SMART MAGNETS – A SOLUTION TO MICROSTOMIA: A CLINICAL REPORT

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Prosthetic rehabilitation of microstomia patients presents difficulties at all stages right from preliminary impressions to insertion of prosthesis. Impression making in microstomia patients is often cumbersome. A modification of standard impression procedure is often necessary while treating such patients and there is a need to fabricate complete dentures that are different from conventional ones.

This clinical report describes a simplified technique used to treat a patient who had limited mouth opening by means of sectional maxillary and mandibular complete dentures. Magnets have been used as retentive elements for this sectional denture. These magnets were very light in weight and did not impede the thickness of the denture. The small size of magnets and their high strength/ attractive forces make them easily stored and carried. An attempt has been made here to describe the fabrication of a sectional prosthesis that is practical, economical, and simple in design.

Key words: Microstomia, Sectional dentures, Magnets

Microstomia or limited mouth opening is an abnormally small orifice. Microstomia may be the sequelae of orofacial burns, carcinoma, maxillofacial trauma, cleft lips, radiotherapy, scleroderma, Plummer Vinson's syndrome, genetic disorders and fibrosis of masticatory muscles etc[1,2]. It is a definite prosthodontic hindrance to carry out the treatment successfully. During a prosthodontic procedure, it is the loaded impression tray that forms the bulkiest item requiring intraoral placement. This, compounded by the presence of limited mouth opening, makes the task of obtaining a proper path of tray placement a difficult and challenging procedure. There is a necessity of fabricating complete dentures that are different from conventional ones because of the insertion and removal problems.[3]

It is for the above-mentioned reason that many authors have advised and advocated sectional custom trays and collapsible denture systems. However, many of these systems require costly or complicated attachment devices, e.g., hinges, locking levers, orthodontic expansion screws, slide lock joints, etc. Also these attachments lead to adverse effect of limiting tongue volume.[4]

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This article brings to light a technique that uses very small magnets for the attachment of sectional dentures that do not exceed the thickness of dentures. These are rare earth magnets and have high attractive forces. They are composed of iron-neodymium-boron to form tetragonal crystalline structure[5,6].

Clinical Report

A 45 year old woman with limited oral opening reported to department of prosthodontics with a chief complaint of getting her missing teeth to be replaced. Patient was having wrinkle free face and was giving a mask-like expression. Hardening of the skin around the mouth caused oral opening to become limited. Further lab investigations were done and then it was diagnosed that patient is suffering from Scleroderma. It is a disease that causes fibrosis by affecting the connective tissue and the blood vessels. Skin becomes tighter and the wrinkles disappear in this disease. Her opening was measured and found to be 28 mm. On intra oral examination it was found that patient's ridges were resorbed. Various treatment options were discussed and finally sectional dentures were designed with right and left sections that could be detached and then joined together in the correct original position with the help of magnets.

Procedure

1. The two plastic perforated stock trays (maxillary and mandibular) of small size were modified and designed for the primary impressions. The flanges of the stock trays were reduced leaving around just 1mm of the height of the flange all around. Tray adhesive was applied. Putty was loaded in the tray and primary impressions were made both maxillary and mandibular. (Fig.1a,1b)

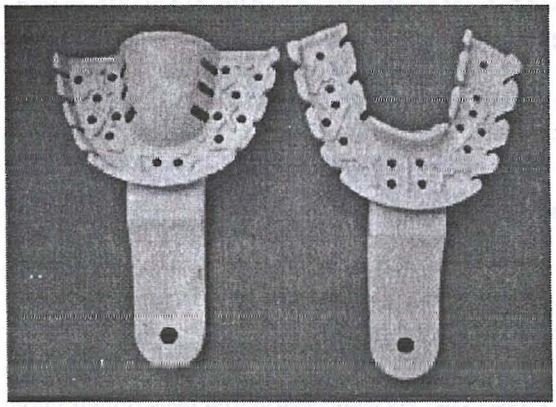


Fig.1 (a) Maxillary & Mandibular modified plastic trays.

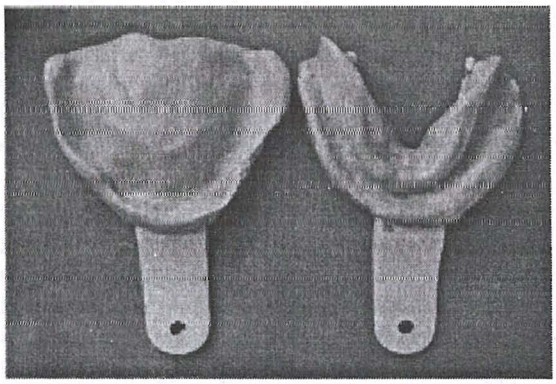


Fig.1 (b) Maxillary & Mandibular primary impression

2. Wax spacers were adapted over both maxillary and mandibular casts. Autopolymerizing acrylic resin trays were fabricated on each stone cast. Total of 4 metal pins were prepared from old and unused grinding stones for each tray. Two of these pins were 20mm long and other 2 were 5mm long, each 2.5mm in diameter. The autopolymerizing acrylic resin and metal pins were fitted symmetrically and parallel to the midline.

3. In the maxillary tray, the short pins were placed over the residual ridges and long pins close to the midline, maintaining the parallelism between the pins. (Fig.2)

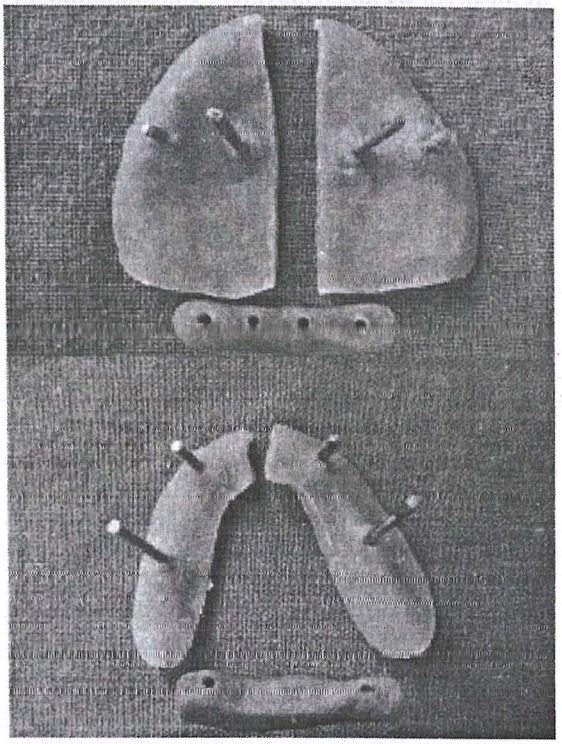


Fig- 2 Maxillary & Mandibular custom sectional tray

4. For mandibular tray, the long pins were placed close distally and short pins close to the midline.

5. The resin trays were lubricated with petroleum jelly and acrylic block of 4x5mm cross section was slided tightly over the pins.

6. The trays were cut into 2 pieces with a steel disc. Trays were shortened 2mm from the sulcus for

border moulding. With the help of green stick border moulding of maxillary and mandibular trays were done section wise i.e. right and left side separately. Then, the final impression was made with zinc oxide eugenol impression paste. Both the sections were joined with the help of acrylic block which slide onto the parallel pins. (Fig.3)

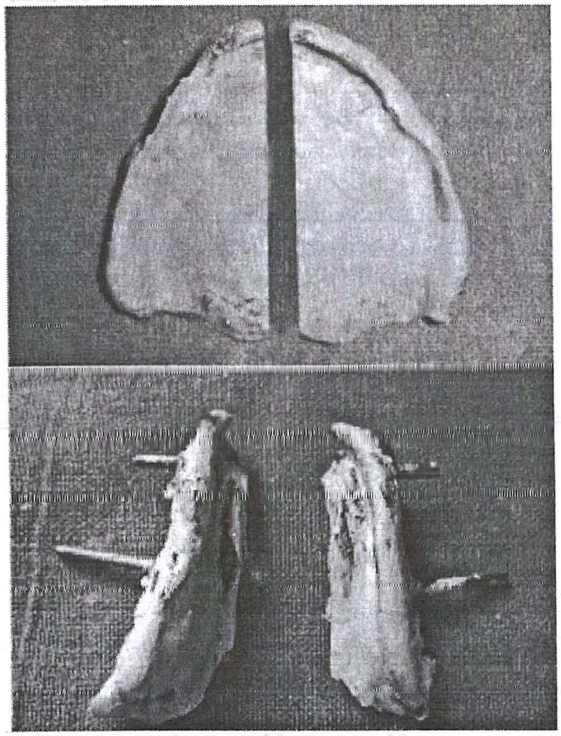


Fig.-3 Maxillary & mandibular final sectional impression

7. Maxillary temporary denture base was fabricated into 3 pieces i.e. right half, left half and anterior plate. Mandibular temporary denture base was prepared in two pieces- right half and left half. With conventional method jaw relations were recorded.

8. Teeth arrangement was done in 3 parts for maxilla i.e. anterior teeth were placed in small anterior plate and posterior teeth on right and left halves respectively. Whereas mandibular teeth were arranged in two parts, right and left subsequently.

9. After trial, wax up of the temporary bases were done. During wax up of maxillary denture, 2 small magnets were placed in the middle of each piece of denture base in the palatal region and two in anterior region. Then two magnets were placed in small anterior plate under each canine.

10. In mandibular trial bases, the magnets were placed in middle of each section i.e. under central incisor regions

11. Then, denture bases were processed section wise with heat cure acrylic resin. The bases were subsequently trimmed, polished and the connection between the bases were secured by means of magnetic attachments (Fig.4 & 5)

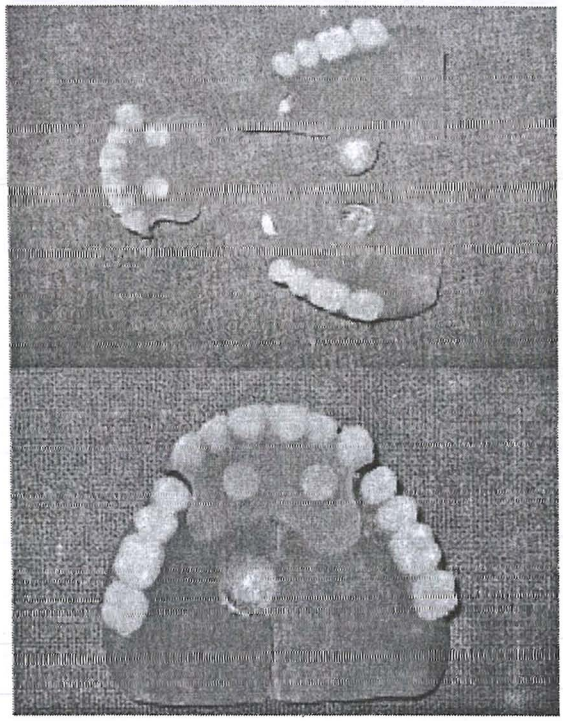


Fig- 4 Maxillary sectional denture

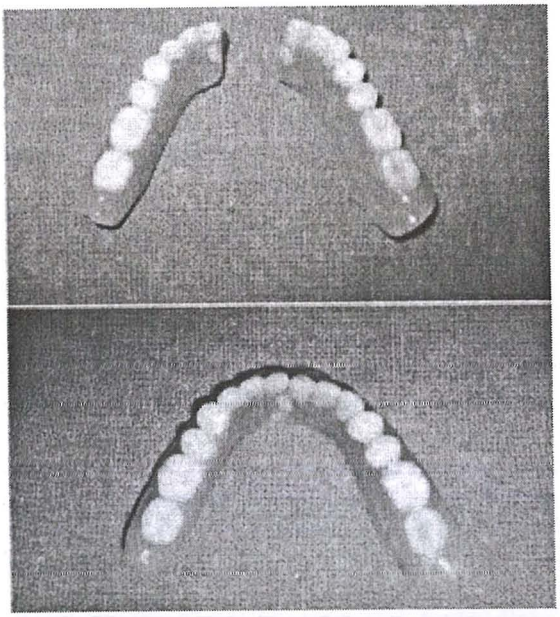


Fig- 5 Mandibular sectional denture

12. The denture was delivered. Initially the patient complained about irritations. The irritations were identified and eliminated during recalls. (Fig.6 a&b)

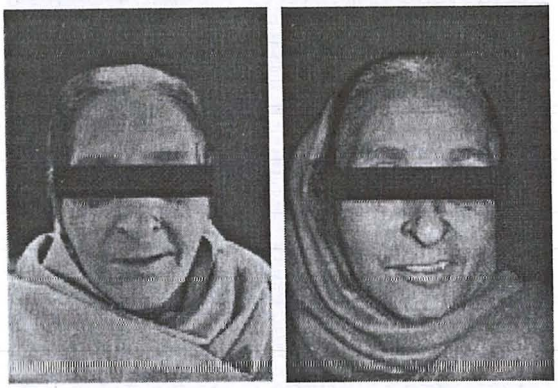


Fig 6(a) Pre-Treatment *Fig 6(b) Post-operative*

Discussion

A maximal oral opening smaller than the size of a complete denture can make prosthetic treatment challenging. Different management techniques described are surgeries, use of dynamic opening devices and modification of denture design. Prosthetic rehabilitation of microstomia patients presents difficulties at various stages of denture fabrication. Because such patients have small oral opening it may be extremely difficult to make impressions and fabricate dentures using conventional methods. Making the impression represents the initial difficulty in prosthetic rehabilitation. Applications of magnets to be used in dentistry has found wide acceptance in orthodontics[7] & prosthodontics[8,9] as they can be manufactured in small dimensions that is few mm in width and height. Because of the large attractive and repellent forces of these magnets they have made their applications in orthodontics for correction of malocclusion. Conventional magnets have been used as retentive devices for removable partial dentures[10], obturators and maxillofacial prosthesis[11].

In the past, various foldable, single piece denture base surfaces were fabricated for these kinds of patients. However, many of these dentures require costly or complicated attachment devices, e.g., hinges, locking levers, orthodontic expansion screws, slide lock joints, etc. In foldable dentures, care must be taken to fit the hinge in the midline. Also, fitting the hinge higher than the tissue surface had adverse effect of limiting tongue volume.

In this case, sectional denture faced no such problems. The use of different size pins in the mandibular impression tray made it possible for the tray to be folded in the horizontal plane thus, facilitating impression procedures [6]. The sectional dentures were easily stabilized intraorally with small magnets. These magnets were very light in weight and thin but its lab work was bit lengthy. Proper instructions were given to the patient that the prosthesis should not be cleaned in acidic or strong denture cleansing solutions or bleach. Mild soap and water could be used without any potential damage to the magnets.

Advantages

- Sectional dentures retained by magnets provide ease of insertion and removal of the prosthesis.

- Mechanical retention allowing for some micro movement without loss of denture retention.
- Structural durability
- Maximum coverage for support, retention and stability
- No restriction of tongue space

Conclusion

This article has described an innovative impression procedures and prosthesis design which aid in fabrication of prosthesis for a patient with limited mouth opening. The fabrication process was convenient for the patient and thus helped in better functioning, health, esthetics and overall well being of the patient. The patient was satisfied and adapted to prosthesis perfectly.

The desire to use magnetic retention is related to the simplicity of the clinical and laboratory procedures. However the long term durability of the magnets remains a problem. Further research is required in the following areas: their biological compatibility, corrosion resistance. Such research will hopefully provide a permanent magnet which will be resistant to the adverse environment of the oral cavity and allow the full potential of dentures retained with magnets to be realised.

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