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Case report
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Unilateral Left-Sided Tessier Type 4 Facial Cleft in A 6-Months-Old Infant: A Case Report with Surgical Reconstruction and Outcome

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ABSTRACT

Background: Cleft Tessier is the most complex classification characterized by oro-orbital malformations with a transverse defect in the mouth extending to the nose and crossing to the lower eyelids. Recent research shows a lack of optimal reconstruction techniques, both surgical methodology and procedural. This case report aims to describe the clinical presentation, surgical reconstruction methodology, and outcomes in a 6-month-old baby with a left unilateral Tessier type 4 facial cleft.

Subject and Methods: A 6-month-old female newborn appears with a congenital left unilateral facial cleft that has existed since birth. Ocular examination showed partial involvement of the lower eyelid with a risk of exposure, while the eyeball was intact. Tessier type 4 cleft arises from failure of fusion between the maxillary and lateral nasal prominences during embryogenesis.

Results: Surgical management focuses on restoring both functions particularly ocular protection and oral competence and facial aesthetics. Early intervention during infancy offers advantages such as improved tissue healing, better adaptation to facial growth, and reduced psychosocial impact. The reconstruction results achieved good initial functional and esthetic outcomes. Further monitoring during the growth period is necessary to assess facial asymmetry and hyperpigmentation that may occur.

Conclusion: Infant reconstruction can yield better esthetics and function, although monitoring and follow-up actions are necessary.

Keywords: tessier type 4 cleft, facial cleft reconstruction, craniofacial surgery, pediatric

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BACKGROUND

Facial cleft is one of the most frequent congenital craniofacial abnormalities. This disorder results in a discontinuity in the lip due to a failure of the palate during development (Neelam Phalke et al., 2024). The incidence of cleft lip is 1 in 700 cases and is generally caused by a disruption in embryological separation (Kini, 2023).

The Tessier cleft is the most complex and unique classification (Assouanet al., 2018). Tessier 4 represents a cross-shaped

defect in the cupid's bow and oral commissure area that goes laterally to the nose and finishes at the lower eyelid (Civantos et al., 2024).

This anomaly not only affects soft tissue, but also the maxillary bone structure medial to the infraorbital foramen and the alveolar ridge, resulting in considerable facial deformity (Tonello et al., 2022). A disease called amniotic deformity, adhesions, and mutilation (ADAM) is a common problem that can happen (Soedjana et al., 2023).

Recent literature emphasizes that orbital involvement in this type of cleft is at risk of causing corneal exposure, ectropion, and other ocular complications if not promptly addressed (Das et al., 2022). A challenge in determining the optimal reconstruction strategy is also posed by the wide anatomical variations in Tessier type 4 (Wang et al., 2021).

Complex management, involving a series of surgeries, is required to address this multi-tissue condition (Chahal et al., 2021). Some of the difficulties in managing this rare craniofacial cleft stem from issues related to the growth of tissues (bone and soft tissue) near the cleft and, consequently, the eye sockets, nose, upper jaw, and cheekbone areas (James et al., 2023)

Case reports predominantly constitute the scientific literature due to the rarity of Tessier type 4 instances. Recent research indicates a lack of global consensus about optimal reconstruction techniques, encompassing both surgical methodologies and duration of procedures (Pellerin et al., 2023). Numerous reported procedures exist, ranging from local flap techniques to phased reconstruction employing a combination of soft tissue and bone (Adifitrian et al., 2023). This indicates that management highly depends on the clinician's experience as well as the specific condition of the patient (Van Slyke et al., 2022).

Beside impacting the esthetic aspect, substantial practical implications in Tessier 4 can affect ocular protection and facial development (Omodan, 2021). The importance of appropriate and timely intervention or treatment as a preventive measure against complication. Early intervention to promote adequate craniofacial development is critical for avoiding complications (Chahal et al., 2021).

Recently, studies have demonstrated that interdisciplinary teams produce superior results (Behunova et al., 2025). Long-term evaluation is essential to assess the success of reconstruction (Kim and Lim, 2024). Due to the complexity of the case and the rarity of Tessier-4 reconstruction in infants, this case could serve as a valuable reference for clinical development of a standardized approach Therefore, intervention and reporting of this Tessier-4 reconstruction case in infants is crucial.

CASE PRESENTATION

We report a 6-month-old female infant with a congenital facial cleft on the left side since birth. There is no family history of similar craniofacial deformities, teratogen exposure during pregnancy or maternal illness during pregnancy. The patient has age-appropriate growth and development. During the clinical examination, a unilateral facial cleft on the left side was observed. The cleft extends from inferior eyelid to lateral upper lip. This is similar to the features of Tessier 4. There is a deformity in the lateral fissure of the upper lip and an irregularity at the vermilion border. There is partial exposure of the lower eyelid, but no abnormalities were found in the eyeball and no visual disturbances were detected during the ophthalmological examination. No cranio-

facial and systemic congenital abnormalities were found. A preoperative evaluation was done to assess the extent of soft tissue defects and plan the surgical procedure.

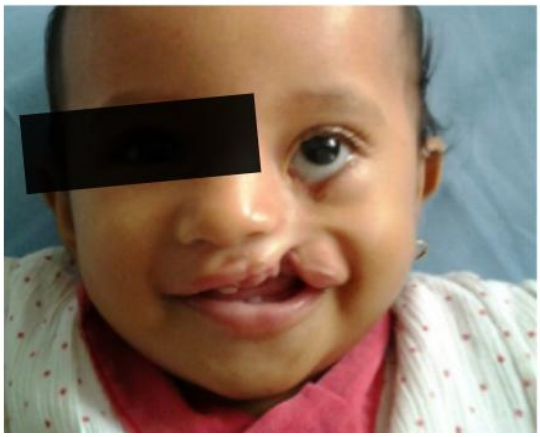

Figure 1. Preoperative view showing unilateral left-sided facial cleft extending from the lower eyelid to the upper lip

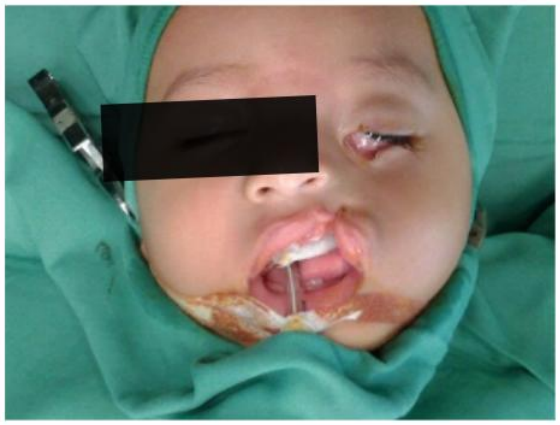

Figure 2. Close-up view demonstrating disruption of the lower eyelid and infraorbital region

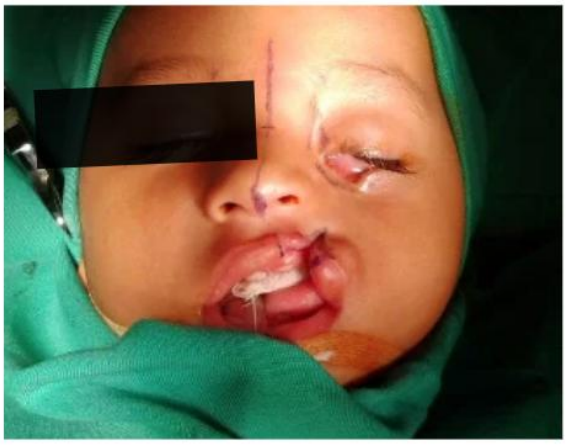

Figure 3. Intraoperative view showing surgical markings and cleft anatomy

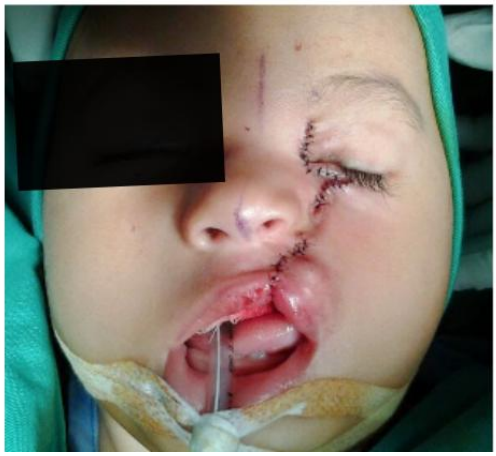

Figure 4. Immediate postoperative appearance following layered reconstruction

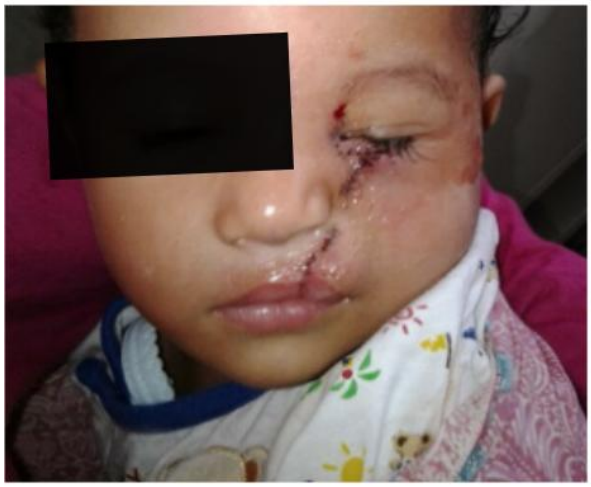

Figure 5. Early post operative outcome demonstrating improved facial symmetry

The patient was then subjected to surgical reconstruction under general anesthesia. During the operation, a cleft defect involving the soft tissue between the lower eyelid and the upper lip was found, accompanied by abnormal insertion and discontinuity of the facial muscles, particularly the orbicularis oris muscle. Dissection and mobilization of the soft tissue were performed carefully to restore anatomical alignment. Closure of the upper lip is performed in layers accompanied by realignment of the orbicularis oris muscle to restore functional continuity. Tissue repositioning is also performed to reconstruct the lower eyelid and infraorbital region.

Soft tissue defects are repaired layer by layer, followed by skin closure and sutured with fine stitches for optimal esthetics. The patient shows a good postoperative condition without complications. Wound healing is progressing satisfactorily, accompanied by improvement in facial contour and continuity of soft tissue.

DISCUSSION

Compared to cleft lip, facial cleft is extremely uncommon and complicated congenital defect. The main cause is the failure in the formation of facial structures during embryonic development, which involves both soft tissue and facial bones (Gao et al.,2022).

The most widely used classification is the Tessier classification, which divides facial clefts based on their anatomical relationship to the orbit, maxilla, and other facial structures in the form of numbering from 0 to 14. This system remains the standard in diagnosis and reconstruction planning because it provides a clear and communicative anatomical overview among clinicians (Taub and Hazkour, 2025).

The proliferation, migration, and differentiation of cells from five primary prominences are essential for the normal development of the face. The medial and lateral nasal prominences originate from the nasal placode, while the maxillary prominences grow medially to form the upper lip, cheeks, and nasal structures. Additionally, the nasolacrimal duct and cleft prominences are determined by the maxillary prominences (Hutagalung et al., 2022). For face structures to successfully form, epithelial and mesenchymal interactions must be coordinated (Lu et al., 2024).

The primary mechanism for the development of facial clefts, including in Tessier 4 cases, is failure in the fusion of the maxillary and lateral nasal prominences, where there is obstruction in neural crest cell migration, disruption of tissue proliferation, and failure in epithelial formation during tissue union (Lucangeli et al., 2025). Apart from these mechanisms, the failure of myoblast migration in the cleft area can also cause disruptions in the continuity of facial muscles, which can lead to functional abnormalities (Vibert et al., 2024).

Various genetic or environmental factors can cause facial clefts. The genetic factors are mutations or gene variants in craniofacial development, while the environmental influences include exposure to teratogens such as drugs or alcohol, maternal ailments, and maternal diseases like nutritional deficits (Babai and Irving, 2023a). No history of teratogen exposure, maternal illness, or family history was found in this case, indicating that it occurred sporadically. This is consistent with the previous case report by (Chahal et al., 2021) which described a very rare bilateral Tessier type 4 case that lacks a solid etiological consensus and presents therapeutic challenges. Moreover, additional case studies suggest that while facial clefts

may be linked to specific disorders such amniotic band syndrome, several instances occur without identifiable predisposing factors (Rasul, 2023).

Tessier 4 is a variant of the oblique cleft characterized by facial anomalies that extend from the upper lip thru the cheek to the lower eyelid, usually affecting the lacrimal system laterally, often resulting in lower eyelid discontinuity, thereby posing a risk of ocular complications (Tonello et al., 2022).

This muscular disruption results in functional impairments, notably affecting the protective role of the lower eyelid, frequently linked to lateral canthus malposition, lacrimal system anomalies, and the potential for corneal exposure, which may lead to severe ocular complications such as keratitis and permanent vision loss in extreme cases (Chahal et al., 2021).

Clinical findings are consistent with a type 4 Tessier presentation, where the lesion extends from the lower left eyelid to the lateral upper lip area, along with a defect in the lower eyelid indicating a disruption in the continuity of the periorbital tissue, which may expose the cornea. However, in this patient, the eyeball is still intact and there have been no problems with vision. There is also damage to the upper lip vermilion, which means that the orbicularis oris is involved. This muscle is important for facial expression and oral competence (Assouan,2018).

In instances of intricate facial clefts, discerning the anatomical configuration of the defect is crucial for establishing the categorisation and reconstructive strategy. Recent literature underscores that clinical examination is the primary gold standard for diagnosing craniofacial clefts, as most cases can be identified through distinctive morphological patterns without the need for imaging techniques during the initial evaluation phase (Tonello et al., 2022).

The involvement of the lower eyelid may cause eyelid malposition, inadequate eyelid closure, and the potential for exposure keratopathy, which can lead to irreversible vision impairment. Consequently, this crucial element of this cleft type necessitates a multidisciplinary assessment, especially by ophthalmologists and plastic surgeons (Zhang et al., 2025).

Consequently, prompt ophthalmological assessment and eyelid restoration are critical elements in therapy to avert long-term morbidity. Long-term case studies also show that appropriate reconstructive approaches can help maintain visual function and improve the esthetic and functional outcomes for patients (Babai and Irving, 2023).

The main goal of Tessier type 4 facial cleft reconstruction is to optimally restore facial function and esthetics. The main goal is to protect the eye structures to avoid problems, and the main goal is to improve midfacial symmetry to get closer to normal anatomy (Prasetyo, 2025). Basic principles of reconstruction in complex facial clefts include layered closure to restore the continuity of tissues anatomically, along with muscle realignment, especially the orbicularis oris, to restore oral sphincter function and facial expression (Zhang et al., 2025)

The modern reconstruction approach stresses the importance of anatomically repositioning tissues according to facial esthetic units for better long-term outcomes (Prasetyo, 2025). In this case, the techniques used include local tissue advancement to gradually close the soft tissue defect and maintain optimal tissue vascularization.

Fine suturing was also done with precision techniques to reduce tissue

damage and the chance of hypertrophic scarring. This method is in line with the goals of pediatric plastic surgery, which are to protect local tissue and reduce secondary deformities (Bisetty et al., 2022). Local tissue advancement is more often used for moderate defects with enough surrounding tissue, especially in young patients (Li et al., 2024).

The timing of the surgery is an important factor in the success of facial cleft reconstruction (Roohani et al., 2023). In this case, the procedure was performed at the age of 6 months, which falls into the category of early reconstruction. Early intervention has several advantages, including supporting a better healing process due to the high tissue regeneration capacity at the infant age, as well as allowing for more physiological facial growth adaptation (Walsh and Foy, 2025).

Furthermore, early correction exerts a beneficial psychosocial effect by mitigating visual stigma from the onset of life and facilitating the establishment of more typical social interactions (Roohani et al., 2023).

The reconstruction successfully restored tissue continuity in the lower eyelid and upper lip, resulting in enhanced facial symmetry (Chahal et al., 2021). Additionally, the protective function of the ocular area improved following the repositioning of the lower eyelid, with no initial indications of corneal complications (Bisetty et al., 2022). Generally, the initial outcomes show satisfactory results in line with the reconstruction goals for complex facial clefts.

Nevertheless, the long-term prognosis for Tessier type 4 still requires special attention (Walsh and Foy, 2025). There is a chance of complications like scarring, facial asymmetry as the child grows, and midfacial growth problems caused by tissue imbalance. Also, because a child's face grows and changes over time, the results of the reconstruction may change as well, which means that surgery may need to be redone (Budihardja et al., 2020).

The main limitation of this case report is the lack of long-term follow-up to assess the stability of the reconstruction results as the patient's facial growth progresses (Bonanthaya et al., 2021). Additionally, no advanced imaging examinations such as 3D CT scans were conducted to evaluate the detailed involvement of skeletal structures, thus limiting the anatomical analysis to intraoperative and preoperative clinical examinations and potentially restricting the comprehensive mapping of the craniofacial deformity in this case. Long-term evaluation is important to assess the possibility of secondary asymmetry, growth disturbances, or the need for surgical revision.

This case underscores the necessity of early diagnosis of intricate facial cleft anomalies, particularly to avert functional complications such as visual impairment and progressive deformities. A comprehensive initial assessment facilitates more effective and targeted surgical planning.

Furthermore, this example illustrates the significance of a multidisciplinary approach to facial clefts, incorporating pediatrics, ophthalmology, and plastic surgery. Clinically, these findings are relevant as a reference in decision-making for rare facial cleft cases with a moderate degree of complexity.

AUTHORS CONTRIBUTION

Author 1 contributed to the conceptualization and design of the study, data collection, surgical management, data analysis, and manuscript drafting. Author 2 contributed to the interpretation of findings, literature review, critical revision of the manuscript, and supervision of the study.

Both authors reviewed and approved the final version of the manuscript.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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