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Case Series

Fabrication of obturators for veau's class III cleft lip and palate patients - A case series

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ABSTRACT

A fissured palate is a genetic condition where there is a gap or opening in the roof of the mouth (palate). This opening occurs due to the inability of the palatal shelves, which are responsible for forming the palate, to properly fuse during fetal development. This results in oronasal communication, or an opening between the palate and the base of the nose. Cleft palates can result from a combination of genetic factors, chromosomal disorders, heredity, and environmental factors. Possible environmental causes include nutritional deficiencies, maternal alcohol or cigarette consumption, exposure to radiation during pregnancy, hormonal imbalances, the ingestion of teratogenic substances by the mother, and infections. Newborns with cleft palates face difficulties in feeding and swallowing due to the gap in the palate. This can lead to problems such as stunted growth and being underweight. As these children grow, they can experience additional challenges including difficulties in speech, dental problems, altered facial appearance, and psychological issues. One immediate solution for infants with cleft palate is the fabrication of a feeding plate, often called an obturator. This device helps close the oronasal opening, enabling improved feeding, and reducing the risk of infections and regurgitation. This intervention can also aid in achieving proper weight gain, which is essential for future reconstructive surgery to repair the cleft palate. This paper presents a case series of infants with cleft palate who received feeding plates. The feeding plates were created using putty impressions to customize them for each patient's needs. This approach aimed to help the infants feed effectively, maintain their weight, and prepare for future reconstructive surgery to address the cleft palate.

1. Introduction

Fissured lip and palate (CLP) is a genetic condition characterized by a separation or gap in the lip and/or palate. It occurs due to the failure of the palatal shelves to fuse during embryonic development, usually around the 9th week of pregnancy.[1] The global incidence of CLP is approximately 1 in 600 births.[2] The prevalence rates vary, with CLP having a prevalence of 9.92 per 10,000 births and cleft lip alone (CL) having a prevalence of 3.28 per 10,000 births.[3] In India, where the birth rate is estimated to be 24.5 million births per year, the prevalence of cleft cases ranges from 27,000 to 33,000 per year.[4] The occurrence of CL is more common in males (2:1 male-to-female ratio), while fissured palate (CP) without CL is more common in females.[5] This is attributed to the delay in fusion of palatal shelves in girls compared to boys.[6] CLP can be linked with various disorders such as Stickler's syndrome, DiGeorge syndrome, Pierre-Robin sequence, Apert's syndrome, Treacher Collins malformation, Waardenburg's syndrome, and trisomy 13 and 18. Individuals with CLP may experience a range of difficulties, including facial growth deficiency, feeding problems (suckling difficulties, nasal regurgitation), dental

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and aesthetic issues, hearing impairments, psychological challenges, and speech difficulties due to velopharyngeal inadequacy.[7] The development of cleft lip and palate is believed to result from a combination of genetic and environmental factors. Additionally, maternal use of certain medications during pregnancy (such as Accutane, methotrexate, antiseizure drugs) can contribute to the risk. Factors like smoking, substance abuse, vitamin deficiency (especially folic acid), and obesity have also been suggested as potential contributors.[8] Cleft lip and palate treatment often involves surgical intervention to close the gap and improve function and aesthetics. Multidisciplinary care, including speech therapy and psychological support, is crucial for managing the various challenges associated with this condition. Early diagnosis and intervention can significantly improve the quality of life for individuals with CLP.

Children born with fissured lip (CL) or fissured palate (CP) often face immediate feeding difficulties due to the structural abnormalities that affect their ability to create proper suction and swallow effectively. These challenges can lead to delayed normal growth and development. Reconstructive surgery is the primary treatment approach to correct cleft lip and cleft palate. Surgical repair for cleft lip is typically performed within the first few months of life, while cleft palate repair is usually done before the child reaches 18 months of age. A feeding plate, also known as an obturator, is a rigid plate designed to address feeding difficulties in infants with cleft palate. The feeding plate acts as a substitute for the missing hard palate, allowing the child to press the tongue against it during swallowing. This helps in creating proper suction and reducing nasal regurgitation. The plate also facilitates a negative pressure during suckling, which aids in efficient feeding.[1,9] The feeding plate prevents the tongue from occupying the cleft space, which can hinder the natural fusion of palatal shelves. It also supports the correct resting position of the tongue, contributing to the proper development of the maxillary and mandibular arches.[10–12] Additionally, it assists in the articulation of words, playing a functional role in speech development.[13] The feeding plate plays a crucial role in ensuring that children with CLP receive proper nutrition. By addressing feeding difficulties and facilitating efficient feeding, the feeding plate helps the child attain the ideal weight necessary for successful reconstructive surgery. This paper presents three cases highlighting the fabrication of feeding plates for children referred from the Neonatal Intensive Care Unit (NICU) of Kalinga Institute of Medical sciences. The report emphasizes the use of a simple impression technique and impression material to create customized feeding plates for these infants.

2. Case Report 1

2.1. Case presentation

A male child, 7 days old, was brought to the Department of Pedodontics and Preventive Dentistry with complaints of difficulty in sucking milk and nasal regurgitation during feeding. The child's birth weight was 2 kg, and he had been admitted to the neonatal ICU due to inadequate weight gain from oral feeding.

2.2. Clinical examination

On intraoral observation, a gap in the hard and soft palate was observed (Veau's class III). This cleft contributed to the feeding difficulties and regurgitation.

Figure 1: Veau's class III cleft lip and palate

Figure 2: Impression registration for cleft

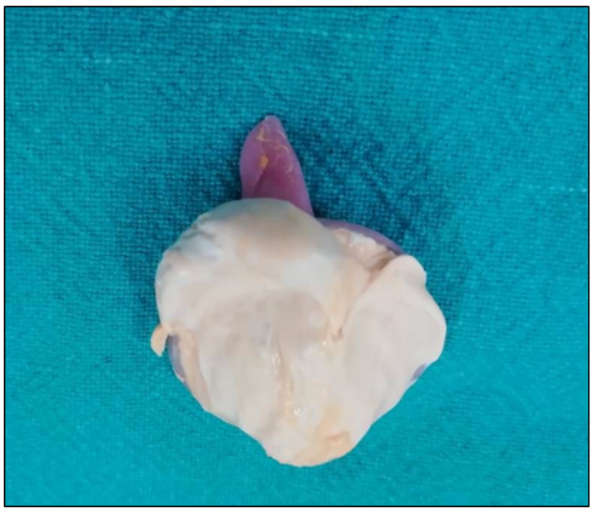

Figure 3: Impression registered using medium body polyvinyl siloxane impression material

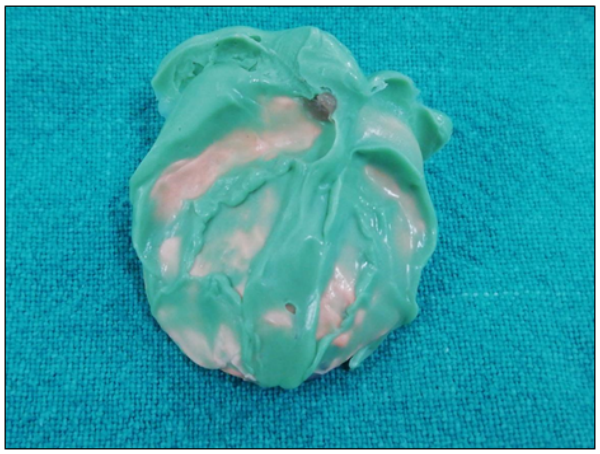

Figure 4: Impression registration using light body polyvinyl siloxane impression material

Figure 5: Cast prepared using type III dental stone

Figure 6: Feeding Plate (FP) was prepared with cold cure acrylic resin and monomer by sprinkle on method

Figure 7: Handles attached to the feeding plate for easy placement and removal from the mouth

Figure 8: Infant with the feeding plate

2.3. Feeding plate fabrication steps

1. Primary Impression: An impression of the infant's palate was taken using medium body polyvinyl siloxane impression material, followed by a light body impression material. This was done using a custom tray.
2. Master Cast: To produce a master cast, type III dental stone was poured into the impression.
3. Feeding plate preparation: The obturator was made using cold cure acrylic resin polymer powder and monomer liquid by the sprinkle-on method. Finishing, followed by polishing of the plate was done to ensure no irritation to the soft tissues occurred.
4. Attachment of wire handles: Two wire handles were attached to the obturator using cold cure resin. These handles would aid in easy removal of the plate by parents if necessary.
5. Fitting and Adjustment: The obturator was checked in the patient's mouth to ensure it didn't impinge on soft tissues and didn't extend too far.
6. Feeding trial: The child was given the obturator, and the mother was instructed to feed the infant. The plate successfully prevented nasal regurgitation, allowing the child to feed without complications.
7. Instructions and follow up: Parents were educated on feeding techniques, cleaning, maintenance of the feeding plate, and oral hygiene. Follow-up appointments were scheduled to monitor if any feeding difficulties arose, soft tissue health, and weight gain. The obturator's border was adjusted to accommodate growing craniofacial structures, and new plates were provided as needed.

3. Case Report 2

3.1. Case presentation

A 7-day-old male child presented to the Department of Pedodontics and Preventive Dentistry with a complaint of fissure of the lip and palate. This condition resulted in difficulties with sucking milk and nasal regurgitation during feeding. The child's birth weight was 1.9 kg, and due to the inability to take oral feed, he was admitted to the neonatal ICU.

3.2. Clinical examination

Intraoral examination revealed a complete unilateral cleft involving the hard and soft palate as well as the lip (Veau's class III).

3.3. Feeding plate fabrication steps

1. *Primary Impression:* An impression of the infant's palate was taken using medium body polyvinyl siloxane impression material. This was done using a

Figure 9: Veau's class III cleft lip and palate

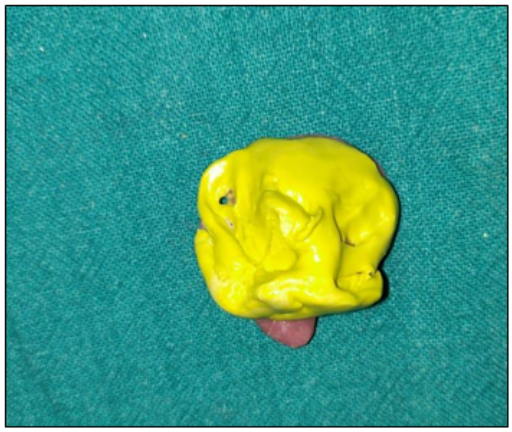

Figure 10: Impression registered using medium body polyvinyl siloxane impression material

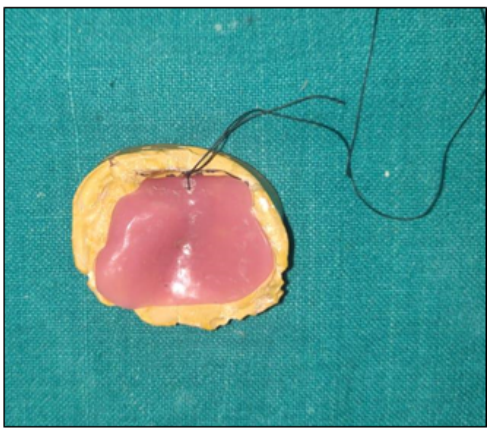

Figure 11: Cast prepared using dye stone Feeding Plate (FP) was prepared with cold cure acrylic resin and monomer by sprinkle on method.

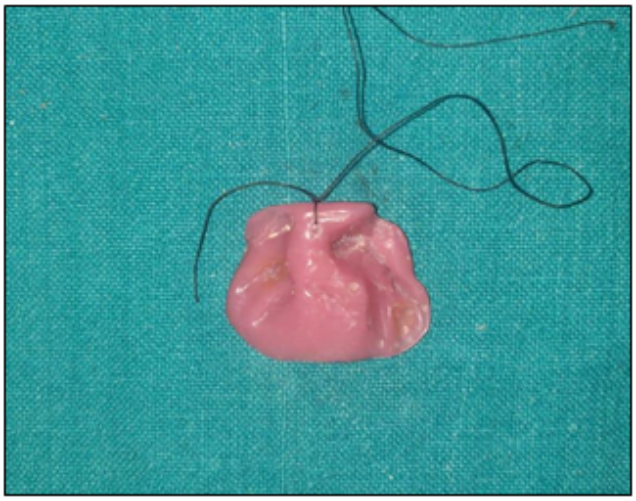

Figure 12: A suture string have been attached on the (FP) for easy removal of plate by parents in an accidental swallowing or in case of gagging

Figure 13: Infant with the feeding plate. (FP) was checked in the patient's mouth for impingement of the soft tissue or any overextension.

custom tray.

2. *Master Cast:* The impression was poured with die stone to create a master cast.
3. *Feeding plate preparation:* The obturator was made using cold cure acrylic resin polymer powder and monomer liquid by the sprinkle-on method. Finishing, followed by polishing of the plate was done to ensure no irritation to the soft tissues occurred.
4. *Attachment of suture strings:* Two suture strings were attached to the feeding plate to allow for easy removal by parents in cases of accidental swallowing or gagging.
5. *Fitting and Adjustment:* The obturator was checked in the patient's mouth to ensure it fit comfortably and did not impinge on soft tissues.
6. *Feeding trial:* The child was given the obturator, and the mother was instructed to feed the infant. The plate successfully prevented nasal regurgitation, enabling successful feeding.
7. *Instructions and follow up:* Parents were educated on feeding techniques, cleaning, maintenance of the obturator, and oral hygiene. The patient was scheduled for follow-up appointments.

4. Case Report 3

4.1. Clinical presentation

A 5-day-old female child presented to the Department of Pedodontics and Preventive Dentistry with a complaint of a fissure of the lip and palate. The child's birth weight was 2.3 kg, and she was admitted to the neonatal ICU. No specific contributing history was noted.

Clinical Examination: Intraoral examination revealed a complete unilateral cleft involving the lip, hard palate, and soft palate (Veau's class III)

Figure 14: Veau's class III cleft lip and palate

Figure 15: Impression registration for cleft

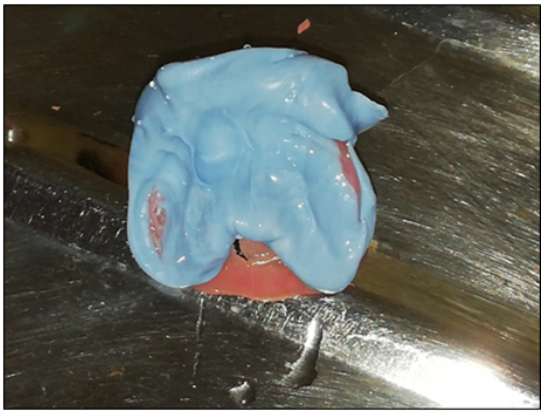

Figure 16: Impression registered using medium body polyvinyl siloxane impression material

4.2. *Feeding plate fabrication steps*

1. *Primary Impression:* A maxillary preliminary impression was taken using a prefabricated custom impression tray and fast-set putty elastomeric impression material. The infant was fully awake and crying during the procedure to maintain a patent airway. The mother held the infant in an upright position to prevent aspiration of the material.
2. *Master Cast:* The impression was poured with die stone to create a master cast
3. *Feeding plate preparation:* The obturator was made using cold cure acrylic resin polymer powder and monomer liquid by the sprinkle-on method. Finishing, followed by polishing of the plate was done to ensure

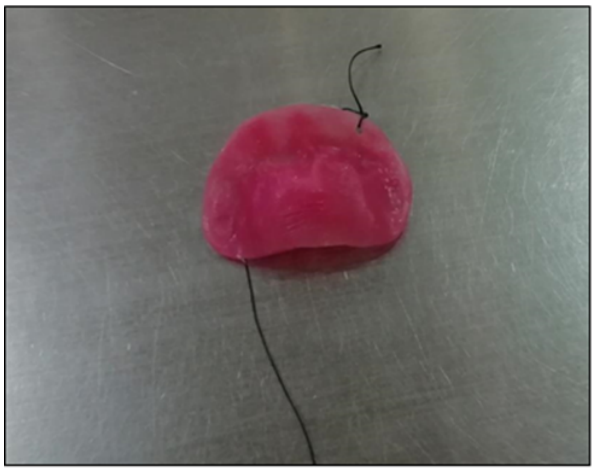

Figure 17: A suture string have been attached on the FP for easy removal of plate by parents in an accidental swallowing or in case of gagging

Figure 18: Infant with the feeding plate. FP was checked in the patient's mouth for impingement of the soft tissue or any over extension.

no irritation to the soft tissues occurred.

4. *Attachment of suture strings:* A suture string was attached to the feeding plate to facilitate easy removal by parents if necessary.
5. *Fitting and Adjustment:* The obturator was checked in the patient's mouth to ensure proper fit without impinging on soft tissues.
6. *Feeding trial:* The child was given the obturator, and the mother was instructed to feed the infant. Successful feeding was observed without nasal regurgitation.
7. *Instructions and follow up:* Parents were educated on feeding techniques, cleaning, maintenance of the obturator, and oral hygiene. The patient was scheduled for follow-up appointments.

5. Discussion

The treatment of cleft lip and palate involves collaboration among various medical and dental specialists, including general surgeons, pediatricians, pediatric surgeons, plastic surgeons, oral surgeons, orthodontists, pedodontists, and prosthodontists.[10] This team approach ensures comprehensive care for the patient's specific needs. CLP cases are effectively managed through plastic and reconstructive surgery, which involves correcting the cleft lip and palate to improve function and aesthetics. While awaiting surgical intervention, infants born with CLP often face challenges related to feeding, weight gain, and nutrition. Temporary appliances like obturators or feeding plates (FPs) are fabricated by pedodontists or prosthodontists.[11] These appliances act as barriers between the oral and nasal cavities, aiding in feeding and preventing nasal regurgitation. Fabricating a feeding plate for young patients can be challenging due to limited access, patient cooperation issues, and the risk of respiratory complications caused by backflow of impression material.[12] Selecting the appropriate impression material is critical to capturing accurate surface details while being easy to handle and remove from the oral cavity, especially in emergency situations. Proper positioning of the infant during the impression-making procedure is essential to ensure the safety and comfort of the patient while capturing accurate impressions.[13,14]

6. Conclusion

A feeding plate facilitates proper feeding by creating a barrier between the oral and nasal cavities, allowing efficient suckling and preventing nasal regurgitation. The use of a feeding plate aids in promoting healthy oro-facial development by supporting the proper alignment of the tongue, palate, and oral structures. The plate prevents nasal regurgitation, which can be a common issue in infants with cleft palate. A feeding plate supports the development of palatal shelves, contributing to the fusion process and help in guiding their proper alignment. By providing a stable surface for the tongue to rest against during feeding and oral activities, a feeding plate helps prevent tongue distortion. The plate acts as a barrier, preventing irritation of the nasal septum and nasal passages by blocking the communication between the oral and nasal cavities. The barrier effect of the feeding plate can also help reduce the risk of ear infections, which can be common in infants with cleft palate. The presence of the feeding plate aids in the approximation of the two ends of the cleft, facilitating the eventual surgical reconstruction process. A feeding plate helps overcome challenges that can hinder normal growth and development in infants with cleft lip and palate. Early use of a feeding plate provides important guidance to surgeons during reconstructive treatment. It helps in maintaining proper alignment, making the surgical process more effective.

7. Source of Funding

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8. Conflict of Interest

None.

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