

## Management of feeding difficulties in an infant with bilateral cleft lip and palate using feeding plate prior to palatoplasty: A case report

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DOI: <https://doi.org/10.66856/ijds.2026.8.3.8114>

### Abstract

**Background:** Feeding difficulty is one of the earliest and most significant functional challenges encountered in infants with cleft palate. The inability to establish an effective intraoral seal results in impaired sucking, nasal regurgitation, prolonged feeding, inadequate nutritional intake, and poor weight gain. Early prosthetic intervention with a feeding plate can improve feeding efficiency and facilitate nutritional rehabilitation before definitive surgical repair.

**Case Presentation:** A 14-month-old female infant with repaired bilateral cleft lip and unrepaired bilateral cleft palate presented with persistent feeding difficulty, choking episodes, nasal regurgitation, and poor weight gain. Clinical examination revealed a complete bilateral cleft palate (Veau Class IV) and a tooth-like structure within the right nasal cavity suggestive of a suspected intranasal ectopic tooth. A customised acrylic feeding plate was fabricated using conventional impression techniques and delivered with comprehensive caregiver instructions.

**Results:** Insertion of the feeding plate resulted in immediate improvement in feeding efficiency, reduced nasal regurgitation, improved swallowing coordination, and progressive nutritional rehabilitation. The appliance served as an effective interim prosthetic aid while the child awaited definitive palatoplasty.

**Conclusion:** This case highlights the importance of early prosthetic rehabilitation using a customised feeding plate to optimise feeding and nutritional status before surgery. It also emphasises the value of meticulous clinical technique, caregiver education, and multidisciplinary cleft care in preparing infants with cleft palate for definitive surgical intervention.

**Keywords:** Bilateral cleft lip and palate, feeding plate, feeding obturator, infant, palatoplasty, nutritional rehabilitation

### Introduction

Cleft lip and palate (CLP) are among the most common congenital craniofacial anomalies, with an estimated global prevalence of approximately 1.7 per 1,000 live births. These malformations result from incomplete fusion of the facial processes during embryonic development and may occur in isolation or as part of recognised syndromes. Beyond the obvious anatomical defect, CLP has profound implications for feeding, speech, hearing, craniofacial growth, dental development, psychosocial well-being, and overall quality of life, necessitating coordinated multidisciplinary management<sup>[1]</sup>.

Feeding difficulty represents one of the earliest and most clinically significant challenges in infants with cleft palate. Normal infant feeding depends on the ability to establish an effective seal around the nipple and generate adequate intraoral negative pressure for coordinated sucking and swallowing. In the presence of a cleft palate, communication between the oral and nasal cavities prevents effective suction, resulting in nasal regurgitation, prolonged feeding time, excessive air intake, choking episodes, fatigue during feeding, and inadequate caloric intake<sup>[2]</sup>. Persistent feeding problems may lead to poor weight gain, failure to thrive, increased caregiver anxiety, and postponement of definitive surgical repair because adequate nutritional status is a prerequisite for safe anaesthesia and successful palatoplasty<sup>[3]</sup>.

Several approaches have been advocated to improve feeding in infants with cleft palate, including specialised feeding bottles, modified feeding techniques, caregiver education, and prosthetic feeding appliances. Among these, a feeding plate functions as a temporary obturator by separating the oral and nasal cavities and providing a rigid platform against which the tongue can compress the feeding teat. This facilitates more effective sucking, improves swallowing coordination, reduces nasal regurgitation, and enhances nutritional intake before surgical reconstruction<sup>[4, 5]</sup>.

Although digital workflows incorporating intraoral scanning and three-dimensional printing have recently been introduced for feeding plate fabrication, conventionally fabricated acrylic feeding plates remain widely utilised because of their affordability, accessibility, and predictable clinical performance, particularly in resource-limited healthcare settings<sup>[6]</sup>.

The present report describes the successful management of feeding difficulties in a 14-month-old infant with repaired bilateral cleft lip and unrepaired bilateral cleft palate using a customised acrylic feeding plate before planned palatoplasty. An additional noteworthy finding was the presence of a suspected intranasal ectopic tooth, emphasising the importance of comprehensive clinical examination and multidisciplinary assessment in children with cleft lip and palate.

## Case Presentation

A 14-month-old female infant was referred from the Neonatal Intensive Care Unit (NICU), PIMS Hospital, Umarda, Rajasthan, India, to the Department of Paediatric and Preventive Dentistry for evaluation and management of persistent feeding difficulties associated with bilateral cleft lip and palate.

The child's parents reported difficulty in feeding since birth, characterised by ineffective sucking, frequent nasal regurgitation of milk, choking episodes during feeding, prolonged feeding time, and inadequate weight gain. Despite receiving routine feeding advice, the infant continued to experience poor nutritional intake, which delayed definitive palatal repair. Feeding difficulties in infants with cleft palate are primarily attributed to the inability to generate adequate intraoral negative pressure because of the communication between the oral and nasal cavities [2, 3].

## History of Present Illness

The infant had undergone successful bilateral cleft lip repair approximately six months before presentation. Following lip repair, feeding difficulties persisted because of the unrepaired palatal defect. According to the parents, liquids frequently regurgitated through the nose, feeding sessions were prolonged and exhausting, and the child demonstrated poor acceptance of semi-solid foods. Owing to inadequate weight gain, the multidisciplinary cleft team deferred palatoplasty until satisfactory nutritional status could be achieved.

## Medical, Family and Birth History

The child was born at term by normal delivery with an uneventful antenatal and perinatal history. There was no history of neonatal intensive care beyond the initial postnatal evaluation related to the cleft anomaly. Medical history was otherwise non-contributory, and developmental milestones were appropriate for age except for delayed weight gain secondary to feeding difficulty.

No family history of cleft lip, cleft palate, or other craniofacial anomalies was reported.

## Clinical Examination

### Extraoral Examination

Extraoral examination revealed a well-healed bilateral cleft lip repair scar with satisfactory lip continuity. Facial symmetry was acceptable, and no associated craniofacial syndrome was clinically suspected. (Figure 1.)

A tooth-like calcified structure associated with a localised swelling was observed within the right nasal cavity. The finding was provisionally diagnosed as a suspected ectopic intranasal tooth, and further radiographic evaluation with multidisciplinary consultation was planned. Although uncommon, intranasal teeth have been reported in association with cleft lip and palate and should be recognised because they may contribute to nasal obstruction, recurrent infection, epistaxis, or chronic rhinorrhoea if left untreated. (Figure 2.)



**Fig 1:** Pre-treatment extraoral photograph demonstrating the repaired bilateral cleft lip



**Fig 2:** Clinical photograph of the suspected intranasal ectopic tooth within the right nasal cavity

### Intraoral Examination

Intraoral examination demonstrated a complete bilateral cleft involving the hard and soft palate, consistent with Veau Class IV cleft palate. A wide communication between the oral and nasal cavities was evident, resulting in the absence of an effective palatal partition during feeding. The maxillary alveolar segments appeared well aligned following previous lip repair, and no active oral infection or mucosal ulceration was present. Oral hygiene was satisfactory for the patient's age.

The palatal defect prevented the infant from generating an adequate intraoral seal around the feeding teat, explaining the persistent feeding difficulty, nasal regurgitation, and poor weight gain observed clinically [2]. (Figure 3.)



**Fig 3.** Intraoral view showing the complete bilateral cleft palate (Veau Class IV)

## Diagnosis

Based on the history and clinical examination, the final diagnosis was:

- Repaired bilateral cleft lip.
- Complete bilateral cleft palate (Veau Class IV).
- Feeding difficulty with poor nutritional status secondary to palatal insufficiency.
- Suspected ectopic intranasal tooth involving the right nasal cavity.

## Treatment Objectives

After discussion with the multidisciplinary cleft team, the primary treatment objectives were to:

1. Improve feeding efficiency.
2. Reduce nasal regurgitation during feeding.
3. Facilitate more effective sucking and swallowing.
4. Improve nutritional intake and promote weight gain.
5. Prepare the patient for definitive palatoplasty.
6. Educate the caregivers regarding appliance use, hygiene, and follow-up.
7. Arrange appropriate investigation and specialist referral for the suspected intranasal tooth.

Considering the persistent feeding difficulties and delayed surgical intervention, fabrication of a customised acrylic feeding plate was planned as an interim prosthetic measure. Feeding plates have been shown to improve feeding efficiency by temporarily separating the oral and nasal cavities, thereby enhancing sucking and reducing nasal regurgitation [4-5].

## Clinical Management

Following comprehensive clinical evaluation and multidisciplinary consultation, the immediate treatment objective was to improve the infant's nutritional status before definitive palatoplasty. As persistent feeding difficulty had resulted in inadequate weight gain, fabrication of a customised feeding plate was planned as an interim prosthetic intervention. The treatment plan, anticipated benefits, possible limitations, and the need for regular follow-up were discussed with the parents, and written informed consent was obtained before treatment.

## Pre-procedural Considerations

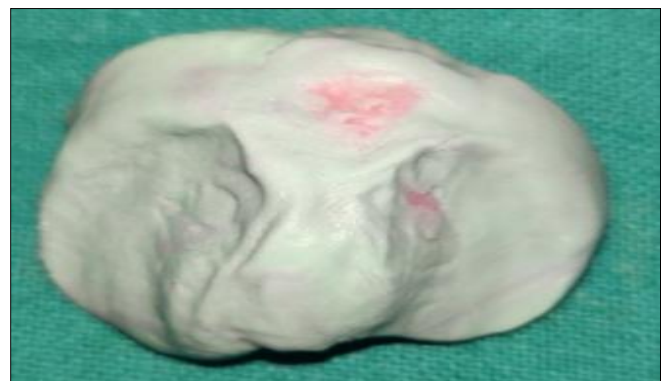
Impression making in infants with cleft palate requires meticulous planning because of the potential risk of aspiration, airway obstruction, and distortion of impression material within the cleft defect. Appropriate emergency equipment, including high-volume suction and resuscitation facilities, was kept readily available throughout the procedure. The infant remained fully awake and was positioned in a supported upright, slightly forward-facing position to facilitate airway protection. Continuous clinical observation was maintained during impression making.<sup>4, 7</sup> Safe impression techniques and careful patient positioning are essential to minimise procedural complications in infants with cleft palate [7, 8].

## Preliminary Impression

A preliminary maxillary impression was obtained using addition silicone putty impression material. High-viscosity

putty was selected because of its dimensional stability, ease of manipulation, and lower risk of flowing into deep undercuts compared with low-viscosity materials. As the infant had a small oral opening, a conventional impression tray could not be used. Therefore, the impression was made using the two-finger technique, in which the putty material was gently adapted and moulded over the maxillary arch with the operator's gloved index fingers. This technique allowed accurate recording of the maxillary arch, alveolar ridges, and cleft margins while avoiding excessive pressure, minimising the amount of impression material used, and reducing the risk of airway obstruction.

After complete polymerisation, the impression was removed cautiously and inspected to ensure accurate reproduction of the anatomical structures without voids or tears. The infant tolerated the procedure well, and no choking, aspiration, cyanosis, or respiratory compromise occurred. Putty silicone used with the two-finger technique is widely recommended for infant cleft impressions because it provides adequate accuracy while improving procedural safety [4, 7]. (Figure 4.)

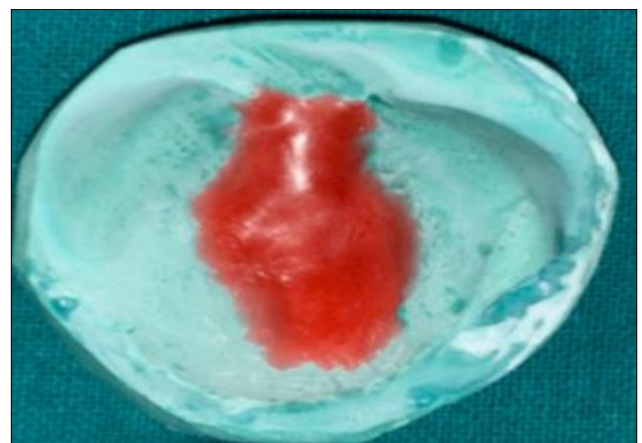


**Fig 4:** Preliminary putty impression of the maxillary arch

## Primary Cast Fabrication

The preliminary impression was disinfected according to standard infection-control protocols before laboratory procedures. Beading and boxing were completed to preserve the peripheral anatomy, and the impression was poured with Type III dental stone to obtain the primary cast.

The primary cast was examined carefully to identify undercuts and accurately delineate the margins of the cleft defect. This cast served as the working model for fabrication of the custom impression tray. (Figure 5.)



**Fig 5:** Primary cast obtained from the preliminary impression

### Fabrication of the Custom Tray

Undercuts adjacent to the cleft margins were blocked out using modelling wax to facilitate safe removal of the tray during the definitive impression procedure.

A custom tray was fabricated using autopolymerising acrylic resin, ensuring uniform spacing for impression material and adequate extension to record the maxillary arch accurately. The tray borders were finished, smoothed, and polished before clinical evaluation. (Figure 6.)



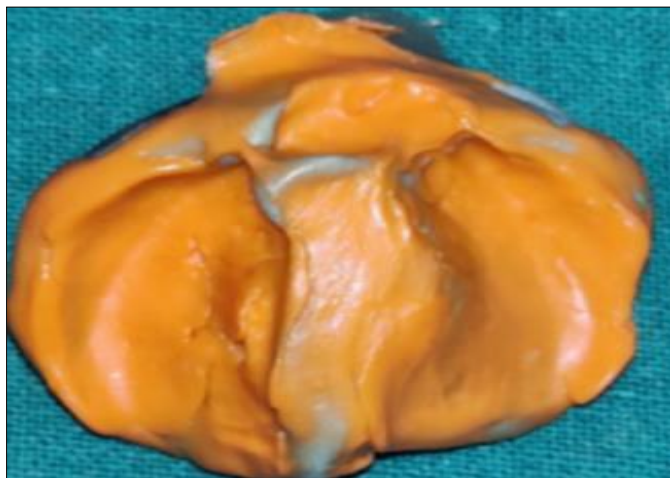
**Fig 6:** Custom acrylic impression tray.

### Definitive Impression

The custom tray was tried intra-orally and adjusted where necessary to ensure passive seating without tissue impingement.

A definitive impression was then recorded using light-body addition silicone impression material. The material accurately reproduced the palatal tissues, alveolar ridges, vestibular sulcus, and cleft margins, providing a detailed impression suitable for fabrication of a well-adapted feeding plate.

Following disinfection, the impression was boxed and poured with Type III dental stone to obtain the master cast. (Figure 7.)



**Fig 7:** Definitive light-body addition silicone impression

### Master Cast Preparation and Feeding Plate Fabrication

The master cast was inspected for defects, and any remaining undercuts were blocked out with modelling wax. (Figure 8.)



**Fig 8:** Master cast used for fabrication of the feeding plate

A customised feeding plate was fabricated using clear heat-polymerised acrylic resin. Heat-cured acrylic was selected because of its strength, dimensional stability, smooth finish, and biocompatibility. After polymerisation, the appliance was finished and polished meticulously to eliminate sharp edges and minimise the risk of soft tissue irritation. To enhance safety during insertion and feeding, a strong dental safety thread was securely attached to the anterior aspect of the appliance. This permitted immediate retrieval should accidental displacement occur during use, thereby reducing the risk of aspiration or swallowing. Attachment of a retrieval thread is widely recommended during fabrication of infant feeding appliances<sup>[4, 9]</sup>. (Figure 9.)



**Fig 9:** Finished heat-polymerised acrylic feeding plate and Intraoral placement of the feeding plate

### Appliance Delivery

At the insertion appointment, the feeding plate was evaluated for:

- Complete seating and adaptation.
- Retention and stability.
- Peripheral extension.
- Absence of pressure areas.
- Patient comfort.
- Functional effectiveness during feeding.

Minor adjustments were performed using pressure-indicating paste to eliminate areas of excessive tissue contact before final polishing.

The appliance effectively obturated the palatal defect, providing temporary separation between the oral and nasal cavities. A supervised feeding trial demonstrated improved lip seal, more coordinated sucking and swallowing, and a noticeable reduction in nasal regurgitation compared with the pre-treatment condition. Similar functional

improvements following feeding plate therapy have been reported in previous case series and clinical reports [4, 6].

### Post-insertion Instructions

Detailed verbal and written instructions were provided to the parents regarding appliance use and maintenance. They were advised to:

- Insert the feeding plate before each feeding session.
- Ensure that the retrieval thread remained securely attached during every use.
- Clean the appliance after each feeding using clean water and a soft toothbrush.
- Avoid abrasive cleansing agents or hot water.
- Store the appliance in a clean container containing fresh water when not in use.
- Inspect the oral cavity daily for ulceration or pressure marks.
- Report immediately if the appliance fractured, became loose, or caused discomfort.
- Attend scheduled follow-up visits for evaluation and adjustment.

The importance of regular review was emphasised because rapid craniofacial growth during infancy may necessitate periodic modification or replacement of the feeding plate to maintain optimal adaptation and function.

### Outcome and Follow-up Immediate Clinical Outcome

The feeding plate was well tolerated immediately after insertion and demonstrated satisfactory retention, stability, and adaptation without compromising the infant's comfort or airway. A supervised feeding session was performed to evaluate the functional effectiveness of the appliance.

Compared with the pre-treatment condition, the infant demonstrated a noticeable improvement in feeding efficiency. The appliance effectively obturated the palatal defect, enabling improved oral control during feeding and reducing communication between the oral and nasal cavities. As a result, nasal regurgitation was markedly reduced, sucking became more coordinated, and swallowing improved. The infant completed feeding with fewer interruptions and less fatigue than previously reported by the caregivers. Similar improvements in feeding performance following feeding plate therapy have been reported in infants with cleft palate [4, 5].

No episodes of gagging, aspiration, respiratory distress, cyanosis, or accidental displacement of the appliance were observed during the insertion appointment or supervised feeding session.

### Follow-up Evaluation

The patient was reviewed at regular follow-up appointments to assess:

- Feeding efficiency
- Nutritional progress
- Retention and stability of the feeding plate
- Oral soft tissue health
- Appliance integrity
- Requirement for adjustment due to maxillary growth

At each review, the oral mucosa was examined carefully for evidence of pressure areas, ulceration, candidal infection, or traumatic lesions. The feeding plate remained well adapted,

and only minor adjustments were required to accommodate normal craniofacial growth.

The parents demonstrated excellent compliance with the recommended hygiene protocol and reported consistent use of the appliance during feeding. No appliance-related complications were encountered throughout the observation period.

### Functional Improvement

Progressive functional improvement was observed during follow-up. According to the parents, the infant showed:

- Improved sucking efficiency.
- Better coordination between sucking and swallowing.
- Significant reduction in nasal regurgitation.
- Reduced choking episodes during feeding.
- Increased acceptance of liquids and semi-solid foods.
- Shorter feeding duration.
- Reduced caregiver anxiety during feeding.

These clinical observations are consistent with previous reports demonstrating that feeding obturators restore functional separation between the oral and nasal cavities and facilitate more effective infant feeding [3, 4].

### Nutritional Rehabilitation

Improved feeding efficiency resulted in progressive improvement in nutritional intake and overall clinical condition. Better feeding tolerance enabled gradual weight gain and optimisation of the child's nutritional status, thereby facilitating preparation for definitive palatoplasty.

| Clinical Parameter       | Before Feeding Plate | After Feeding Plate |
|--------------------------|----------------------|---------------------|
| Body weight              | 5.1 kg               | 6.8 kg              |
| Average feeding duration | 45-65 minutes        | 20 minutes          |
| Nasal regurgitation      | Frequent             | Markedly reduced    |
| Choking episodes         | Frequent             | Occasional/Absent   |
| Acceptance of feeds      | Poor                 | Improved            |
| Nutritional status       | Poor                 | Improved            |

### Visit Clinical Event

**Visit 1:** History taking, clinical examination, diagnosis, treatment planning, informed consent, preliminary impression, and primary cast fabrication

**Visit 2:** Custom tray fabrication, definitive impression, master cast preparation, and feeding plate fabrication

**Visit 3:** Feeding plate insertion, adjustment, supervised feeding trial, caregiver instructions for insertion, removal, cleaning, and feeding techniques, followed by scheduled follow-up for appliance evaluation, nutritional assessment, and multidisciplinary planning for palatoplasty

### Discussion

Feeding difficulty is one of the earliest and most significant problems in infants with cleft palate because the inability to generate adequate intraoral negative pressure compromises coordinated sucking, swallowing, and respiration. The abnormal communication between the oral and nasal cavities results in ineffective sucking, nasal regurgitation, prolonged feeding, excessive air intake, choking, and poor weight gain [2, 3].

The present case highlights the importance of early prosthetic intervention in an infant with bilateral cleft lip and palate whose palatoplasty was delayed due to poor nutritional status. Improving nutrition before surgery is essential, as malnutrition adversely affects wound healing, immune function, anaesthetic safety, and surgical outcomes.<sup>1</sup> Following insertion of the customised feeding plate, feeding efficiency improved, nasal regurgitation decreased, swallowing coordination improved, and progressive nutritional rehabilitation was achieved, demonstrating the effectiveness of this conservative approach.

Feeding plates function by temporarily obturating the palatal defect, separating the oral and nasal cavities and providing a stable surface against which the tongue compresses the feeding teat, thereby improving milk extraction and reducing nasal leakage<sup>[4, 5]</sup>. They also reduce caregiver anxiety and facilitate more comfortable feeding<sup>[3]</sup>.

Although digital workflows using intraoral scanning, computer-aided design, and three-dimensional printing are increasingly reported, conventional impression techniques remain widely used because they are economical, readily available, and provide clinically satisfactory results.<sup>6</sup> In this case, a conventional workflow using a putty preliminary impression, custom tray, definitive elastomeric impression, and heat-polymerised acrylic resin produced a well-adapted feeding plate with excellent clinical performance.

Safe impression making remains critical because airway obstruction, aspiration, and displacement of impression material into the cleft defect are recognised risks. Appropriate patient positioning, suitable impression materials, continuous monitoring, suction readiness, and experienced clinical supervision minimise these complications<sup>[7]</sup>. No impression-related complications occurred in the present case.

An additional feature of this case was the identification of a suspected intranasal ectopic tooth. Although uncommon, intranasal teeth occur more frequently in patients with cleft lip and palate and may present with nasal obstruction, recurrent epistaxis, chronic rhinorrhoea, foul-smelling nasal discharge, facial pain, or remain asymptomatic<sup>[10, 11]</sup>.

Successful feeding plate therapy depends on accurate appliance fabrication, caregiver education, and regular follow-up. Parents should be instructed regarding appliance insertion, removal, hygiene maintenance, recognition of pressure areas, and early identification of complications. Periodic review is essential because rapid maxillary growth may require adjustment or replacement of the appliance<sup>[4]</sup>.

The strength of this report lies in documenting prosthetic rehabilitation of an infant with bilateral cleft lip and palate, delayed palatoplasty due to poor nutritional status, and a suspected intranasal ectopic tooth—an uncommon clinical combination that emphasises the importance of comprehensive multidisciplinary evaluation.

However, as a single case report, the findings cannot be generalised. Objective feeding assessment tools, validated caregiver-reported outcomes, and long-term follow-up after palatoplasty were not available. Future prospective studies comparing conventional and digitally fabricated feeding plates using standardised functional and nutritional outcome measures are needed to strengthen the evidence supporting early prosthetic intervention.

## Conclusion

Feeding difficulties in infants with cleft palate can significantly impair nutrition, growth, and readiness for definitive surgical repair. This case demonstrates that a customised acrylic feeding plate is a safe, conservative, and effective interim prosthetic appliance that improves sucking efficiency, reduces nasal regurgitation, enhances swallowing coordination, and supports nutritional rehabilitation before palatoplasty.

The concurrent identification of a suspected intranasal ectopic tooth highlights the importance of comprehensive clinical assessment and multidisciplinary management in children with cleft lip and palate. Although limited to a single case, this report reinforces the valuable role of early paediatric dental intervention and feeding plate therapy as an effective bridge to definitive surgical treatment while optimising nutritional status in comprehensive cleft care.

## Clinical Learning Points

- Feeding difficulty is an early and significant complication in infants with cleft palate due to inadequate intraoral negative pressure.
- A customised feeding plate temporarily obturates the palatal defect, improving sucking, swallowing, reducing nasal regurgitation, and supporting weight gain.
- Early prosthetic intervention enhances nutritional status and facilitates preparation for definitive palatoplasty.
- Safe impression techniques, accurate appliance fabrication, regular follow-up, and caregiver education are essential for successful treatment.
- Comprehensive clinical assessment should include evaluation for associated anomalies, including intranasal ectopic teeth.

## Informed Consent

Written informed consent for treatment, clinical photography, and publication of this case report was obtained from the patient's legal guardian.

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