

## Case Report

# Prenatal 3D sonographic diagnosis of lateral facial cleft (Tessier number 7): description of two cases and review of the literature

Ya-Ni Yan<sup>1</sup>, Yu-Kun Deng<sup>2</sup>, Qiu-Yan Pei<sup>1</sup>, Yan Wang<sup>3</sup>, Zhen-Juan Yang<sup>1</sup>, Yun-Tao Li<sup>1</sup>, Sha Dou<sup>3</sup>, Lin Zhang<sup>3</sup>, Guo-Li Liu<sup>3</sup>

<sup>1</sup>Department of Obstetric Ultrasound, Peking University People's Hospital, Beijing, P. R. China; <sup>2</sup>Department of Ultrasound, Beijing Jishuitan Hospital, Beijing, P. R. China; <sup>3</sup>Department of Obstetrics and Gynecology, Peking University People's Hospital, Beijing, P. R. China

Received June 21, 2016; Accepted May 25, 2017; Epub October 15, 2017; Published October 30, 2017

**Abstract:** Lateral facial cleft is a rare congenital malformation that may occur as either an isolated phenomenon or along with other congenital anomalies. We present two cases of lateral facial cleft associated with ear deformities diagnosed by antenatal ultrasound. Two-dimensional sonography revealed that the fetuses were appropriate for gestational age, with widening of the left oral commissures, whereas three-dimensional sonography in surface rendering mode showed left lateral facial clefts (number 7 according to the Tessier classification) and ear deformities. One fetus had a left lateral facial cleft with bilateral cup ears and a low-set left ear, and the other fetus had a left lateral facial cleft with right microtia, bilateral accessory ears and bilateral skin tags on both cheeks. These cases confirm the utility of three-dimensional sonography in the prenatal diagnosis of lateral facial clefts.

**Keywords:** Lateral facial cleft, prenatal diagnosis, three-dimensional sonography, ear deformity, no. 7 cleft

## Introduction

Lateral facial cleft is a rare anomaly. According to the well-established Tessier classification, lateral or transverse facial clefts are categorized as cleft number 7 [1]. This congenital deformity results from the failure of fusion of the maxillary and mandibular processes. Its estimated frequency is 1 in 60,000 to 300,000 live births, and it accounts for 1 in 100-300 of all cases of facial cleft [2, 3]. A unilateral cleft involves one side of the lip, and the left side is more commonly affected [4]. In addition, males are more frequently affected than females [5]. A unilateral facial cleft is characterized by a variable degree of widening of the oral commissure (macrostomia), and it is frequently associated with variable hypoplasia of the lateral skeleton of the face (maxilla, zygomatic bone, and ascending branch of the mandible) and external ear. Herein, we report two cases of fetuses with a left lateral facial cleft associated with ear deformities diagnosed prenatally by three-dimensional (3D) ultrasonography.

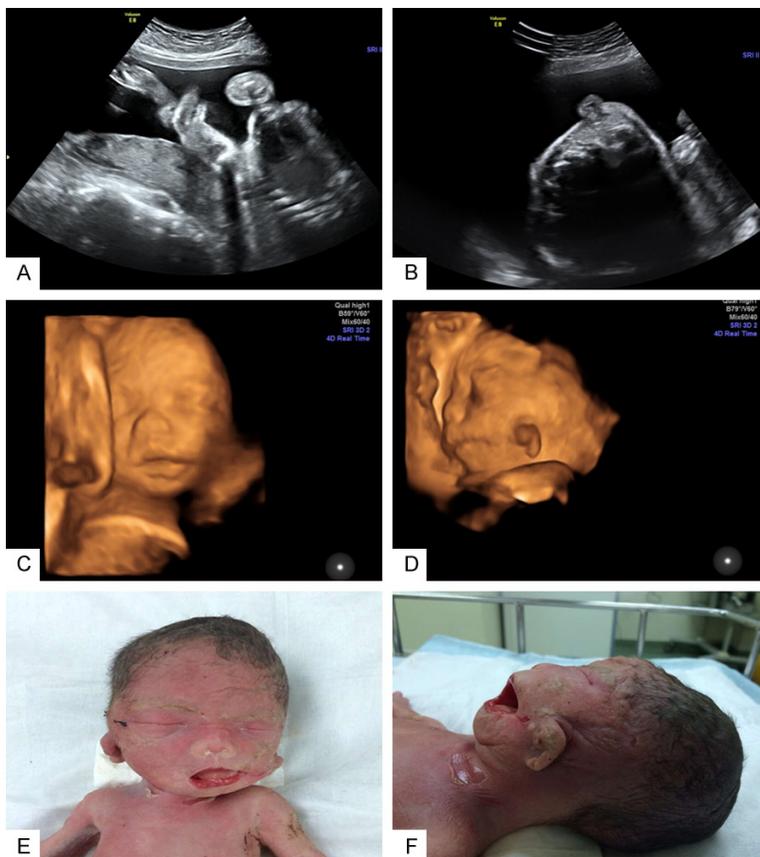
## Case presentation

### Case 1

A 33-year-old Chinese patient (gravida 1, para 0) was referred to our hospital for a routine scan at 27 weeks of gestation. This was her first pregnancy conceived via *in vitro* fertilization and embryo transfer (IVF-ET). This patient had no specific risk factors for fetal malformations. First-trimester screening, including nuchal translucency scan and biochemical analysis, indicated a very low risk of chromosomal aberrations, and the location of the placenta was low.

Initially, two-dimensional (2D) ultrasound (US) examination performed at our hospital did not reveal any obvious facial abnormalities. However, the left oral commissure seemed to be slightly deep and widened, and the left and right commissures of the mouth seemed asymmetric. Upon further examination, we found that the position of the left ear was low; however, we could not clearly see the shape of the

## Prenatal diagnosis of lateral facial cleft



**Figure 1.** A composition of sonograms and the appearance of the fetus after termination of the pregnancy. A: Coronal sonogram image showing that the upper lip appeared intact; however, the left oral commissure appeared to be slightly deep and widened, and the commissures of the mouth appeared asymmetrical, suggesting a left facial lateral cleft. B: Sagittal sonogram image showing the low position of the left ear. C: 3D US image showing the widening of the left oral commissure, with apparent asymmetry between the left and right sides of the mouth and a sunken left cheek. D: 3D US image showing the small, low-set left ear. E: The left facial lateral cleft was confirmed. F: The cup, low-set left ear confirmed the antenatal US findings.

left ear (**Figure 1A, 1B**). The mother had placenta previa, but the remaining fetal anatomy and biometry were normal, including the amniotic fluid volume and placental insertion.

At the end of examination, 3D US in surface rendering mode was performed using a GE E8 Expert scanner (GE Healthcare, Milwaukee, WI), which revealed asymmetric macrostomia as a result of a left lateral facial cleft. In addition, the cheek was sunken and was associated with a small, malformed, low-set left ear (**Figure 1C, 1D**). Meticulous examination for amniotic band syndrome revealed negative results. Genetic amniocentesis was performed at our hospital for fetal chromosome analysis.

Cytogenetic analysis revealed a normal karyotype of 46, XY, and array comparative genomic hybridization analysis revealed no genomic imbalances. The patient received a consultation with a plastic surgeon and ultimately decided to terminate the pregnancy. Autopsy examination revealed a left facial cleft of approximately 1.5 cm and a low-set, cup left ear, as suspected on antenatal 3D US. Notably, a cup right ear was also observed that had not been previously detected sonographically (**Figure 1E, 1F**).

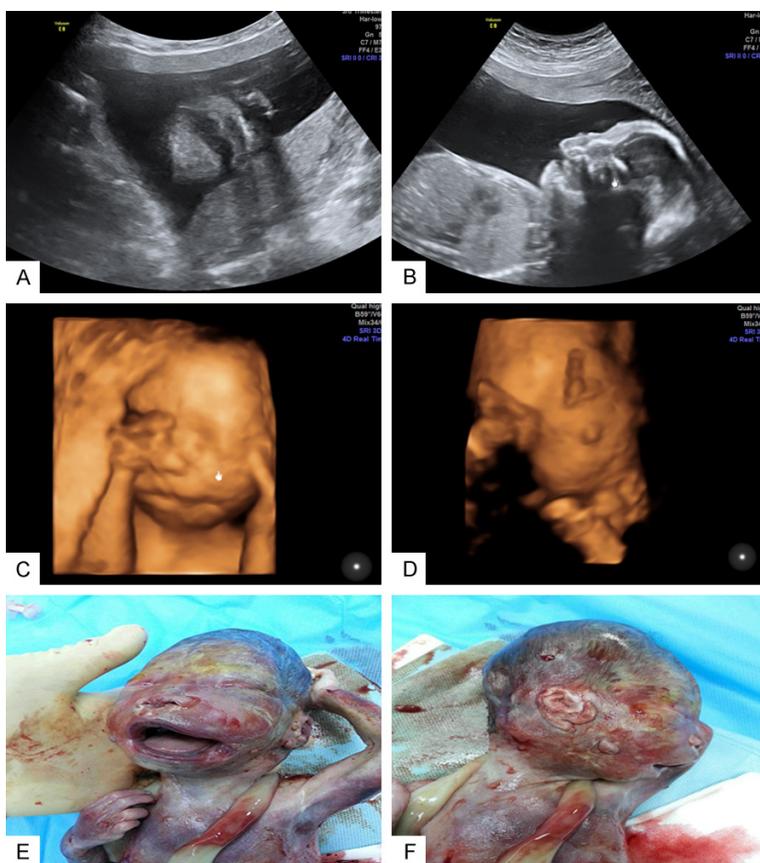
### Case 2

A 34-year-old Chinese patient (gravida 3, para 1) was referred to our hospital for targeted US examination at 24 weeks of gestation. This patient had a male child who had been delivered vaginally 7 years prior and was healthy. Her second pregnancy 5 years prior had resulted in early miscarriage. The patient had no specific risk factors for fetal malformations, and her pregnancy had been unremarkable. Her family history was negative for craniofacial and other congenital malformations.

First-trimester screening, including nuchal translucency scan and biochemical analysis, revealed a very low risk of chromosomal aberrations.

At 24 weeks of gestation, the patient underwent 2D US examination in our hospital, which showed that the fetus was appropriate for gestational age and also revealed mild polyhydramnios. Notably, the left lateral commissures of the mouth were widened, and a skin tag was observed on the right cheek of the fetus, but the shape of the right ear was not clearly seen (**Figure 2A, 2B**). No cleft lip was identified, and the alveolar ridges appeared intact. 3D US in surface rendering mode was performed using a

## Prenatal diagnosis of lateral facial cleft



**Figure 2.** Comparisons of sonograms with the appearance of the fetus after termination of the pregnancy. A: Coronal view of the lips, showing an intact superior lip; however, the commissures of the mouth appeared asymmetric, suggesting a left lateral facial cleft. B: The suspicion of a left lateral facial cleft was strengthened by the lateral view of the cheek (Finger). C: 3D US image showing asymmetric macrostomia due to the left lateral facial cleft. D: 3D US image showing the small right ear and skin tag on the right cheek of the fetus. E: The left lateral facial cleft was confirmed. The left ear was normal; there was a skin tag on the left cheek of the fetus, and a small, pre-auricular skin tag was observed, which was regarded as an accessory ear. F: The right ear was small; there was a skin tag on the right cheek of the fetus, and small, pre-auricular skin tags were observed, which were regarded as accessory ears.

GE E8 Expert scanner (GE Healthcare, Milwaukee, WI), which revealed a left lateral facial cleft and small right ear associated with a skin tag on the right cheek of the fetus (**Figure 2C, 2D**). No intrauterine synechia was observed, and no other abnormalities of the internal organs were discovered. The fetus was diagnosed with a left lateral facial cleft. Genetic analysis was not performed because the parents refused. The patient had a consultation with a plastic surgeon and eventually decided to terminate the pregnancy. Autopsy examination revealed a left facial cleft of approximately 2 cm, a small right ear, and a skin tag on the

right cheek of the fetus, as suspected on antenatal 3D US. The size of the right skin tag was approximately 1.2 cm. Moreover, a skin tag was observed on the left cheek of the fetus, in addition to small, bilateral, pre-auricular skin tags, which had not been previously noted sonographically. The small, bilateral, pre-auricular skin tags were regarded as accessory ears. No bony defect was observed. The anomalies detected on US were confirmed (**Figure 2E, 2F**).

### Discussion

Lateral facial cleft is a rare malformation. Thus far, only three patients with an isolated lateral facial cleft have been reported antenatally in the literature: one had a bilateral lateral facial cleft [6], one had a cleft accompanied by bilateral skin tags and anterior displacement of the left external ear [7], and one had asymmetric macrostomia as a result of a left lateral facial cleft, accompanied by a skin tag over the left oral commissure area [8]. Other cases have been reported as part of a malformation syndrome, such as oculo-auriculo-vertebral spectrum [9] or Barber-Say syndrome [10]. The present two cases increase the total number of reported cases to 5. The details of all 5 reported cases of lateral facial cleft [6-8] are summarized in **Table 1**.

Lateral facial cleft is a rare anomaly. It is classified as cleft number 7 according to the Tessier classification of facial clefts. It is thought to result from interruption of mesoderm migration, which enables union of the maxillary and mandibular processes during the fourth and fifth weeks of embryonic development, or from disruption of the processes that occur after fusion [11]. The etiology of this condition is

## Prenatal diagnosis of lateral facial cleft

**Table 1.** Summary of lateral facial cleft (Tessier number 7) case reports

Reference	Gestational week	Sex	Ultrasound features	Chromosome karyotype	Prognosis	Age at operation
Presti F, [6]	26	F	The lips appeared prominent, and the lateral commissures of the mouth were widened	46, XX normal	A female baby weighing 2,280 g was delivered by Cesarean section	Received operation at 6 months of age
Pilu G, [7]	22	Unknown	A lateral facial cleft accompanied by bilateral skin tags and anterior displacement of the left external ear	Unknown	Elective termination of pregnancy	
Chang YL, [8]	24	M	Asymmetric macrostomia resulting from a left lateral facial cleft, accompanied by a skin tag over the left oral commissure area	46, XY normal	A male baby weighing 2,730 g was delivered vaginally	Received operation at 3 months of age
Our case No. 1	27	M	Asymmetric macrostomia as a result of a left lateral facial cleft, accompanied by an apparently sunken cheek and a small, malformed, low-set left ear	46, XY normal	Elective termination of pregnancy	
Our case No. 2	34	M	A left lateral facial cleft and small right ear, accompanied by a skin tag on the right cheek	Unknown	Elective termination of pregnancy	

unknown. This type of cleft presents with variable degrees of severity, from slight widening of the mouth to a cleft extending up to the ear. It can be bilateral, but most reported cases are unilateral and do not extend beyond the anterior border of the masseter. Our two cases both had a left lateral facial cleft accompanied by an ear deformity. Additional anomalies that have been reported with lateral clefts include preauricular skin tags, microtia, absence of the Eustachian tube, temporomandibular joint, and zygomatic arch, polydactyly and cardiac and renal anomalies [12, 13]. Amniotic bands can result in the incomplete formation of facial structures in humans [14]. However, in our two cases, no clear evidence of amniotic bands was detected. Various surgical techniques for correcting lateral facial clefts have been described in the literature. The aim of surgery is to create a symmetric commissure with minimal scarring. The fetus in one of our cases had a lateral facial cleft accompanied by microtia and a low-set ear; thus, the patient and family members consulted with a plastic surgeon, and they decided to terminate the pregnancy.

We suggest that 3D US is particularly valuable for detecting atypical clefts and lateral clefts in particular. The central portions of the face, nose, lips and alveolar ridge are well visualized with a standard 2D scan. However, the lateral part of the fetal face is not equally accessible on both sides; therefore, it is particularly difficult to compare the two sides and identify asymmetry using a 2D approach. In our cases, the standard 2D sonographic views of the face,

profile and upper lip appeared normal. Although a lateral cleft was suspected, the anomaly was not fully appreciated until a 3D view of the face was obtained.

Three cases of an isolated lateral facial cleft detected before birth have been previously reported. One was detected at 26 weeks of gestation by 2D US, which revealed widening of the oral commissure, and the baby was delivered at 34 weeks due to preterm labor [5]. In addition, one case had a left lateral facial cleft accompanied by bilateral skin tags and anterior displacement of the left external ear, as detected by 3D US at 22 weeks of gestation, which eventually resulted in elective termination of the pregnancy [6]. The other case presented with a left lateral facial cleft accompanied by a skin tag over the left oral commissure area, which was diagnosed using 3D US at 24 weeks of gestation. Moreover, a male baby weighing 2,730 g who was delivered vaginally [7] at 40 weeks of gestation has been reported; this baby had an isolated left facial cleft of approximately 1.2 cm, one small skin tag over the left mouth angle that was suspected on antenatal 3D US, and a left pre-auricular skin tag that had not been previously noted sonographically.

In our country, 2D US examination is performed routinely during second- and third-trimester screening. On 2D US, a wide or unusually deep oral commissure and the impression of asymmetry between the left and right sides of the face have been recognized as signs of a lateral facial cleft; however, the lateral part of the fetal

## Prenatal diagnosis of lateral facial cleft

face is not equally accessible on both sides using this technique. Therefore, it is difficult to identify asymmetric widening of the oral commissure and to diagnose ear deformities using 2D US. In contrast, 3D US of the face allows for full visualization of anomalies. In our two cases, the antenatal 3D US findings were confirmed by the postmortem appearances of the fetuses.

### Conclusion

If a facial cleft is suspected based on 2D US findings, we suggest that 3D US should be subsequently performed. 3D US appears to have substantial value in the prenatal detection of lateral facial clefts, independent of the etiology.

### Acknowledgements

This study was supported by the Peking University People's Hospital Research and Development Funds (RDC 2015-11), the Scientific Achievements and Technology Popularization Projects of Beijing Health and Family Planning Commission (No. TG-2015-04), and the National Natural Science Foundation of China (No. 81641060).

### Disclosure of conflict of interest

None.

**Address correspondence to:** Qiuyan Pei, Department of Obstetric Ultrasound, Peking University People's Hospital, No. 11 Xizhimen South Street Xicheng District, Beijing 100044, P. R. China. Tel: 86-10-88325325; Fax: 86-10-88324775; E-mail: pqypei@126.com

### References

- [1] Tessier P. Anatomical classification facial, cranio-facial and latero-facial clefts. *J Maxillofac Surg* 1976; 4: 69-92.
- [2] Khaleghnejad-Tabari A, Salem K and Ghajar MF. Treatment of bilateral macrostomia (lateral lip cleft): case report. *Iran J Pediatr* 2012; 22: 425-427.
- [3] Kajikawa A, Ueda K, Katsuragi Y, Hirose T and Asai E. Surgical repair of transverse facial cleft: oblique vermilion-mucosa incision. *J Plast Reconstr Aesthet Surg* 2010; 63: 1269-1274.
- [4] Grabb WC. The first and second branchial arch syndrome. *Plast Reconstr Surg* 1965; 36: 485-508.
- [5] Ewings EL and Carstens MH. Neuroembryology and functional anatomy of craniofacial clefts. *Indian J Plast Surg* 2009; 42 Suppl: S19-34.
- [6] Presti F, Celentano C, Marcazzo L, Dolcetta G and Prefumo F. Ultrasound prenatal diagnosis of a lateral facial cleft (Tessier number 7). *Ultrasound Obstet Gynecol* 2004; 23: 606-608.
- [7] Pilu G, Visentin A, Ambrosini G, D'Antona D and Andrisani A. Three-dimensional sonography of unilateral Tessier number 7 cleft in a mid-trimester fetus. *Ultrasound Obstet Gynecol* 2005; 26: 98-99.
- [8] Chang YL, Lien R, Chang SD and Chao AS. Prenatal 3D sonographic diagnosis of an isolated lateral facial cleft. *J Clin Ultrasound* 2012; 40: 219-221.
- [9] Witters I, Schreurs J, Van Wing J, Wouters W and Fryns JP. Prenatal diagnosis of facial clefting as part of the oculo-auriculo-vertebral spectrum. *Prenat Diagn* 2001; 21: 62-64.
- [10] Suga K, Shono M, Goji A, Matsuura S, Inoue M, Kawahito M, Kinoshita M, Takeda M and Mori K. A case of Barber-Say syndrome in a male Japanese newborn. *Clin Case Rep* 2014; 2: 224-227.
- [11] Gundeslioglu AO and Ince B. Congenital macrostomia: a case report. *Kulak Burun Bogaz Ihtis Derg* 2013; 23: 179-182.
- [12] Makhija LK, Jha MK, Bhattacharya S, Rai A, Dey AB and Saha A. Transverse facial cleft: a series of 17 cases. *Indian J Plast Surg* 2011; 44: 439-443.
- [13] May H. Transverse facial clefts and their repair. *Plast Reconstr Surg Transplant Bull* 1962; 29: 240-249.
- [14] Jabor MA and Cronin ED. Bilateral cleft lip and palate and limb deformities: a presentation of amniotic band sequence? *J Craniofac Surg* 2000; 11: 388-393.