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Treacher Collins Syndrome (mandibulofacial dysostosis) – A case report

Praveen Sharma[1], Ajina Sam[1], Iffath Misbah[1], Prajwal M.N.[2]

[1]Department of Radio-diagnosis, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha Nagar, Thandalam, Chennai, India
[2]Department of Radio-diagnosis, Adichunchanagiri Institute of Medical Sciences, Bellur, Karnataka, India

ABSTRACT

Background. Treacher-Collins Syndrome (TCS) (or mandibulofacial dysostosis) is a rare autosomal dominant genetic disorder involving 1st and 2nd branchial arches present with craniofacial deformities with variable expressivity. TCS commonly manifests as facial dysmorphism with varied presentations. In this case report, we demonstrate the typical CT (Computed Tomography) findings of the characteristic features.

Case report. Here, we report an 8-year-old boy who presented for evaluation of uneven facial features. Upon a multidisciplinary evaluation, he was diagnosed with TCS, and the characteristic radiological features are described in this report.

Conclusions. TCS has a variable degree of phenotypic expression with no related developmental delay or neurologic disorder. Proper counselling, planning, and surgical procedures are necessary for more promising results.

Keywords: mandibulofacial dysostosis, branchial region, craniofacial abnormalities, computed tomography, chromosome aberrations

INTRODUCTION

A rare autosomal dominant genetic illness of craniofacial deformity affecting the mandible, maxillae, and ears is known as TCS, also known as mandibulofacial dysostosis. In the year 1889, George Andreas Berry described this condition as a neonatal deformity having the lower colobomata eyelids[1]. An early case report detailing the ocular and periorbital sequelae of this condition was published in 1900 by British ophthalmologist Edward Treacher Collins, who presented the condition at a meeting in London [2].In 1949, Adolphe Franceschetti and David Klein, who did an extensive review covering most of the issues, coined the term Mandibulofacial Dysostosishence the name Franceschetti-Zwahlen-Klein & Berry's syndrome [3].

CASE REPORT

A mother brought an eight-year-old male child to the Department of Pediatrics to present with a deformed face, deafness, and a small and malformed ear structure since birth. Antenatal history, natal history, and postnatal history are uneventful. Developmental milestones are achieved as per age and immunized for the period; absence of consanguineous marriage; non-specific family history.

On examination, a head circumference of 53 cm Scalp hair, intelligence, genitals, and development were normal. The systemic analysis was regular. On external examination, low posterior hairline, low set ears, downward slanting of the palpebral fissure, lower eyelid bilateral coloboma, devoid of eyelashes in the right lower eye, prominent nose, microtia, malar hypoplasia, small mandible, open mouth, and high arch palate were present.

Computed tomography (CT) face with multi-planar reconstructed (MPR) images, three-dimensional (3D) volume rendered (VR) images, and three-dimensional (3D) surface shaded display (SSD) show [Figure 1 (A, B, C, D, E)], [Figure 2 (A, B)], [Figure 3 (A, B, C, D)], and [Figure 4 (A, B, C)].

Corresponding author:
Ajina Sam
E-mail: ajinasam20@gmail.com

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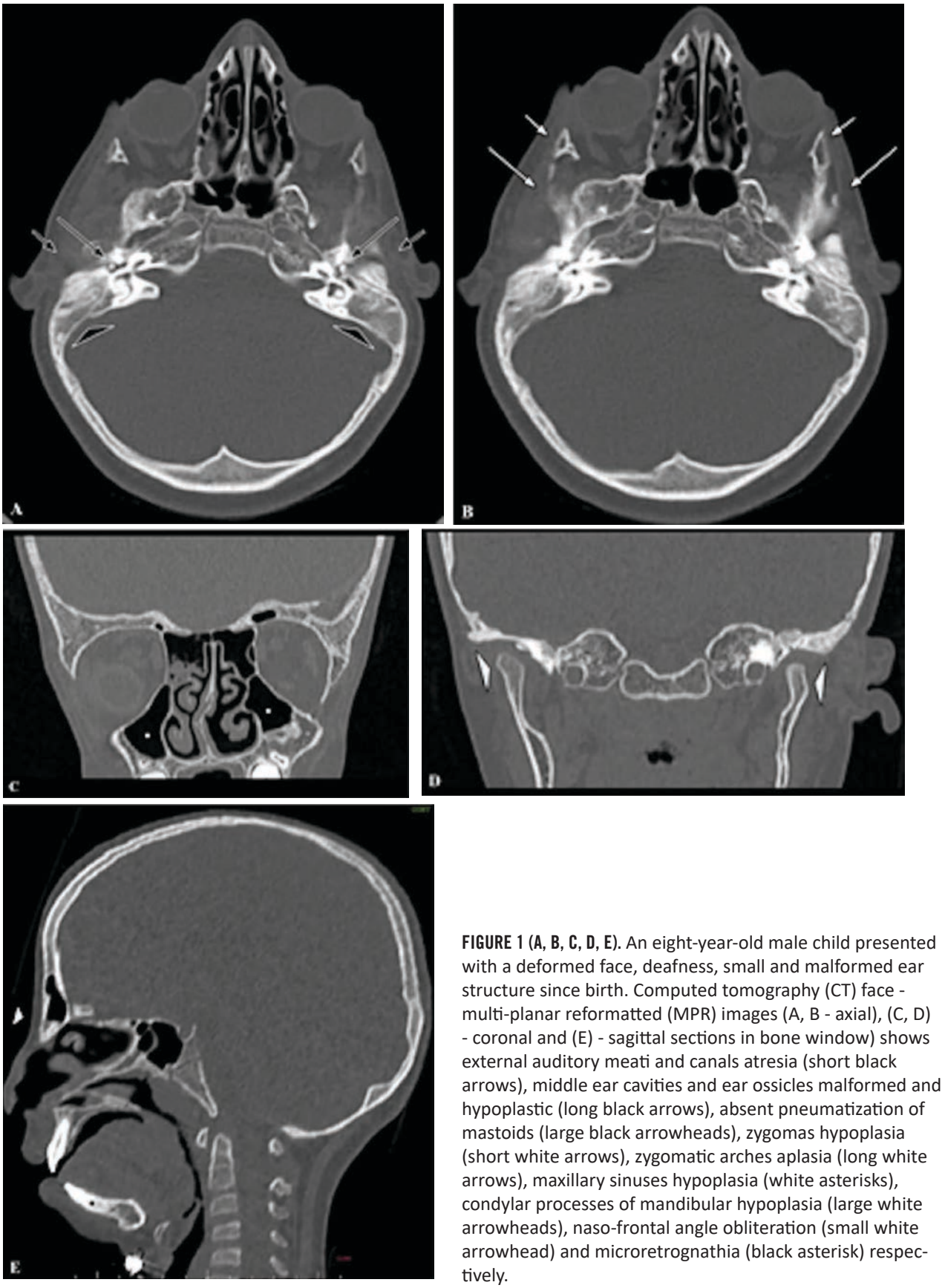

FIGURE 1 (A, B, C, D, E). An eight-year-old male child presented with a deformed face, deafness, small and malformed ear structure since birth. Computed tomography (CT) face - multi-planar reformatted (MPR) images (A, B - axial), (C, D) - coronal and (E) - sagittal sections in bone window) shows external auditory meati and canals atresia (short black arrows), middle ear cavities and ear ossicles malformed and hypoplastic (long black arrows), absent pneumatization of mastoids (large black arrowheads), zygomas hypoplasia (short white arrows), zygomatic arches aplasia (long white arrows), maxillary sinuses hypoplasia (white asterisks), condylar processes of mandibular hypoplasia (large white arrowheads), naso-frontal angle obliteration (small white arrowhead) and microretrognathia (black asterisk) respectively.

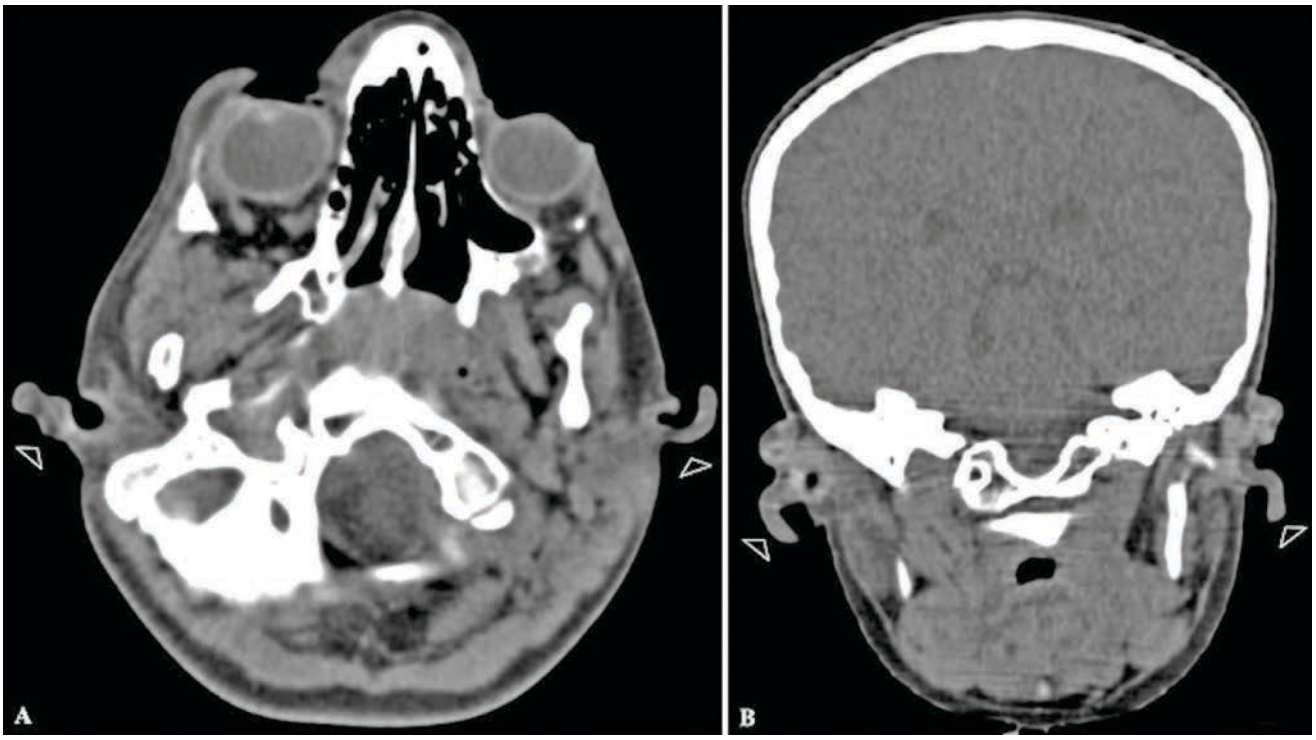

FIGURE 2 (A, B). An eight-year-old male child presented with a deformed face, deafness, small and malformed ear structure since birth. Computed tomography (CT) face - multi-planar reformatted (MPR) images (A - axial, B - coronal sections in soft tissue window) shows microtias (small black arrowheads)

- Mandibular:
  - Microretrognathia.
  - Mandibular hypoplasia (condylar processes).
  - The concave curvature of the horizontal rami of the mandible.
  - Open mouth.
- Zygoma and Zygomatic Arch:
  - Zygomas malformed, hypoplasia.
  - Zygomatic arches aplasia.
- Otic:
  - Microtias.
  - External auditory meati and canal atresia
  - Middle ear cavities and ear ossicles are malformed and hypoplastic.
- Nasal and Sinuses:
  - Nasofrontal angle obliteration with narrow nares
  - Hypoplasia of the alar cartilage
  - Maxillary sinuses are hypoplastic.
- Ocular:
  - Downward slanting palpebral fissures.
  - Coloboma or defects of the lower eyelids.
- Mastoid:
  - Absentpneumatization of mastoids.

Based on the clinical and imaging findings, TCS (or mandibulofacial dysostosis) is considered. Initially, an eight-year-old male was surgically treated in the left ear (left ear reconstruction with costochondral framework replacement).

DISCUSSION

Etiology/Genetics

"TCS (or mandibulofacial dysostosis) is a rare autosomal dominant inheritance with a higher penetrance degree but a variable phenotypic expression with an estimated occurrence of 1 in 50,000 live births", affecting both genders equally. The TCOF1 gene mutation causes TCS, which is associated with a link to the chromosome 5q32 locus. In the inherited form, spontaneous mutations can happen; nonsense or deletion variants can result from them, and there is no preference for one gender over another. Treacle, the TCOF1 protein, participates "in the ribosome biogenesis process. Treacle is a component of both methylation and the rRNA pre-processing complex. Haploinsufficiency is caused by a function mutation loss; in mouse studies, this tumor is linked to the development of the craniofacial region. The neuroepithelium prior to fusion as well as the embryonic frontonasal & branchial arches" exhibited the highest levels of TCOF1 expression [4].

Clinical and imaging findings

Structures derived from the bilateral 1st& 2nd pharyngeal arches are affected by TCS. Soft tissue and skeletal structures, however, are rarely symmetrical. Franceschetti divided TCS into five groups, including unilateral, abortive, complete, and unusual.

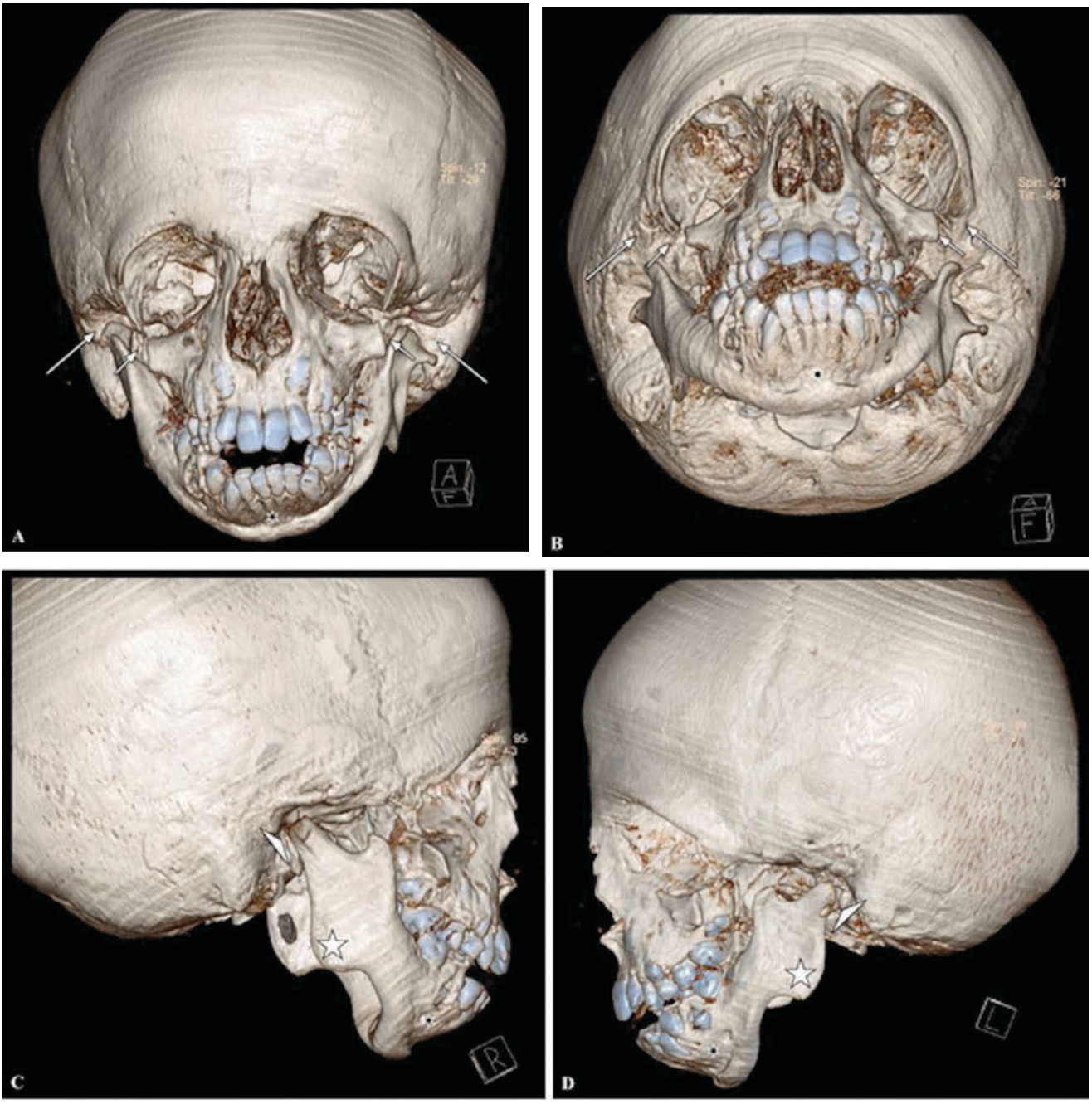

FIGURE 3 (A, B, C, D). An eight-year-old male child presented with a deformed face, deafness, small and malformed ear structure since birth. Computed Tomography (CT) Face - three-dimensional (3D) volume rendered (VR) images (A - coronal, B - coronal oblique, C - right para-sagittal and D - left para-sagittal) shows zygomas hypoplasia (short white arrows), zygomatic arches aplasia (long white arrows), condylar processes of mandibular hypoplasia (large white arrowheads), concave border of horizontal rami of the mandible (large white stars) and microretrognathia (black asterisk) respectively

The typical clinical manifestations and Computed tomography (CT) findings of Treacher Collins syndrome (TCS)(or Mandibulofacial dysostosis):

Ocular and periorbital

It includes vision loss, strabismus, congenital cataracts, microphthalmia, or anophthalmia. Antimongoloid down slanting of the palpebral fissures and lower eyelid colobomas/lid notching Others include lacrimal duct atresia & absence of puncta, absent orbicularis oculi muscles, meibomian glands, and periorbital dermoid.

Auricular

It includes middle ear ossicle defects that cause conductive hearing loss, bilateral microtia or anotia, external auditory canal stenosis or atresia, and these conditions. The inner ear's morphology is normally normal.

Zygoma and malar region

It includes “deficient zygoma anthropometrically utilizing axial CT linear measurements by Posnick, smaller inter-zygomatic arch distance along with zygomatic arch length, and malar hypoplasia.

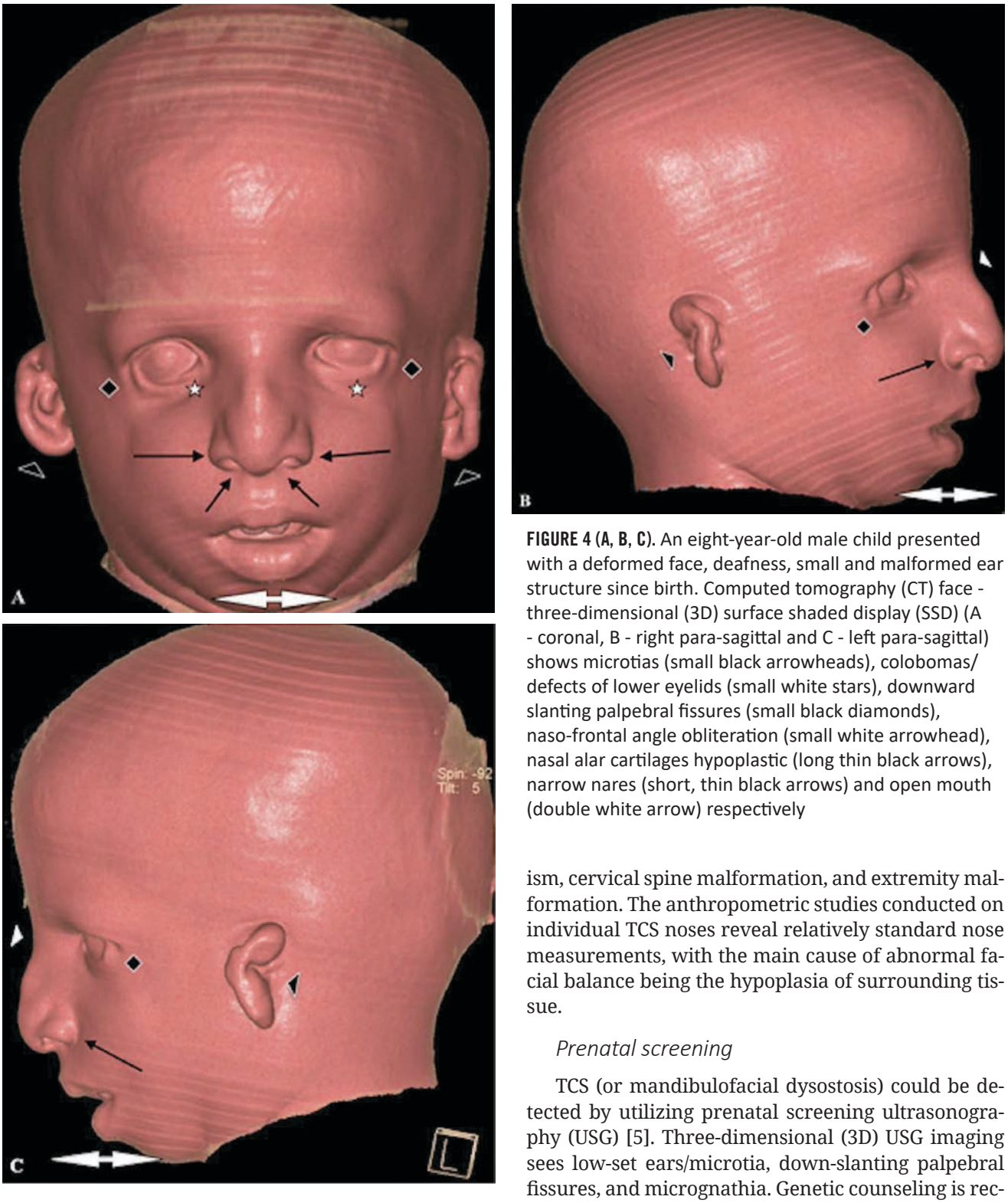

FIGURE 4 (A, B, C). An eight-year-old male child presented with a deformed face, deafness, small and malformed ear structure since birth. Computed tomography (CT) face - three-dimensional (3D) surface shaded display (SSD) (A - coronal, B - right para-sagittal and C - left para-sagittal) shows microtias (small black arrowheads), colobomas/defects of lower eyelids (small white stars), downward slanting palpebral fissures (small black diamonds), naso-frontal angle obliteration (small white arrowhead), nasal alar cartilages hypoplastic (long thin black arrows), narrow nares (short, thin black arrows) and open mouth (double white arrow) respectively

Maxilla and mandible

It includes facial profile convexity due to retrognathia. Also, the mandibular angle is obtuse, the ratio of maxillomandibular deficiency is high, and the antegonial notch height is high.

The uncommon clinical manifestations and computed tomography (CT) findings of TCS (or mandibulofacial dysostosis) are choanalatresias, complete or submucous cleft palate, absent parotid glands, congenital heart disease, renal anomalies, cryptorchidism, cervical spine malformation, and extremity malformation. The anthropometric studies conducted on individual TCS noses reveal relatively standard nose measurements, with the main cause of abnormal facial balance being the hypoplasia of surrounding tissue.

Prenatal screening

TCS (or mandibulofacial dysostosis) could be detected by utilizing prenatal screening ultrasonography (USG) [5]. Three-dimensional (3D) USG imaging sees low-set ears/microtia, down-slanting palpebral fissures, and micrognathia. Genetic counseling is recommended for high-risk families, regardless of USG findings.

Management

Neonatal management

Management includes airway management, feeding, and growth. Airway obstruction occurs at multiple sites, like the oropharynx/hypopharynx (glossoptosis/micrognathia), nasopharynx (choanal atresia), or laryngopharynx (laryngomalacia). Conservative

management (nasopharyngeal trumpet or suctioning) and positioning (side or prone) may be adequate in mild cases. In moderate cases, an early mandibular advancement or tongue-lip adhesion is performed. In severe cases, intubation or tracheostomy early tarsorrhaphy might be required to prevent corneal scarring, blindness, and ulceration.

Surgical management

Mandibular "distraction osteogenesis enables neonatal mandible advancement to relieve airway obstruction. Curvilinear distraction devices, Bimaxillary surgery, LeFort I with bilateral sagittal split osteotomy", Bone-Assisted Hearing Aid, Ear Reconstruction, Palatoplasty, Eyelid Correction such as Skin Grafting, Orbicularis Transposition, Z-plasty, and Canthopexy Midface/soft tissue resuspension such as microvascular-free flaps and soft tissue augmentation [6].

Differential diagnosis

Differential diagnosis of TCS (or mandibulofacial dysostosis) includes

(a) Nager syndrome (pre-axial acrofacialdysostosis).
(b) Miller syndrome (post-axial acrofacialdysostosis).
(c) Hemifacialmicrosomia (facio-auriculo-vertebral spectrum).
(d) Goldenhar syndrome (oculo-auriculo-vertebral spectrum).

(a) Nager syndrome (pre-axial acrofacialdysostosis) has similar facial features to TCS. Moreover, aplastic, hypoplastic, or duplicated thumbs, fused radius, and ulna are examples of pre-axial limb abnormalities [7].

(b) Miller syndrome (post-axial acrofacialdysostosis) has similar facial features to Treacher-Collins syndrome (TCS). Also, post-axial limb anomalies: cleft lip, with or without cleft palate, ectropion, complete or incomplete absent development of all four limbs (5th digital ray) [8].

(c) Hemifacialmicrosomia (facio-auriculo-vertebral spectrum) has similar facial features to Treacher Collins syndrome (TCS) and primarily affects the mouth, ear, and mandible [9].

(d) Goldenhar syndrome (oculo-auriculo-vertebral spectrum) has similar facial features to Treacher-Collins syndrome (TCS). Also, vertebral abnormalities (vertebral segmentation errors) epi-bulbar dermoid [10].

In this case, there were no additional features of pre- and post-axial limb abnormalities, ectropion or out-turning of lower eyelids, cleft lip, epi-bulbar dermoid, or vertebral anomalies that were diagnosed as TCS or mandibulofacial dysostosis.

CONCLUSION

TCS is a craniofacial deformity associated with a complex congenital disorder. Reconstruction treatment is essential for ultimately managing their social and psychological development.

Take away points:

- The child's intelligence is typically unaffected.
- Reconstructive surgery typically yields positive outcomes and improves the patient's quality of life.
- TCS does not exhibit a neurologic disorder or developmental delay in conjunction with its variable degree of phenotypic expression.
- Proper planning, and surgical, and counseling procedures are necessary for more promising outcomes.

Limitations of the study:

This study was limited by the genetic test lack.

Patient consent:
The authors attest that they have all the necessary permissions in place to publish this case study and any related photos.

Author's contributions:
All the authors mentioned above have contributed in Conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing—original draft preparation, writing—review and editing and visualization. All authors have read and agreed to the published version of the manuscript.

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