Anchored Hearing Aid) 6 years back to restore the normal sound conducting mechanism. On X-ray skull AP/ both lateral view (7 years back)- sclerotic & acellular bilateral mastoids were found. Bilateral external auditory meatus were not visualised (hypoplastic or atretic). Patient had undergone bilateral implantation (Southern implants with customised bar superstructure) for retention of ear prosthesis 5 years back (Figure 2.).

Management of peri-implantitis

Patient's parents had given history of recurrent infection around external auricular implants and patient had undergone medication for this from time to time. Upon clinical examination, there was mild bleeding or pus discharge and accumulation of crustings around both implants. The soft tissue reaction was graded as Holgers grade III i.e., redness, moistness, and moderate swelling with tissue granulation around the abutment. The cotton swab was taken from pus discharged around implant abutment and sent to the microbiology lab for culture and sensitivity test (Figure 3.). The peri-implantitis was managed locally by daily cleaning the tissues around implants according to the methods followed by Rokaya et al. 2013.[4] The soft tissue crusting was removed using soft nylon (interdental) brush and instructed to the patient for the same. The implant abutments and Hader bar was

cleaned using hydrogen peroxide (1:1 diluted with normal saline) and with betadine. Patient was also instructed that hairs should not be grown around implant. Hairs should be trimmed if it becomes long as it can wrap around the abutment and can provoke an inflammatory reaction.

Results of culture sensitivity test reported, Staphylococcus aureus as main pathogen and drug resistance to Penicillin group, Erythromycin, Trimethoprim and Sulfamethoxazole. The isolated organism was sensitive to Clindamycin and all β-Lactam antibiotics except Penicillin. Patient was referred to ENT Department for the further management. Patient was under medication for one and a half month. Initially, narrow spectrum antibiotic was started (Tab Clindamycin 300mg BDX 6days) along with anti-inflammatory (Tab Diclofenac 50mg in combination with Trypsin and Rutoside). When infection was not subsided, antibiotic regimen was shifted to moderate spectrum (Tab Clarithromycin 500mg OD X 5days along with Tab Metronidazole 400mg TDS X 5days, Hydroheal Ointment X15 days and Inj Gentamicin 80mg).

When peri-implantitis was subsided with Holgers Grade 0: reaction free skin, fabrication of new prosthesis was initiated. (Figure 4) The patient was strictly advised for hygiene maintenance of the implants.

Fabrication of silicone prosthesis

Hollow round plastic container was taken for impression making. Petrolatum gel was applied to the surrounding facial skin and hair for easy removal of the impression without any distortion. The implant superstructure or bar was blocked with silicone putty material to prevent entry of impression material in undercuts. Impression was made using irreversible hydrocolloid (alginate). A 50-mL disposable syringe was loaded with alginate and injected around implant supported bar. Impression was completed by filling the remainder of the impression container with material. After the impression had set, impression was removed, using a slight twist to facilitate removal (Figure 5.) Stone cast was poured from the impression which was used as a guide to obtain the wax pattern. Bilateral impression of the old ear prosthesis was also duplicated by using irreversible hydrocolloid impression material in duplicator and wax patterns were obtained along with old acrylic housing having bar clip attachments. The wax prosthesis then tried on the patient and evaluated for the accurate fit on the tissues, correct horizontal bilateral alignment with the contralateral side, orientation of the ear in relation to the side of the head and integrity of the margins during simple jaw movements was checked (Figure 6.). The wax pattern was invested in the denture flask to obtain the mould. Mould was obtained in three parts to achieve easy placement of silicone. The wax prosthesis was sealed to the model. Locations were cut in the helix area of the mould to orient the second piece of the mould around the helix accurately. Above this third piece of mould was placed.

The room temperature vulcanizing (RTV) silicone (MP Sai, Enterprise) was used for the fabrication of the final prosthesis provided with intrinsic stains for shade matching as it was economical to the patient. Basic colors used were yellow, white, brown, purple, and red. The stains were added to the silicone paste for optimal color match. Constant comparison was done with the skin of the approximate area. The flasks were kept for 24 hours at room temperature as per the manufacturer's instructions for complete vulcanisation. After complete processing of silicone, it was removed from the mould (Figure 7.). Examination of the final prosthesis was done for any defects and porosities. Excess flash was cut with sharp scissor and cut ends finished with fiber trimming wheels using straight handpiece. The final prosthesis was then tried on the patient and aesthetically acceptable to the

patient (Figure 8.). Patient was instructed to clean daily the area around implant supported bar to remove any soft tissue debris and dried exudates accumulated around abutment by using a soft end nylon bristle interproximal dental brush, or a cotton swab. The patient was also instructed to be careful while removing the prosthesis so that the thin margins do not tear and the silicone rubber does not separate from the acrylic housing. The patient was also instructed to remove his prosthesis at night for aeration of the implant area and to avoid humidity underneath the prosthesis which may cause local irritation. This is more important in hot weather due to more humidity as patients had more problems during this season as described earlier.

Discussion

The maxillofacial patient's quality of life is affected and predisposes him or her to a variety of psychosocial impairments. Therefore, the aim of maxillofacial rehabilitation should be to provide a confident life to the patient by rehabilitation of facial defects with a suitable prosthesis. Surgical autogenous reconstruction of auricular defects can be done but this may not be feasible for personal/medical reasons. Prosthetic reconstruction using craniofacial osseointegrated implant is a good alternative to develop an auricular prosthesis more conservatively using different retentive methods available and silicone is a suitable material for fabrication of prosthesis because of its life like appearance and flexibility. [5] Here, RTV silicone (MP Sai, Enterprise) was used as it was more economical to the patient. The success of auricular implant retained prosthesis depends upon soft tissue maintenance around implant. Peri-implantitis is the main problem with implant retained prosthesis. Etiological factors related to peri-implantitis are thick skin graft, movement of skin around the abutment, the lack of seal between the soft tissue and the implants, bar-clip design for retention of the prosthesis, improper hygiene, humid environment and growth of opportunistic microorganisms. A thick skin graft may affect the seal of connective tissue due to its mobility and may also cause difficulty for the patient to maintain hygiene around the area. This may cause accumulation of debris and colonization of microorganisms, which may lead to peri-implantitis.[4,6,7,8]The pathogens most commonly involved are Staphylococcus aureus, Pseudomonas aerugenosa, Klebsiella and other gram negative bacteria. If there is absence of a barrier to the microflora, the pathogens can easily penetrate into the deeper tissues and cause peri-implantitis.[6] The frequency of adverse skin reactions around the implant is generally very low and the main symptomatic reactions may consist of slight redness, reddened and moistened peri-implant tissues, granulation tissue associated with the implants or infection of the peri-implant soft tissues.[9,10] Skin response to percutaneous abutments has been considered as an indicator of success, by rating it on a five point scale. This five point scale (Likert scale) is a result of the work of Holgers et al in 1987 and has been adopted widely.[11]

Class	Description
0	No irritation: epithelial debris removed if present.
1	Slight redness: temporary local treatment.
2	Red and slightly moist tissue; no granuloma formation: local treatment; extra controls.
3	Reddish and moist; sometimes granulation tissue: revision surgery is indicated.
4	Removal of skin-penetrating implant necessary as a result of infection.

In this case report, the major soft tissue problems around implants (erythema with granulation formation, infection-Hoglers grade III peri-implantitis) was due to poor hygiene. It was managed locally by cleaning with diluted hydrogen peroxide, betadine, curettage and regular

hygiene maintenance. [12] The soft end nylon bristle interproximal dental brush or tufted dental floss was advised to patient to clean around the abutment or implant superstructure.[13] It helps in reducing the bacterial load around the skin-abutment interface and promotes healing. The problem related to thick tissue around implant has been also found one of the main cause of periimplantitis around auricular implant and can be managed by surgically reducing the thickness of the soft tissues around the implants.[4] Gumieiro et al have stated that good patient hygiene compliance combined with thin and immobile peri-implant soft tissues have been found to result in minimal soft tissue complications.[14]

The prosthodontist should monitor the stability of the abutment and the health of the soft tissue at regular recall visits of the patient. Adequate time should be allotted for instructions on placing and removing the prosthesis as well as proper maintenance of the prosthesis, abutments and surrounding skin areas for the long term success of the implant retained prosthesis.[15,16]

Conclusion

The maxillofacial prosthesis should be unnoticeable in public. Its color, texture, form and translucency must duplicate the missing structures and adjacent skin to restore normal appearance and hence, improving the quality of life. The use of osseointegrated implant retained prosthesis provides a simple and viable alternative to surgical reconstruction and as a gold standard in the management of individuals with massive auricular defects. The maintenance of the prosthesis and superstructure or the surrounding area around the implant is the most important factor relative to clinical success or failure. It is the responsibility of the patient as well as the treatment team to maintain the health of the implants and the condition of the prosthesis. Follow-up management is a way of monitoring these conditions and managing problems to ensure a healthy and successful prosthetic experience.

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Legend Figure

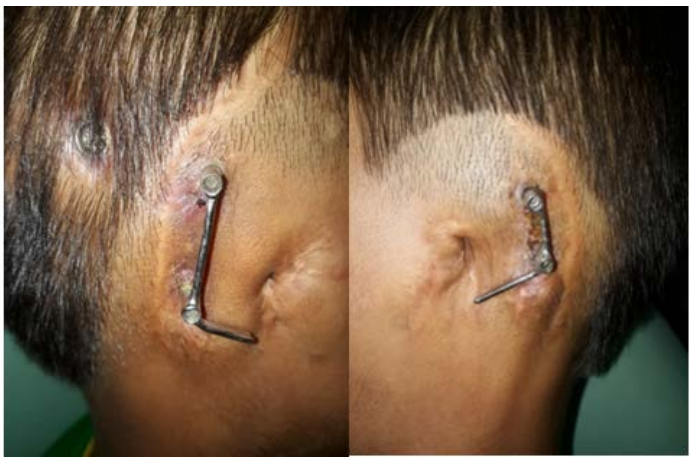

Figure 1: Showing red, moistened soft tissue along with epithelial crust deposited around implant abutment interface.

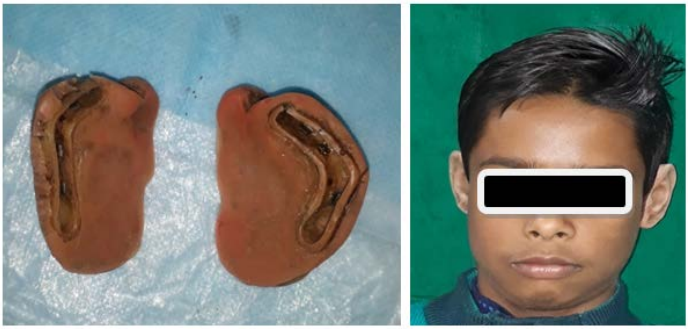

Figure 2: (a) Old silicone prosthesis with acrylic housing (b) Patient with old silicone prosthesis.

Figure 3: Cotton swab was taken for culture sensitivity test.

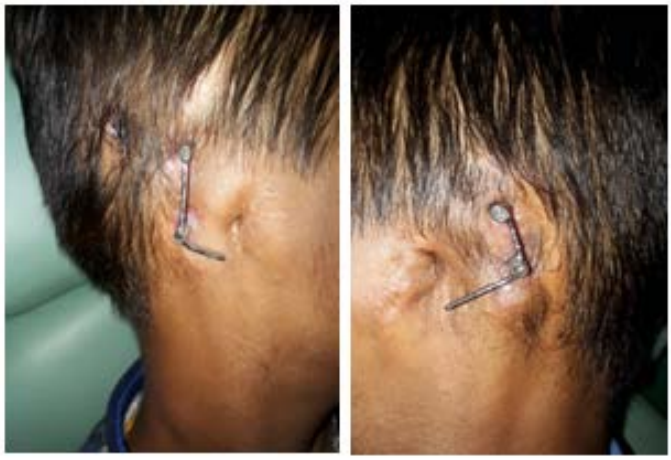

Figure 4: After management of peri-implantitis.

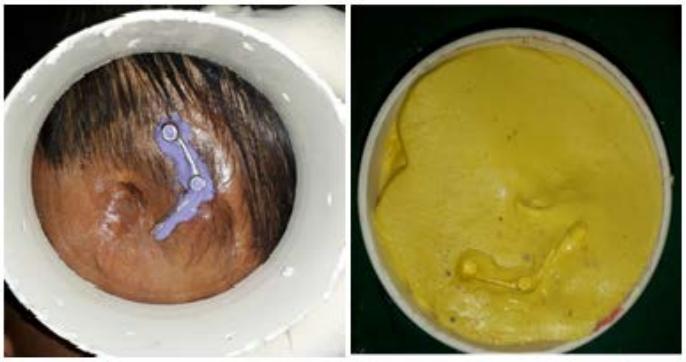

Figure 5: Bilateral missing auricular impression using irreversible hydrocolloid.

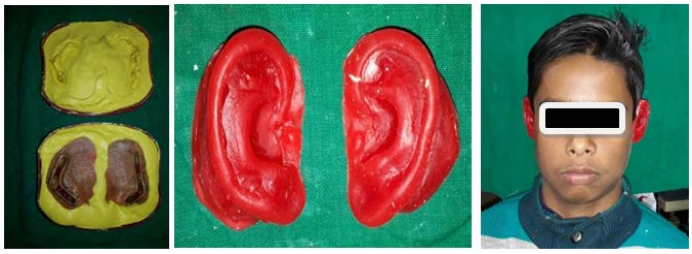

Figure 6: (a) Bilateral mould of ear was formed by duplicating old auricular prosthesis in irreversible hydrocolloid (b) Mould with acrylic housing in place was poured with molten wax (c) Wax prosthesis trial done.

Figure 7: (a) Wax pattern invested in denture flask (b) Mould prepared after Dewaxing (c) Finished bilateral silicone auricular prosthesis after complete processing- external view (d) Inner view with acrylic housing.

Figure 8: (a) & (b) Patient with bilateral auricular silicone prosthesis.