Article published online: 2024-04-16

Prenatal Diagnosis of a Case of Asyndromic Tessier Class-7 Bilateral Complete Transverse Facial Cleft: Case Report with Review of Literature

Seneesh Kumar Vikraman[1,2] Shasmita Yandamuri[1] Jay Desai[1]

[1] Centre for Prenatal Diagnosis and Fetal Therapy, ARMC AEGIS Hospital,Perinthalmana, Malappuram, Kerala, India
[2] Aster MIMS Hospital, Kottakal, Malappuram, Kerala, India

Address for correspondence Seneesh Kumar Vikraman, MD (OBG), DNB, M.MFM, Lakshmi Bhavan, Pallipuram PO, Via Pattambi, Palakkad 679305, Kerala, India (e-mail: drseneeshkv@gmail.com).

J Fetal Med

Abstract

Transverse or lateral facial clefts are atypical and rare forms of facial clefts identified as Tessier type 7 in the classification system for orofacial clefts. They have an overall incidence of 1 in 60,000 to 300,000 live births. We report a case diagnosed at 22 weeks of gestation. The two-dimensional (2D) ultrasound examination revealed a single live fetus with a persistently open mouth, failure of visualization of lateral commissures, and mild retrognathia. The three-dimensional (3D) surface rendering of the fetal face demonstrated a bilateral horizontal facial cleft that extended from the lateral commissures to the ears. No additional anomalies were identified. Fetal karyotype and whole exome sequencing reports did not reveal any genomic imbalances. The case highlights the importance of 2D oblique and 3D imaging of the fetal face when subtle findings are detected in routine 2D views. A review of the literature is provided to enhance the understanding of the entity.

Keywords

- lateral facial cleft
- Tessier type 7
- 3D ultrasound
- surface rendering
- bilateral transverse facial cleft
- fetus

Introduction

Lateral or transverse facial clefts are rare and atypical forms of facial clefts representing less than 0.5% of the cleft lip-palate spectrum with an overall incidence of 1 in 60,000 to 3,00,000 live births.[1] It corresponds to type 7 of the classification proposed by Tessier as they are centered on the zygomaticotemporal suture with no relation to the orbits.[2] Lateral facial cleft presents with varying degrees of severity and potential associations with other co-existent anomalies.[3] Technological advancements in ultrasound have facilitated the prenatal diagnosis of these atypical facial clefts and their enhanced characterization.

Very few cases with prenatal diagnosis have been reported in the literature pertaining to lateral facial clefts.[4–14] We report a case of isolated bilateral complete transverse facial cleft diagnosed prenatally at 22 weeks of gestation with the pertinent details of the two-dimensional (2D) and three-dimensional (3D) ultrasound examination and genetic workup. A review of the literature of the previously reported cases is provided for a better understanding of the lateral clefts.

Case Report

A 32-year-old South Indian, second gravida with a previous spontaneous miscarriage, was referred to our fetal medicine unit at 22 weeks of gestation in view of a suspected fetal facial abnormality. She had a nonconsanguineous marriage with a 37-year-old partner. In her preultrasound assessment, no

DOI https://doi.org/10.1055/s-0044-1779289.
ISSN 2348-1153.

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

relevant aspects were obtained from the pedigree analysis. The early anomaly and nuchal translucency scan performed elsewhere were reported as normal. She had not undergone any prenatal screening for aneuploidy.

Targeted 2D ultrasound examination performed with a GE Voluson E6 unit (BT 18, GE healthcare technologies, Milwaukee, Wisconsin, United States) at 22 weeks of gestation revealed a single live intrauterine fetus with appropriate growth and mild polyhydramnios. The coronal view of the nose and lips suggested a persistently open mouth with a lack of visualization of the lateral commissures (►**Fig. 1A–D**). On oblique examination of the fetal face, an orofacial sulcus widening the commissures of the mouth was identified on both sides. A midsagittal view of the face revealed mild retrognathia. Subsequently, 3D surface rendering of the fetal face demonstrated a bilateral transverse facial cleft extending from the lateral commissures of the mouth across the cheeks toward the bilateral low set ears (►**Fig. 2A** and **B**). A detailed anatomic survey along with fetal echocardiography did not identify any additional abnormalities.

The extent and the severity of the anomaly along with the potential functional impairment related to changes in maxillofacial balance, swallowing, and hearing were explained in detail to the couple. They were offered amniocentesis with karyotype and whole exome sequencing to identify any genetic basis and estimate recurrence risk for future pregnancies. The couple accepted the procedure and subsequently opted for termination of pregnancy. The couple declined a fetal autopsy. A male fetus weighing 320 g was born following the second-trimester termination of pregnancy. Postabortal examination of the fetus confirmed the facial anomaly that was consistent with the prenatal ultrasonographic observations (►**Fig. 2C** and **D**). No other external malformations were identified. Meanwhile, the karyotype and whole exome sequencing reports did not reveal any genomic imbalances.

Discussion

Paul Tessier published an anatomical classification of craniofacial clefts that specified 15 locations for the clefts ranging from 0 to 14, according to their location with respect to the orbital cavity.[2] Though this classification does not take embryology or etiopathogenic factors into consideration, it continues to be the most accepted system for clinical practice. Our case was consistent with the most lateral craniofacial cleft no. 7 of the Tessier classification as it had no relation with the orbit and was centered on the zygomaticotemporal suture.

The etiopathogenesis of the lateral facial cleft is complex and multifactorial.[7] The embryologic origin of the lateral facial cleft can be traced to the 7th embryological week when the maxillary and the mandibular processes of the first and second branchial arches fail to fuse.[15,16] The mechanism of cleft formation has been explained by several pathogenetic pathways related to impaired migration of ectomesenchymal

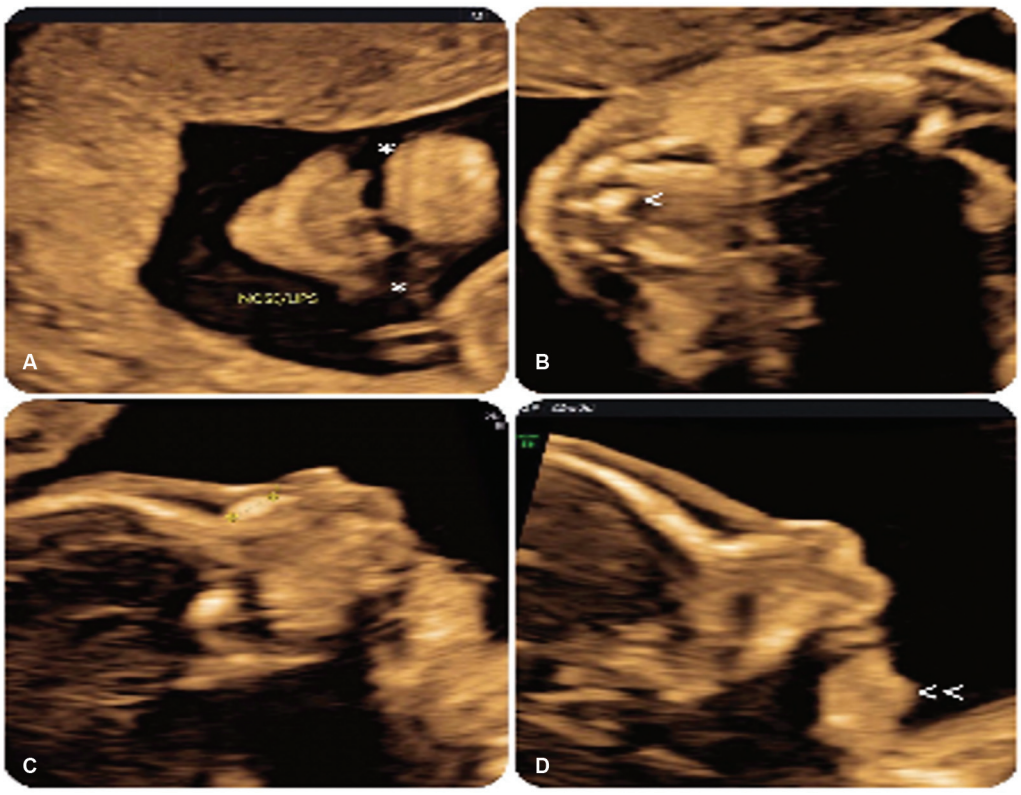

Fig. 1 The two-dimensional (2D) ultrasound images of the lateral facial cleft (gestational age 22 weeks). This image shows the 2D ultrasound features of lateral facial cleft, (**A**) the coronal view of nose and lips showing intact upper lip in this view and failure of visualization of lateral commissures (marked as .), (**B**) axial view showing intact palate (marked as <), (**C**) profile view of face showing the presence of normal nasal bone, and (**D**) median profile view showing the presence of mild retrognathia (marked as <<).

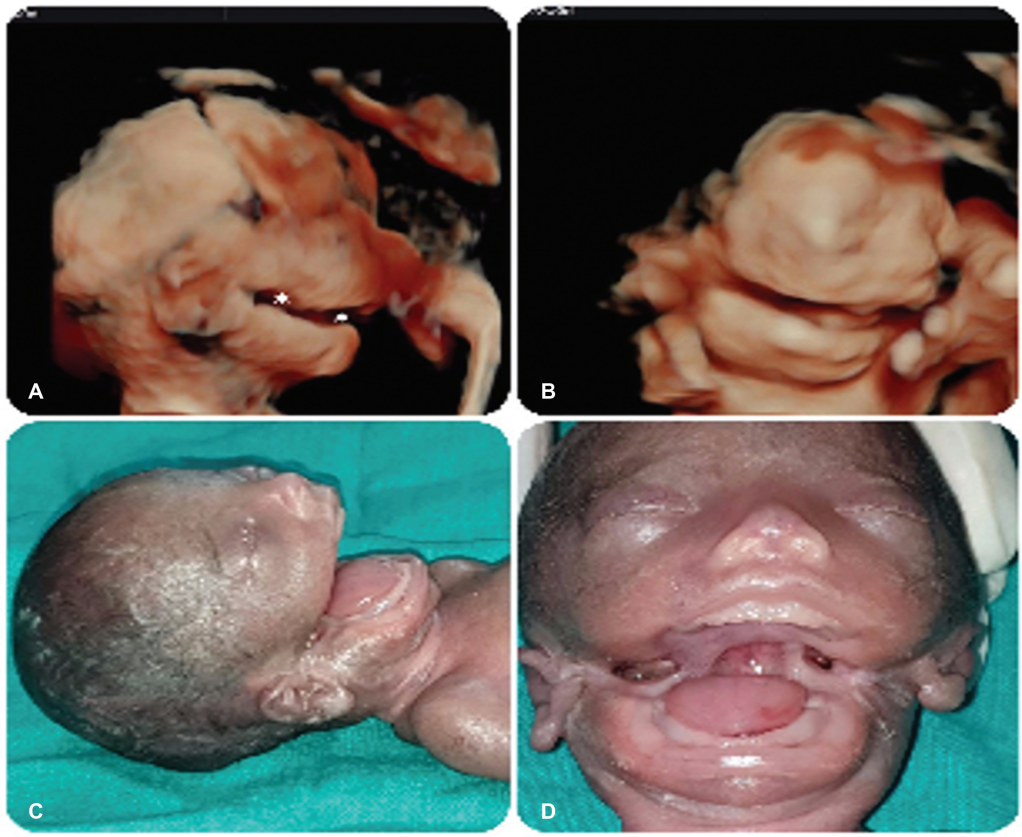

Fig. 2 The three-dimensional (3D) prenatal ultrasound and postnatal images of the lateral facial cleft (gestational age 22 weeks). This image shows the 3D ultrasound and postnatal aspects of the lateral facial cleft, (**A**) the lateral view of the rendered image of face showing the extent of the transverse facial cleft (marked as .), (**B**) frontal view of the 3D surface rendered image of the face showing the cleft, (**C**) postnatal image confirming the transverse facial cleft-lateral view, (**D**) postnatal image confirming the transverse facial cleft-frontal view. 3D settings: HD live surface rendering, volume sweep quality = mid 2, B-mode angle= B49 degrees, volume sweep angle = V60 degrees, mix 100/0.

cells, palatal shelf disorders, vascular causes attributable to embryonic hematoma formation from disruption of the stapedial artery stem, and other disruptive factors such as amniotic bands.[7] It is also claimed to be a postmerging anomaly due to varied clinical expression.[17] In a study by Stelnicki et al, a lamb uterus model was used to demonstrate cell migration impediment, ischemia, and cell apoptosis attributed to disruptive restrictive forces that resulted in the development of lateral facial cleft.[18] Lateral facial clefts may also occur in the postorganogenesis period due to interruption from amniotic bands.[19]] Various genetic and environmental factors have also been associated with the aetiopathogenesis of transverse facial clefts.[19]

►**Table 1** enlists the key aspects of the prenatally diagnosed cases of lateral facial cleft reported prior to our case. As is evident, lateral facial cleft is associated with a myriad of clinical presentations. The deformity varied from mild forms, with slight asymmetric hemifaces or a slight widening of the mouth with a preauricular skin tag to severe forms with the cleft extension toward a low set dysmorphological external ear. In general, bilateral transverse facial clefts were less common compared with unilateral transverse facial clefts. Four cases were part of syndromes, with two attributed to oculo-auriculo-vertebral spectrum (Goldenhar syndrome) [13,14] and two cases to Treacher-Collins syndrome.[9,11] Intrauterine synechiae was observed in two cases that was later confirmed during caesarean section.[5,6] However, no clear evidence of amniotic bands was present either at ultrasound or postnatal examination of the neonate and placentas in both cases. Genetic investigations were performed in six cases, which did not reveal any chromosomal abnormalities.[5,6,10,12–14]

The noteworthy feature in our case was macrostomia with bilateral diastasis extending to the preauricular area. These structural abnormalities are considered to be associated with restricted movement of the temporomandibular joint (TMJ). The development of the clinical features in the present case might be interpreted as a sequence of events, with the Tessier number 7 cleft being the primary event, which further led to limited movement of the TMJ. The presence of polyhydramnios is suggestive of poor fetal swallowing movements most likely caused by the TMJ limitation.[5,8,14] In addition, micrognathia can be regarded as a secondary defect because the growth of the fetal mandible and the functional integrity of TMJ are interdependent.[20] In our case, we performed karyotype with whole exome sequencing that did not reveal any abnormalities (►**Supplementary File** [available in the online]).

The professional guidelines for the mid-trimester ultrasound scan recommend assessing the fetal median facial

Table 1 Prenatally diagnosed reported cases of transverse facial clefts from review of literature

Case no.	Author	Maternal age and parity	GA at diagnosis	Mode of detection	Laterality	Key ultrasound features	Associated syndrome(s)	Genetic workup	Outcome
1	Presti et al[5]	33 G3P0	26	2D	Bilateral	Lips appeared prominent and the lateral commissures appeared widened Mild polyhydramnios noted Intra uterine synechiae was observed	None	Karyotype-46XX	LSCS
2	Pilu and Segata[4]	29 G1	21	2D + 3D	Unilateral	Left macrostomia with bilateral skintags Single umbilical artery	None	Not done	TOP
3	Cavaco-Gomes et al[8]	35 G4P1	21	2D + 3D	Unilateral	Left facial cleft extending from the left commissure to left low set ear	None	Not done	TOP
4	Lee et al[6]	36 G3P2	25	2D + 3D	Bilateral	Left macrostomia Intrauterine synechiae	None	Karyotype-46XX	LSCS
5	Kubo et al[9]	39 G3P2	29	2D + 3D	Bilateral	2D-hypoplastic mandible 3D-bilateral down slanting palpebral fissures with macrostomia and micro-gnathia Bilateral ears microtia. polyhydramnios	Treacher-Collins syndrome	Not done	LSCS
6	Pereira et al[11]	24 G1	33	2D + 3D	Bilateral	Microphthalmia, transverse facial defect with bilateral auricular hypoplasia Low set ears	Treacher-Collins syndrome	Not done	LSCS
7	Witters et al[13]	20 G1	32	2D	Unilateral	Left facial cleft with hemiatrophy of nose and telorbitism FGR, single umbilical artery, cardiac ASD	Oculo-auriculo-vertebral spectrum (Goldenhar syndrome)	Karyotype-46XY	Intrauterine fetal demise at 37 weeks
8	Asai et al[14]	27 G1	31	2D + 3D	Bilateral	Lateral facial cleft with micrognathia Polyhydramnios	Oculo-auriculo-vertebral spectrum (Goldenhar syndrome)	Karyotype-46XX	LSCS
9	Chang et al[12]	33 G3P2	24	2D + 3D	Unilateral	Left lateral facial cleft	None	Karyotype-46XY	Natural labor
10	Song et al[7]	31 G2P1	22	2D + 3D	Unilateral	2D-oral commissures appeared asymmetric	None	Not done	TOP

Table 1 (*Continued*)

Case no.	Author	Maternal age and parity	GA at diagnosis	Mode of detection	Laterality	Key ultrasound features	Associated syndrome(s)	Genetic workup	Outcome
11	Troyano Luque et al[10]	39 G4P2L2A1	29	2D + 3D	Unilateral	Deformity of left fetal hemiface	None	Karyotype-46XX	Natural labor
12	Our case	32 G2P0	22	2D + 3D	Bilateral	Bilateral lateral clefts extending from lateral commissures to the ears	None	Karyotype- 46 XY Whole exome sequencing-no variant	TOP

Abbreviations: 2D, two dimensional; 3D, three dimensional; GA, gestational age; G, gravida; LSCS, lower segment cesarean section; No, number; P, parity; TOP, termination of pregnancy.

profile, nasal bone, and orbits along with the coronal views of nose-lips.[21] However, these views are less informative for the diagnosis of lateral facial clefts.[3] In lateral facial cleft, 3D ultrasound in surface mode can also be helpful for identifying associated facial deformities and elucidating the extent of defects.[22,23] It is critical for counseling, allowing discussion about the technical details of surgical treatment and the postnatal aspects of the newborn. In our case, failure to visualize the lateral commissures led to the suspicion of a cleft, which was later confirmed by 3D ultrasound.

Implications for Clinical Practice

In 2D ultrasound examination besides the coronal views of the fetal lips and chin, attention should be paid to the lateral commissures for which additional oblique views are advised. Any subtle irregularity warrants further 3D ultrasound for complete characterization of the facial anatomy. Once prenatally detected multidisciplinary counseling to facilitate the decision regarding the continuation of pregnancy is imperative. Genetic workup and fetal autopsy (to reconfirm the findings, extent of involvement and new abnormalities if any) should be offered as lateral facial clefts could be potentially syndromic.

Informed Consent

Informed consent was obtained from all women.

Conflict of Interest

None declared.

References

1 Makhija LK, Jha MK, Bhattacharya S, Rai A, Dey AB, Saha A. Transverse facial cleft: a series of 17 cases. Indian J Plast Surg 2011;44(03):439–443

2 Tessier P. Anatomical classification facial, cranio-facial and latero-facial clefts. J Maxillofac Surg 1976;4(02):69–92

3 Kuriyama M, Udagawa A, Yoshimoto S, Ichinose M, Suzuki H. Tessier number 7 cleft with oblique clefts of bilateral soft palates and rare symmetric structure of zygomatic arch. J Plast Reconstr Aesthet Surg 2008;61(04):447–450

4 Pilu G, Segata M. A novel technique for visualization of the normal and cleft fetal secondary palate: angled insonation and three-dimensional ultrasound. Ultrasound Obstet Gynecol 2007;29(02):166–169

5 Presti F, Celentano C, Marcazzò L, Dolcetta G, Prefumo F. Ultrasound prenatal diagnosis of a lateral facial cleft (Tessier number 7). Ultrasound Obstet Gynecol 2004;23(06):606–608

6 Lee M, Ko YB, Yang JB, Kang BH. Prenatal 3D sonography of an isolated lateral facial cleft. J Clin Ultrasound 2018;46(04): 292–295

7 Song WL, Ma HO, Nan Y, et al. Prenatal diagnosis of isolated lateral facial cleft by ultrasonography and three-dimensional printing: a case report. World J Clin Cases 2021;9(24):7196–7204

8 Cavaco-Gomes J, Duarte C, Pereira E, Matias A, Montenegro N, Merz E. Prenatal ultrasound diagnosis of Tessier number 7 cleft: case report and review of the literature. J Obstet Gynaecol 2017;37(04):421–427

9 Kubo S, Horinouchi T, Kinoshita M, et al. Visual diagnosis in utero: prenatal diagnosis of Treacher-Collins syndrome using a 3D/4D ultrasonography. Taiwan J Obstet Gynecol 2019;58(04):566–569

10 Troyano Luque JM, Padilla Pérez AI, Guerra Martín AL, Sánchez Peraza JJ, De La Rosa Rodríguez MA. A case of isolated Tessier 7 cleft in the newborn of a diabetic mother. J Obstet Gynaecol 2011; 31(04):343–345
11 Pereira DC, Bussamra LC, Araujo Júnior E, et al. Prenatal diagnosis of Treacher-Collins syndrome using three-dimensional ultrasonography and differential diagnosis with other acrofacial dysostosis syndromes. Case Rep Obstet Gynecol 2013:203976
12 Chang YL, Lien R, Chang SD, Chao AS. Prenatal 3D sonographic diagnosis of an isolated lateral facial cleft. J Clin Ultrasound 2012; 40(04):219–221
13 Witters I, Schreurs J, Van Wing J, Wouters W, Fryns JP. Prenatal diagnosis of facial clefting as part of the oculo-auriculo-vertebral spectrum. Prenat Diagn 2001;21(01):62–64
14 Asai S, Tanaka M, Miyakoshi K, et al. A case of Tessier number 7 cleft with severe micrognathia: prenatal sonographic and three-dimensional helical computed tomographic images. Prenat Diagn 2010;30(02):159–161
15 Hill MA. Early human development. Clin Obstet Gynecol 2007;50 (01):2–9
16 Cohen MM Jr. Malformations of the craniofacial region: evolutionary, embryonic, genetic, and clinical perspectives. Am J Med Genet 2002;115(04):245–268
17 Poswillo D. The pathogenesis of the first and second branchial arch syndrome. Oral Surg Oral Med Oral Pathol 1973;35(03): 302–328
18 Stelnicki EJ, Hoffman WY, Vanderwall K, Harrison MR, Foster R, Longaker MT. A new in utero model for lateral facial clefts. J Craniofac Surg 1997;8(06):460–465
19 Sherer DM, Metlay LA, Woods JR Jr. Lack of mandibular movement manifested by absent fetal swallowing: a possible factor in the pathogenesis of micrognathia. Am J Perinatol 1995;12(01): 30–33
20 Oghale OP, Chris-Ozoko Nee Ebite LE. Asyndromic bilateral transverse facial cleft. Ann Med Health Sci Res 2013;3(01):122–124
21 Salomon LJ, Alfirevic Z, Berghella V, et al; ISUOG Clinical Standards Committee. Practice guidelines for performance of the routine mid-trimester fetal ultrasound scan. Ultrasound Obstet Gynecol 2011;37(01):116–126
22 Sepulveda W, Wong AE, Castro F, Adiego B, Martinez-Ten P. Feasibility of 3-dimensional sonographic examination of the fetal secondary palate during the second-trimester anatomy scan. J Ultrasound Med 2011;30(12):1619–1624
23 Merz E, Abramovicz J, Baba K, et al. 3D imaging of the fetal face - recommendations from the International 3D Focus Group. Ultraschall Med 2012;33(02):175–182

