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ORIGINAL ARTICLE

Prefabricated Stock Trays for Impression of Auricular Region

Shetty Vibha · G. N. Anandkrishna · Purwar Anupam · N. Namratha

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Abstract The conventional methods of impression making for maxillofacial defects are cumbersome and time consuming for both patient and operator. This study focuses upon standardizing and simplifying the impression making methodology for auricular prosthesis with the help of prefabricated stock trays for auricular region. The stock trays were designed on positive replicas of anatomical structures, broadly divided into long and narrow, short and broad and long and broad ear. For each stock tray, impressions of auricle, of patients of different morphology were made with plastic funnels of different shape and size ensuring at least 6 mm of space between the anatomical part and inner surface of funnel and master cast was obtained. Subsequent adaptation of wax was done and fabrications of stock stainless steel trays were done. A standardized stock tray for making of auricular impressions was developed. From this innovative technical procedure it is possible to get an accurate impression of auricular defects now by the use of prefabricated stock trays rather than the cumbersome conventional method.

Keywords Maxillofacial prosthesis · Auricular defect · Stock tray · Impression · Irreversible hydrocolloid

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S. Vibha · G. N. Anandkrishna · P. Anupam (✉) · N. Namratha
Department of prosthodontics, M.S. Ramaiah Dental College and Hospital, MSRIT Post, Bangalore 560054, India
e-mail: apurwar77@gmail.com

Introduction

The Fabrication of an extraoral facial prosthesis is as much an art as it is science [1]. The scientific aspect requires an accurate impression for the development of an accurately fitting facial prosthesis [2]. Various maxillofacial impression techniques described so far have been based upon the materials available and the dexterity of the operator, making it more art than science. Standardizing the method of making the impression will not only make the process reliable but improve fit of the prosthesis, optimize the amount of impression material and pressure used for impression of maxillofacial region and increase comfort for the patient. With the advent of better materials, impressions of the oral cavity have been standardized over the years with the use of prefabricated impression trays. Although these materials are available for maxillofacial impressions too, we do not have the advantage of prefabricated impression trays.

Materials and Methods

This original research was conducted in the Department of Prosthodontics, M.S. Ramaiah Dental College, Bangalore, Karnataka, India. The armamentarium required for the fabrication of prefabricated impression tray or stainless steel stock trays are:

1. Different shape and size of funnels commonly available,
2. Petroleum jelly,
3. Low fusing impression compound (Dental product of India limited, Mumbai, India),
4. Hematoxylin pencil,

5. Pieces of gauze and dental floss thread,
6. Two large flexible mixing bowl and spatulas,
7. Irreversible hydrocolloid powder in adequate amount [Tulip alginate impression material (CAVEX), Holland],
8. Cold water,
9. Syringe 50 ml,
10. Modelling wax (The Hindustan dental products, Hyderabad, India),
11. Dental stone type III (Kalabhai Karson private limited, India),
12. Dental plaster (Asian chemicals, Rajkot, India), and
13. 18-8 Austenitic stainless steel perforated sheet

Selection of Subject

Selection of subject was done on the basis of type of ear into long and narrow, short and broad and long and broad ear [3] taking into consideration that an average space of 6 mm will be necessary between the tray and the tissue of this classification.

Technique for Fabrication of the Tray for Auricular Impression

1. Reference lines [4] were drawn with the help of measuring scale using skin marker (Hematoxylin pencil). The vertical reference line passes through the most superior and inferior position of ear and horizontal line representing the ala-tragus line was extended posteriorly. The same axis was extended 7 mm from the periphery of the ear, thereby marking the vertical and horizontal extent of the tray. The reference lines not only determine the extension of stock trays but also decide the extent of perauricular tissue to be covered by the trays (Fig. 1a, b).

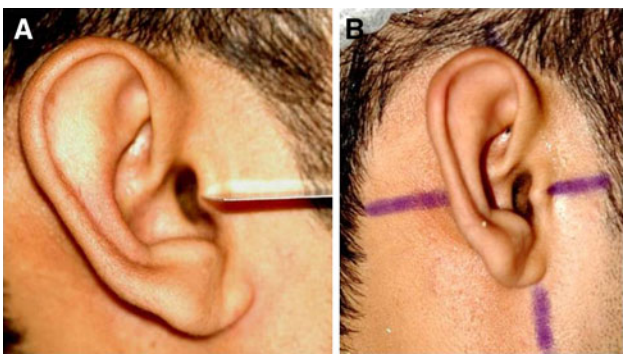

Fig. 1 **a** Measuring scale used to determine the *vertical* and *horizontal* axes. **b** *Reference lines* are drawn using skin marker

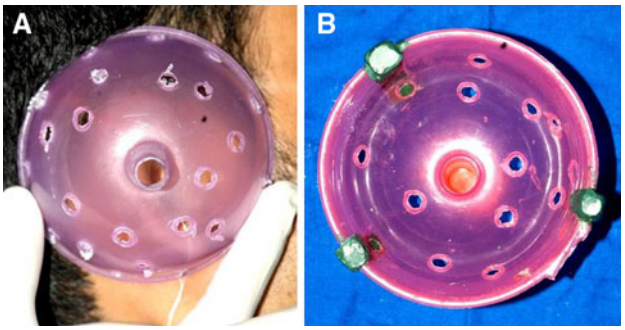

Fig. 2 **a** Appropriate size of funnel is placed on normal ear with minimum of 6 mm space between the most distal convexity of the helix and inner surface of funnel. **b** To achieve passive impression tissue stoppers (low fusing impression compound) are fabricated at three different positions

2. The appropriate size of funnel was placed on the normal ear of subject based on the reference lines and a minimum of 6 mm of space was ensured between the most distal convexity of the helix and inner surface of funnel. The periphery of the funnel extended beyond the marked lines (Fig. 2a).
3. To achieve passive impression of auricle and surrounding tissues, tissue stoppers were fabricated on the funnel at three different positions with the help of low fusing impression compound. The tissue stops also ensure accurate placement of funnel over the soft tissue area. A tungsten carbide trimmer was used to make perforations on the surface of the funnel to provide mechanical retention for the hydrocolloid material (Fig. 2b).
4. The subject was seated upright in the physiological rest position with the head unsupported [3]. The external auditory meatus was blocked with the help of gauze piece tied with 6 inch long piece of dental floss (Fig. 3a).

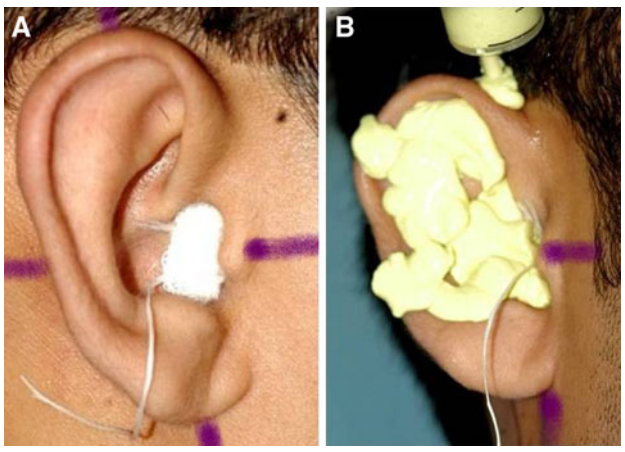

Fig. 3 **a** External auditory meatus is blocked with gauze piece tied with dental floss. **b** Thin consistency alginate is syringed into the complex anatomy of ear

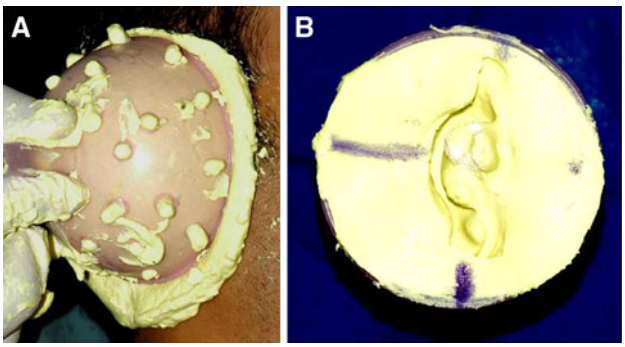

Fig. 4 **a** second mix of material is loaded in funnel and placed over syringed material. **b** Impression is removed with a snap movement

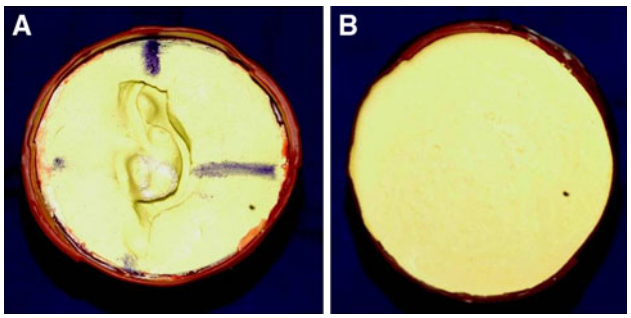

Fig. 5 **a** Impression is boxed. **b** Cast is poured with type III dental stone

5. Subject was draped and facial hair protected by light application of petroleum jelly. The alginate was mixed with appropriate water powder ratio to produce a fluid mix that was then syringed into the complex anatomy of ear (Fig. 3b).
6. A simultaneous second mix was loaded in the funnel and placed passively over the injected material (Fig. 4a).
7. Once set, impression was removed with quick twisting movement (Fig. 4b).
8. Impression was boxed with boxing wax (Fig. 5a).
9. Cast was poured with type III dental stone to obtain the preliminary cast (Fig. 5b).
10. The reference lines were redefined on the preliminary cast (Fig. 6).
11. The undercut area especially the region of the concha and area below the helix was blocked on the primary cast with the help of modelling wax (Fig. 7).
12. On the primary cast with block out cast, a 5 mm thickness wax sheet was adapted to achieve adequate amount of space between the stock tray and highest point of auricle and cast was sealed on the periphery (Fig. 8a, b).
13. Sealed primary cast was now inverted into thick mix of Type II gypsum in a large flexible bowl (Fig. 9a).

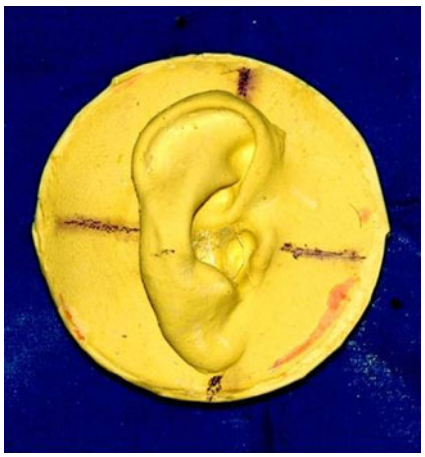

Fig. 6 Primary cast obtained and reference lines are redefined

Fig. 7 Undercut areas are blocked with modelling wax

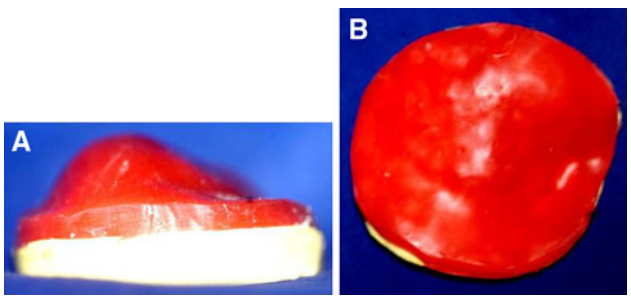

Fig. 8 On block out cast 5 mm thickness of modelling wax sheet is adapted and sealed on the periphery

14. After the Type II gypsum had set, the wax was removed by dewaxing and the cast separated and plaster mold obtained (Fig. 9b).
15. Inner surface of plaster mold thus obtained was painted with separating medium and was poured with type III dental stone (Fig. 10a, b).

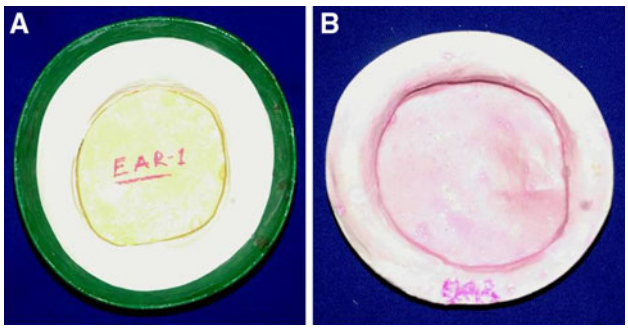

Fig. 9 **a** Sealed primary cast is placed inverted into thick mix of plaster of paris in large bowl. **b** Primary cast is removed and mold is obtained

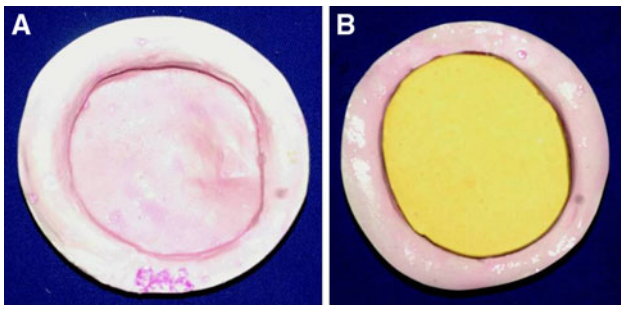

Fig. 10 A Separating media is applied in inner surface of plaster mold. **b** Type III dental stone is poured in the mold

16. After final setting of dental stone the plaster mold was broken and the master cast was obtained on which the fabrication of stainless steel stock trays was done. An iron die was fabricated based on the dimensions of the master cast. A female counterpart or the "punch" was fabricated and both were used to press the stainless steel perforated sheets to the desired shape and dimension. Beading of 2×2 mm was then soldered around the borders of the tray. Close to the centre of the tray, at the most elevated position; a 1.5 cm handle was soldered. Positioning the handle in the centre is important to avoid unequal pressure during the impression making procedure, ensuring accuracy of the impression. The trays were then finished and electro polished (Fig. 11a, b).
17. Clinical demonstration of Impression procedure. External auditory meatus was blocked with the help of gauze piece tied with 6 in long piece of dental floss. Irreversible hydrocolloid material was mixed and syringed into the complex anatomy of ear. A simultaneous second mix was loaded in the prefabricated stock tray for auricle and placed passively over the injected material (Fig. 12).

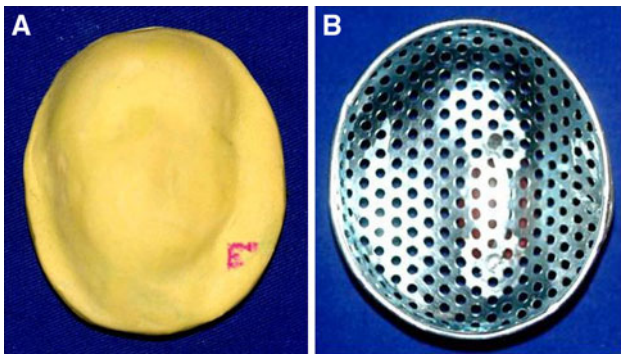

Fig. 11 **a** After final setting of dental stone plaster is mold is broken and master cast is obtained. **b** Punching process is done to fabricate stock tray for ear

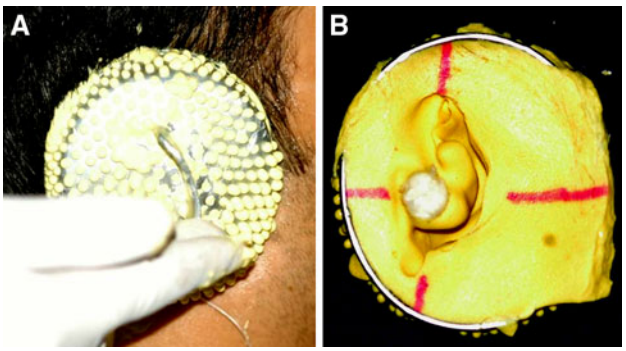

Fig. 12 Clinical demonstration of impression procedure

Discussion

The conventional method of making maxillofacial impressions involved the use of irreversible hydrocolloid material reinforced with Type II gypsum [1]. Alternatively high-viscosity polyvinyl silicone impression material [5] was used with the help of a suitable carrier. With the former technique, the impression method is arbitrary with the weight [1] of the reinforcement material applied being uncertain and is dependent on the consistency of the material [6]. In addition the time taken for the Plaster reinforcement to set could cause minor distortions of the impression material [1, 7] besides altering the pressure on the hydrocolloid material and therefore the tissues to be recorded. With the second technique, the size of the carrier determines the amount of impression material used. A large amount of material will cause inherent stresses to be built within the material with resultant strain. The use of resin to reinforce the impression material may cause discomfort for the patient due to the exothermic heat of polymerization [8].

In the technique described in this study, the use of a stock tray controls the amount of material used and thereby the amount of pressure applied on the tissues. The centrally

placed handle enables the application of uniform pressure on the tissues to be recorded. The even application of pressure is due to the provision of 6 mm space [4] for the impression material between tray and tissue to be recorded. The use of optimal impression material enhances the inherent advantages of the material while avoiding the disadvantages. Utilizing a tray excludes the use of a reinforcing medium or the use of gauze pads [2] with all its accompanying disadvantages. The tray also permits the use of irreversible hydrocolloid impression material, a far more economical impression material vis-à-vis elastomeric material and the impression can be poured immediately, increasing the accuracy of the resultant cast. This results in a reduction of chair side time, making it a comfortable experience for both patient and operator.

The above technique of using a stock tray for making auricular impressions makes it a simple, reliable and repeatable procedure.

Result

A stainless steel stock tray was fabricated with three sizes of large, medium and small on the basis of type of ear to make accurate auricular impressions with irreversible hydrocolloid.

Conclusions

Within the limitation of the research the following conclusions can be drawn with the use of stock trays:

1. Amount of material required for the impression of maxillofacial region is controlled which is not possible in conventional method.
2. Even application of pressure is possible increasing the accuracy of the impression.
3. Time required for the impression preparation is significantly reduced as compared to the conventional method.
4. The tray makes impression making procedures simpler for maxillofacial or plastic surgeons who need pre-operative study models.
5. The technique is comfortable to the patient.

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