Prosthetic rehabilitation of trauma induced partial auricular defect with magnet-retained prosthesis

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Abstract

This clinical report describes the rehabilitation of a partial auricular defect with magnet-retained prosthesis. The patient presented with partial auricular defect, missing a part of the left ear helix, scapha, and anti-helix following an animal attack. He also had a history of failed prosthetic treatment with bar-clip retained prosthesis, wherein infection of the percutaneous soft tissue resulted in failure of one of the implant. The treatment planning and method of fabrication are discussed.

How to cite: Mirchandani B, Shrestha B, Theerathavaj M L Srithavaj, Thaworanunta S. Prosthetic rehabilitation of trauma induced partial auricular defect with magnet-retained prosthesis. M Dent J 2016; 36: 329-335.

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Received: 12 September 2016
Accepted: 21 November 2016

Introduction

An auricular defect can arise due to trauma, congenital malformation, or surgical removal of neoplasm.[1-2] Acquired auricular deformities most commonly result from a wide range of traumatic injuries, including human and animal bite.[3] Prosthetic rehabilitation of auricular defects can be an alternative treatment option to reconstructive surgeries and at times provides better aesthetic outcomes.[4] Since the introduction of osseointegration for use of bone conduction hearing aids (BAHA) in early 1970s, the use of craniofacial implants has become integral part of the treatment of these facial defects.[5] Retention mechanism for auricular prosthesis include mechanical devices, adhesives, bars, and magnets. For implant-retained prosthesis, the conventional retention mechanisms recommended are two or three implants involving bar-clip or magnetic systems.[6]

Even though clinical reports have been published of the implant retained partial auricular prosthesis,[7] none have discussed the fabrication with a single magnetic attachment. This clinical report describes partial auricular prosthesis retained by single implant with magnetic attachment.

Clinical report

A 72-year-old male patient with a chief complaint of a missing partial ear was referred to Maxillofacial Prosthetic Service, Mahidol University and requested a new auricular prosthesis. On examination, the patient was partially missing a part of the left ear helix, scapha, and anti-helix but the lobule and tragus were retained (Fig. 1). Previous history revealed that he was involved in a dog attack, which resulted in the partial amputation of his left ear. Subsequently, patient was rehabilitated with partial auricular prosthesis retained with bar-clip

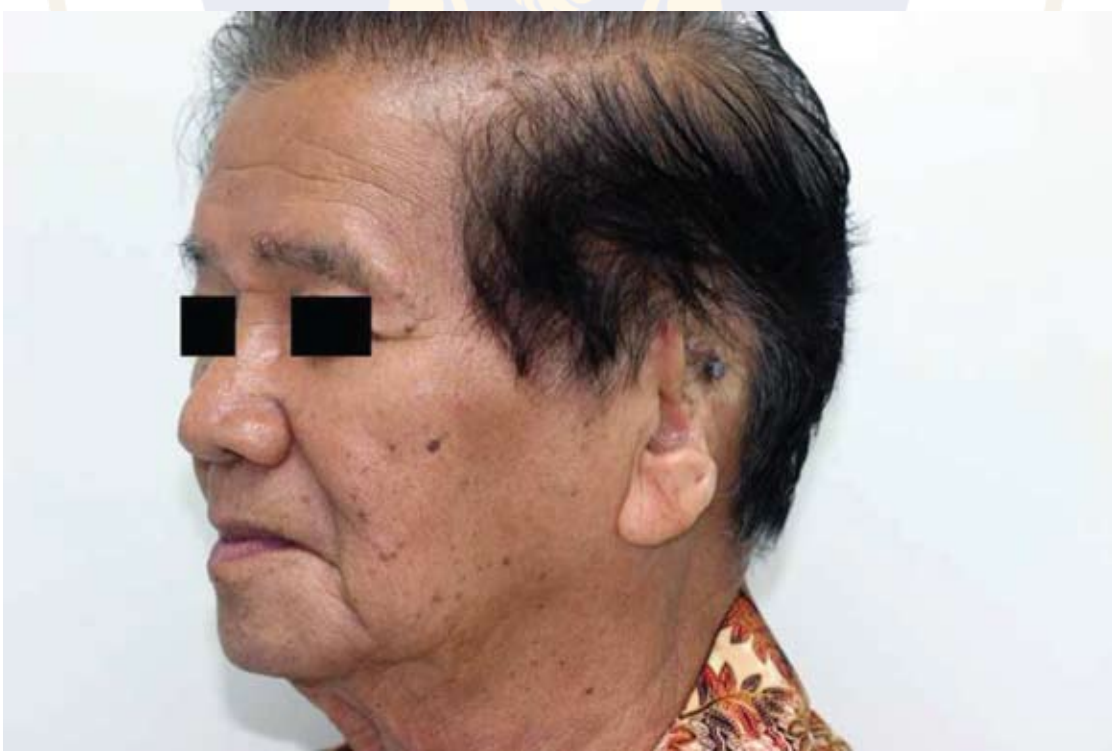

Fig. 1 Patient with partial auricular defect.

attachment placed on two craniofacial implants. However, on recall visit infection of percutaneous soft tissue was noted which resulted in failure of one of the implants, following which the affected implant was surgically removed. After careful discussion regarding various treatment options wherein the patient refused further surgical intervention, fabrication of a new auricular prosthesis retained by a single magnet with additional use of adhesives was planned.

The prosthetic phase began with making an impression of the defect using a technique to minimize soft tissue distortion. After blocking out the inner ear using moist cotton and lubricating any facial hair associated with defect, Magnacap (Maxi Magnacap Diameter 5.1 mm Length 2.1 mm; Cochlear Vistafix Implant Systems) was screwed directly onto the standard abutment (Abutment Complete 5.5 mm SEC 007-0; Entific Medical Systems). Auricular magnet (Auricular magnet Diameter 7.1 mm; Vistafix Implant Systems) was placed over the Magnacap. Impression was made with polyvinyl siloxane impression material (Multisil Epithetik soft and hard form; Berdent, Germany). A three-step technique was followed, in the first step hard form was syringed under the remaining parts of lobule allowing the material to stabilize the remnant (Fig. 2a). In the second step, soft form polyvinyl siloxane impression was syringed over the remaining defect (Fig. 2b). In the third step, the hard form was syringed all over the impression and wooden sticks (Dalian Goodwood; Medical Care Ltd.) were used to stabilize the impression and prevent distortion during removal (Fig. 2c). Laboratory analog (Maxi Lab Analogue Abutment; Vistafix Implant Systems) was attached (Fig. 2d) and the impression poured with Type IV dental stone (Nok Stone; Lafarge). Using baseplate wax (TT 100 soft; Cavex) a housing for the magnetic attachment was sculpted which was then fabricated with heat-cured polymethyl methacrylate (PMMA) resin (Ortho-jet; Lang Dental Mfg Co Inc) (Fig. 3). The PMMA housing along with wax replica of the auricular prosthesis was clinically evaluated on the patient. The housing was embedded into the wax replica and the form, position, and margins of replica were adjusted as necessary. A 3-piece mold was fabricated using Type IV dental stone (Fig. 4). The wax was eliminated from the mold and tinfoil-separating medium (Tinfoil substitute; Factor II Inc) was applied. The housing was cleaned thoroughly and thin layer of resin primer (A 330-G; Factor II Inc) was applied and allowed to dry. RTV silicone (MDX 4-4210; Dow Corning, CA) was mixed with intrinsic staining (Functional staining II; Factor II, Inc, Lakeside, AZ) and packed into the mold. After vulcanization, the prosthesis was extrinsically stained and fixed using silicone adhesive (Silastic Medical Adhesive Type A; Factor II Inc) (Fig. 5). The prosthesis was delivered to the patient and hygiene instructions were enforced (Fig. 6). The patient was advised to keep surfaces of prosthesis, abutment, and retentive elements clean with use of soft bristled brush. Recall visits were done one month following delivery thereafter every three months. Subsequently, after one year of use implant stability, peri-implant tissue health, and hygiene procedures were found to be in good condition.

Discussion

There are three main factors that affect the outcome of the craniofacial implants: the quality and volume of the bone, hygiene, and radiation therapy. Despite high overall success rate of osseointegrated implant in mastoid region compared to other craniofacial region, soft tissue infection is the most common complication reported (21-48%).[8] In this report the reason for implant failure could be associated with adverse percutaneous skin reaction, necessitating

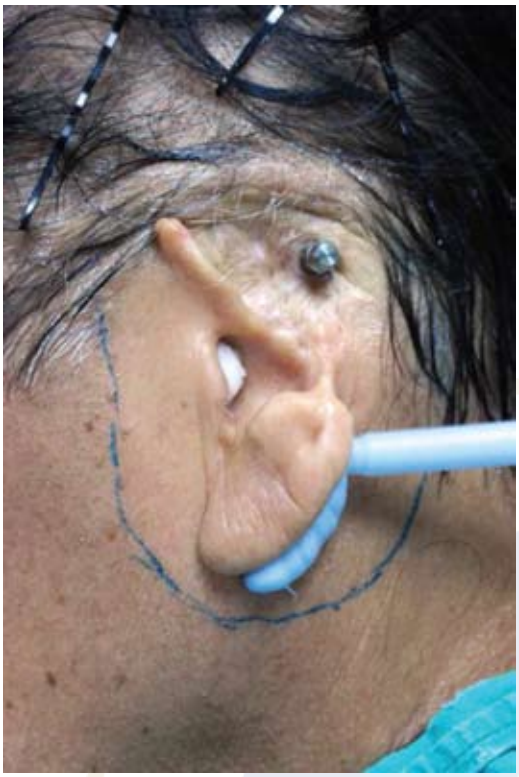

Fig. 2a First impression step: hard form syringed under tissue remnant.

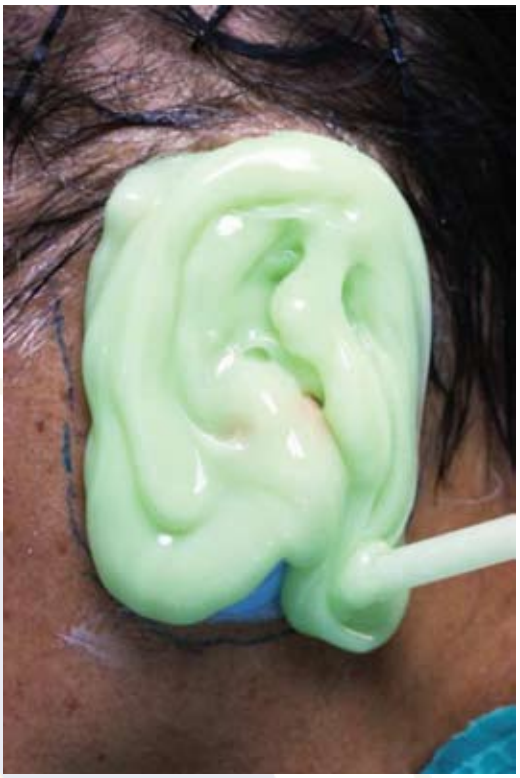

Fig. 2b Second impression step: soft form syringed over remaining defect.

Fig. 2c Third impression step: hard form syringed all over impression.

Fig. 2d Laboratory analog attached to impression.

Fig. 3 Housing for magnetic attachment sculpted.

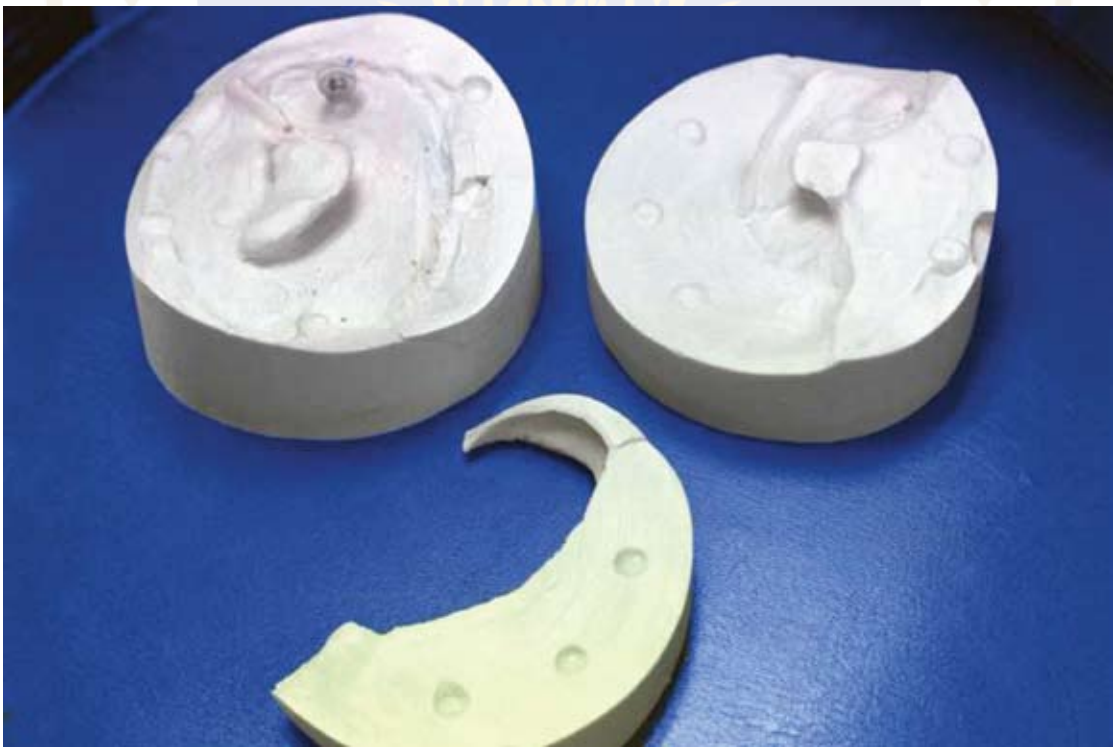

Fig. 4 Three-piece mold fabricated with type IV stone.

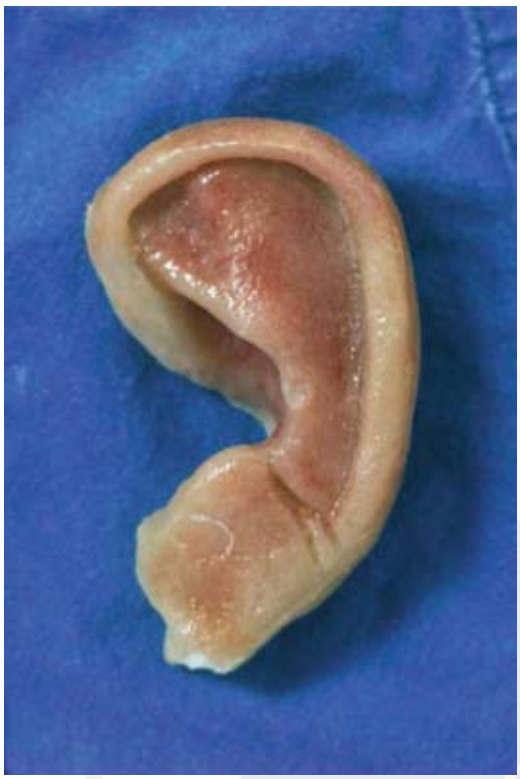

Fig. 5 Silicone prosthesis after extrinsic staining.

removal of implant due to infection. Even though hygiene instructions were thoroughly given to the patient, previous history revealed frequent lapses in hygiene procedures and follow up visits owing to his geriatric age.

For auricular prosthesis the two principal forms of retention systems used are splinted (bar-clip) and non-splinted (magnets) designs. According to clinical and biomechanical studies,[9] two implants are considered adequate to retain an auricular prosthesis. In this report, the patient was initially rehabilitated with bar-clip attachment over two implants; however, one of the implants failed following severe percutaneous skin reaction and the patient refused to undergo further implant placement. Consequently, the patient was rehabilitated with single magnet attachment with additional use of adhesive for the retention of a partial silicone auricular prosthesis.

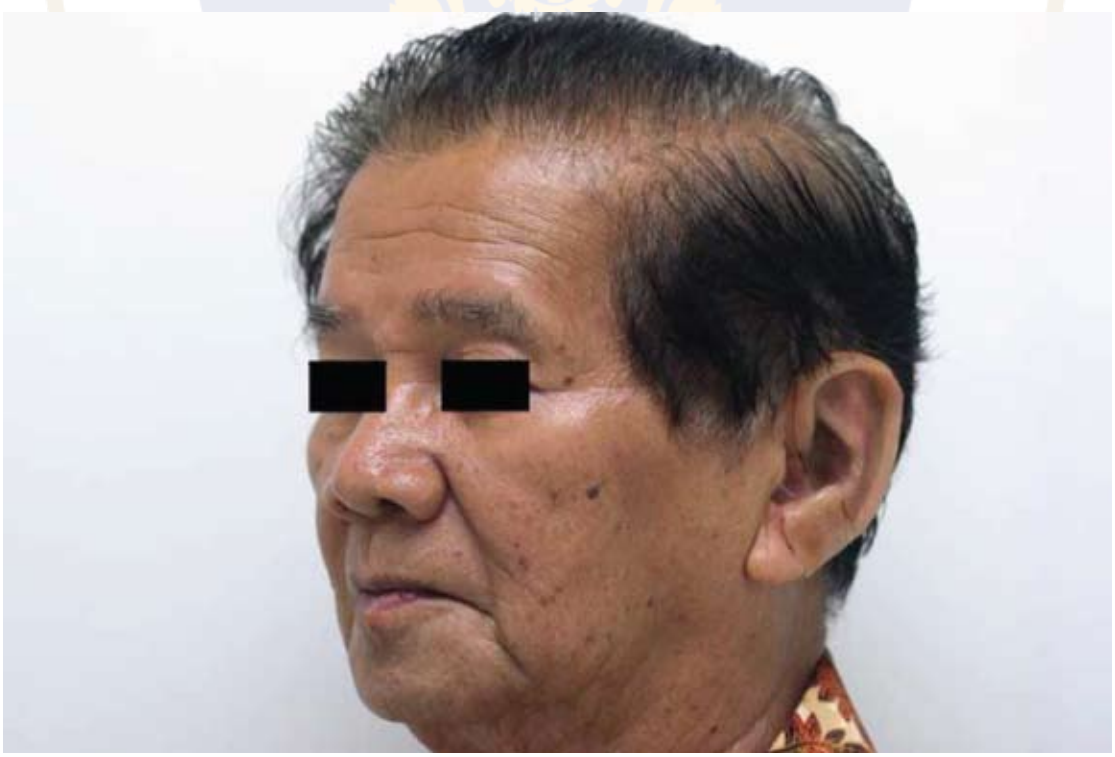

Fig. 6 Prosthesis delivered to the patient.

Partial auricular defects are usually associated with movable and flaccid tissues; therefore, the objective of impression procedure was to minimize the distortion of soft tissues and accurate reproduction of details.[10] Kubon et al[7] described a procedure in which two impression materials were used (polyether and light-body poly vinyl siloxane) along with plaster to create a three piece impression. Although this technique can accurately reproduce the defect without distortion, malposition of parts can happen during reassemble of impression. Also, the impression procedure can be difficult to manage due to the high flow of light-body polyvinyl siloxane. The impression technique used in this report produces a 1-piece impression that does not require any reassembly, therefore, has fewer chances of errors and can also be applied in the impression of other craniofacial defect involving movable tissues.

A technique for fabricating an auricular prosthesis retained by combined use of magnet and adhesive was described. By using the magnet retained auricular prosthesis, patient experienced improved retention, esthetic, and social acceptance. In addition, use of adhesive facilitated a positive fit of the margins and provided additional retention to the prosthesis.

Acknowledgment: None
Funding: None
Conflicts of interest: None
Ethical Approval: not required (clinical report)

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