International Journal of Dentistry and Oral Science (IJDOS)
ISSN: 2377-8075

Prosthetic Management Of Bilateral Anotia - A Case Report

Research Article

Kasim Mohamed[1], Ananya Mishra[2*]

[1] Professor and Head, Department of Prosthodontics, Crown and Bridge, Sri Ramachandra Institute of Higher Education and Research (SRIHER), Chennai.
[2] Post graduate student, Department of Prosthodontics, Crown and Bridge, Sri Ramachandra Institute of Higher Education and Research (SRIHER), Chennai.

Abstract

Anotia is a congenital defect of the auricle affecting the anatomy of the outer pinna and the external auditory meatus. Its most severe form manifests as complete absence of the external ear. The absence of the external ear impacts the psychology and well-being of those born with it. This aesthetic impairment not only affects an individual's personal life but also their social intercourse. Reconstructive plastic surgery and prosthetic rehabilitation are the two treatment options used for its management. Although, mild to moderate structural defects can be managed by reconstructive plastic surgeries, reconstruction of completely absent ear poses a challenge. Thus, prosthetic rehabilitation is an alternative treatment option for such cases, establishing successful ear contour and aesthetics. This case report describes the sequential prosthetic rehabilitation of a young female patient with bilateral anotia.

Keywords: Anotia; Congenital Microtia; Prosthetic Rehabilitation; Auricular Prosthesis; Missing Ear.

Introduction

The human ear is an organ for auditory perception, consisting of the outer pinna and ear canal, the middle tympanic cavity and ossicles, and the inner cochlea with other important structures. The absence of the outer pinna is known as anotia. It is described as a congenital defect of the auricle ranging from mild structural abnormality to complete absence of the ear [1]. Weerda [2] classified anotia/microtia into three degrees according to its phenotypic severity, the first degree being the mildest and the third being the most severe, with complete absence of the external ear. Anotia maybe associated with conductive hearing loss due to a narrow or completely absent external auditory meatus and can be unilaterally or bilaterally occurring, with an incidence rate of 1:10,000 births [1,3]. It can either be managed by surgical reconstruction or prosthetic rehabilitation. Surgical reconstruction is usually considered in children withmild degree of microtia and can be performed only after the age of six [4]. Moreover, reconstructive surgeries are associated with post-surgical complications like graft rejection, high psychological stress associated with multiple surgeries and an increased demand for post-operative patient care to prevent recurrent infections [5].

The rehabilitation of patients with facial prosthesis became a part of prosthodontics as dentists traditionally corrected intra-oral defects which presented along with ocular, nasal or auricular involvement. Thus, conservative prosthetic rehabilitation became an alternative and a prime treatment option for the management of anotia. Prosthetic options include the use of removable retentive aids, such as hairbands and spectacles, or fixed retentive aids such as implants with attachments to retain the extra-oral prosthesis.

This article highlights the success of sequential prosthetic management of a young female patient with congenitally missing bilateral ears.

Case Report

A 24 year old female patient first reported at the age of 8 years for the management of congenitally missing bilateral ears. After consultation with the team of otolaryngologists and plastic surgeons, surgical reconstruction of the auditory canal was attempted to facilitate normal hearing. An auditory stent was fabricated and placed in the surgically created auditory canal to maintain its pa-

***Corresponding Author:**
Ananya Mishra,
Post graduate student, Department of Prosthodontics, Crown and Bridge, Sri Ramachandra Institute of Higher Education and Research (SRIHER), Chennai, India.
E-mail: anyamishra15@gmail.com

Received: May 05, 2021
Accepted: July 09, 2021
Published: July 18, 2021

Citation: Kasim Mohamed, Ananya Mishra. Prosthetic Management Of Bilateral Anotia - A Case Report. *Int J Dentistry Oral Sci.* 2021;8(7):3292-3295.
doi: http://dx.doi.org/10.19070/2377-8075-21000670

tency and prevent stenosis. Due to recurrent surgical site infection (SSI), the surgery failed after a period of 5-6 months. Post healing, examination of the defect region on the left revealed hyper-pigmented, scared tissue covering the area. At the age of 9, implant retained BAHA (Bone anchored hearing aid) device was placed in the right temporal bone (Fig:1).

In very young children, implants that support BAHA cannot be placed due to the presence of an extremely thin temporal bone which compromises the implant osseointergation[6]. The patient's mother demanded implant retained ear prosthesis but considering her young age, conservative prosthetic options like the hair band and spectacle retained prosthesis were suggested. The patient choose hair band retained silicone ear prosthesis for the replacement of the bilateral ears (Fig:2).

She was instructed to use the prosthesis until she attained puberty. Since the patient was young, prosthesis maintenance protocols were instated to her and her mother. Follow-up reviews were conducted every 6 months to ensure the viability of the prosthesis. After 3 years, around the age of 12, new hair band retained ear prosthesis were fabricated and given to the patient and prosthesis maintenance protocols were reinstated. The prosthesis was timely changed, at an interval of 2-2.5 years, owing to the loss of surface integrity and colour. At the age of 16, bilateral implant retained silicone ear prosthesis with Hader bar attachment was planned. Radiographic evaluation was done with the help of CT (computed tomography) scan to determined the thickness of the right and left temporal bones. Surgical drilling templates were fabricated using approximate measurements of a normal human ear to mark the antihelix for guiding the placement of implants. The first stage surgery consisted of placement of four Branemark Mark II craniofacial implants (two implants/side) of 3.7 mm x 8 mm diameter in the left and right temporal bone. The second stage surgery was performed after 6 months by elevating a partial thickness skin flap, followed by placement of four 5 mm abutments (two/side) over the implants. After 2 weeks, silicone impressions (Zhermack Elite HD+, Germany) of the bilateral defect sites were made for the fabrication of the Hader bars. Donor site impressions were made using triple layer impression technique for the fabrication of the ear[7]. The Hader bars were attached to the abutments over which acrylic substructure with clips were placed to support the wax patterns of the bilaterally missing ears (Fig: 3, 4, 5).

To determine the appropriate position, length, width and protrusion of the ear prostheses in accordance to the face, a specially designed reference plane indicating device was used, as described by Kasim Mohamed et al[8]. The required adjustments were made to the wax pattern. Once the wax pattern was finalised, it was used to fabricate the silicone ear prosthesis. The prostheses were retained over the bar attachments and evaluated for fit, comfort and aesthetics (Fig:6).

The patient was instructed to clean the dried exudate around the implant bar using saline solution with the help of a cotton swab twice daily. She was given a visual demonstration regrading the importance of maintenance of hygiene around the implants and the prosthesis. Follow-up reviews were conducted every 6 months to evaluate prosthesis fit and aesthetics. When the patient was 21 years old, new implant retained silicone ear prosthesis was planned in accordance to her stabilised skin colour and facial features. Acrylic substructures with clips were re-fabricated to improve retention. Wax-pattern was fabricated and tried to verify the ear position using the same method as described before, followed by evaluation of fit and aesthetics. The final wax pattern was used for the fabrication of the prosthesis. The silicone ear prosthesis was placed over the bar attachments and extrinsic staining was done under natural light to match the facial skin tone of the patient. Prosthesis maintenance protocols were reinstated and follow-up reviews were conducted every 6 months.

Fig:1- Bone anchored hearing aid (BAHA) placed in the right temporal bone

Fig:2- Hair-band retained silicone ear

Fig:3- Osseous implants with Hader bar attachment.

Fig:4- Acrylic substructure with clips.

Fig:5- Wax pattern try-in.

Fig:6-Implant retained silicone ear prosthesis

Discussion

Carving the framework of the auricle using autologous costal cartilage grafts have been one the most commonly employed surgical reconstructive procedures for the management of microtia/anotia and usually requires 3 stages for completion[9-13]. Autologous reconstruction demands an adequate bulk of the patients costochondral cartilage to generate an adequately sized and shaped ear. This anatomical requirement creates an age associated limitation which requires the patient with anotia or microtia to wait at least until they attain the age of 8 years[14].Moreover, the surgical reconstruction of the ear is an extremely technique sensitive and a complex procedure,and can only generate successful post-operative results depending on the surgeons surgical skill and experience. The surgeon also requires to make the surgically reconstructed ear appear normal and lifelike or else the anatomical abnormality can be easily detected by the observers eyes, especially during close encounters. Surgical procedures are also associated with post-operative complications, most common of which are surgical site infections, graft rejection and exposure of the cartilage framework due to skin flap necrosis[15-17]. Incase the cartilage framework is exposed and cannot be salvaged, the surgery is considered to be a failure. To rectify the lost external ear contour, surgeons usually have to harvest additional graft, which may or may not be successful. Also, the presence of permanent scar tissueas a result of multiple failed surgeries is a constant reminder of the patient's imperfection. Therefore, incase of young children with anotia, in whom surgical reconstruction of the auditory canal is not possible, BAHA (bone anchored hearing aid) helps rehabilitate conductive loss of hearing[18].

Over the years, the surgeons and prosthodontists have come together to work as a team to provide the best functional, aesthetic and prosthetic outcome to the patients with anotia. Unlike reconstructive surgeries, the prosthetic treatment options are almost immediate, requiring only a few appointments to be successfully completed. Patients, as young as 4 years, can be prosthetically rehabilitated with hair-band retained ear prosthesis and do not require to wait until they attain a certain age. If done well, these prosthetic options are natural looking and almost undetectable. They are easy to use, require minimal care and maintenance, and are not associated with post-operative pain and complications. The craniofacial implant retained auricular prosthesis usually requires only a single surgery, followed by placement of the prosthesis. The bar and clip attachment provides good retention to the prosthesis, giving the patient a sense of comfort and confidence[19]. A long term study report has shown that patients adapted extremely well to the implant retained auricular prosthesis, ensuring treatment success and improvement in their quality of life[20]. Perhaps the only and most significant disadvantage of auricular prosthesis is the deterioration of the material over time, leading to rough and torn edges, discolouration and loss of fit which may require prosthesis replacement every 3-4 years.

Patients with congenital auricular deformities endure social, psychological, aesthetic, functional and financial burden, which not only affects them but also their family members. Studies have shown that children and adults with microtia and anotia suffer from low-self esteem, depression and anxiety, which tends to worsen with age and has a negative impact on theirover-all quality of life[16,21].Therefore, the ultimate aim of any treatment must be to render the patient free of social and psychological stigmatisation, ensuring a normal life.

Conclusion

The sequential prosthetic treatment delivered to the patient over a decade, suggests that prosthetic management of anotia is a great alternative to surgical reconstructive procedures. The relentless efforts of physicians from multiple disciplines made the patients rehabilitation journey a successful endeavour, boosting her self esteem and confidence along the way.

Declaration Of Patient Consent

The authors certify that patient consent form has been obtained. The patient has given her consent for the use of her images and

other clinical information that has been reported in the journal. The patient understands that her name and initials will not be published and efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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