

The Role of Mutations on Gene TCOF1, in Treacher Collins Syndrome

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Abstract

Treacher-Collins syndrome or mandibular facial dysostosis is a rare genetic disorder associated with craniofacial malformations such as missing cheekbones. Common physical characteristics include downward-looking eyes, microgantia (small mandible), hearing loss, immature zygoma (cheekbones), sagging of the lateral part of the lower eyelids and deformed ears, or no ear.

Keywords: Treacher-Collins Syndrome; Mandibular Facial Dysostosis; Genetic Disorder; Tcof1 Gene

Signs and Symptoms Treacher-Collins Syndrome

Jaw hypoplasia, lower eyelid disorders, down-slanted or anti-mongoloid eyelid cleft palate, and cleft palate in the zygomatic arch are the most common findings. Lower eyelid colboma is usually found on the outer third of the eyelid, and the lower eyelid cilia are usually either completely absent or incomplete on the inside of the eyelid. Gaps in the zygomatic arch cause sunken species. The lower jaw is extremely small and can be easily identified from the face, but sometimes radiography is needed for diagnosis. The ramus branch of the mandibular bone may be incomplete and the coronoid and condylar appendages may be flat or absent. Problems around the ears and cheeks and cleft palate are other symptoms of the syndrome. Ear disorders are another finding of the disease that affects all three parts of the ear (outer, middle and inner). Transient hearing loss occurs in 25 to 50% of patients, mainly due to hypoplasia of the external ear canal and middle ear bones. Other disorders of the external ear, especially small ones (Microtia) are common. Protrusions and skin cavities are seen around the ears and cheeks. Cleft palate is seen in 25 to 33% of

patients and may be associated with cleft lip. Increased hair growth in the cheeks and large mouth are other findings.



Figure 1: Image of patients with Treacher-Collins syndrome with related disorders [1].

Due to the depression of the cheeks and the lower jaw, the patient's nose looks large. Dental disorders include occlusion and detached teeth, hypoplastic or ectopic. Atrial

fibrillation is also seen in some patients. Fortunately, facial changes in these patients are very clear and specific and can be easily identified with a little care. Mental retardation is seen in 5% of patients, which is attributed to hypoxia and respiratory disorders in infancy. Congenital heart disease is seen in some patients and is more common than normal people. Most disorders include ventricular septal defect, atrial septal defect, and patent ductus arteriosus. These patients also showed open arterial duct and open oval hole on echocardiography [1,2].

Etiology of Treacher-Collins Syndrome

The disease is genetically transmitted autosomally, but 60% of cases are caused by new mutations. The penetration of the disease gene is variable and the manifestations of the disease are different in a family. The disease gene was identified as TCOF1 in 1996 and is located on chromosome 5q32-33.1 [1,3].

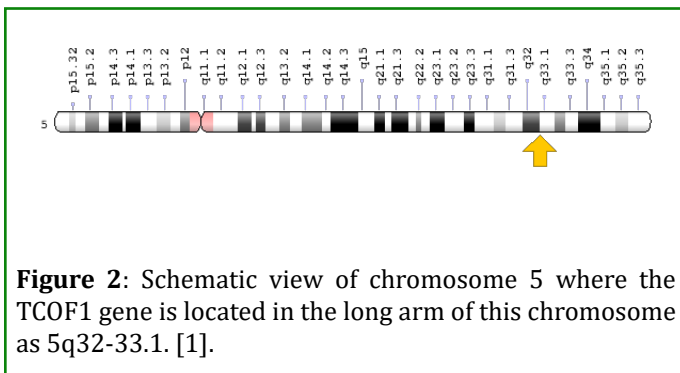


Figure 2: Schematic view of chromosome 5 where the TCOF1 gene is located in the long arm of this chromosome as 5q32-33.1. [1].

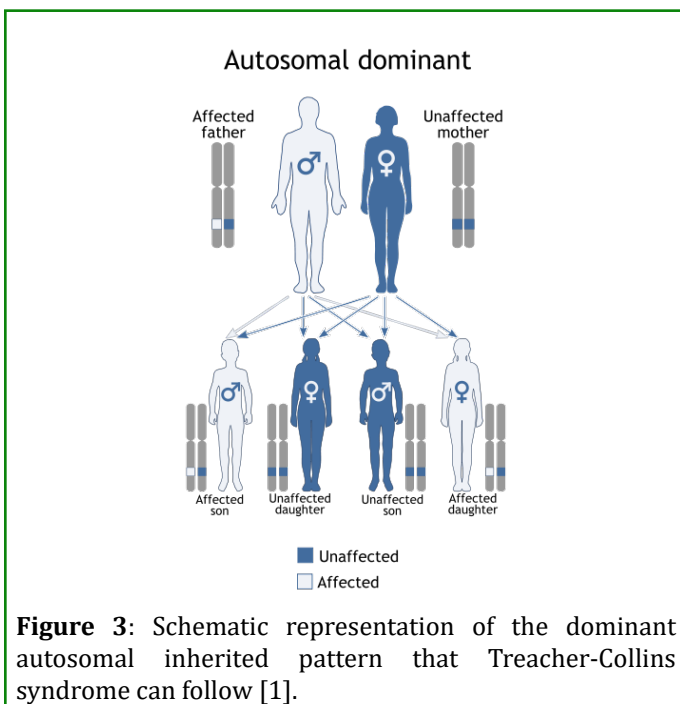


Figure 3: Schematic representation of the dominant autosomal inherited pattern that Treacher-Collins syndrome can follow [1].

Frequency of Treacher Collins Syndrome

The prevalence of Treacher-Collins syndrome is 1 in 50,000 live births worldwide [1,4].

Prognosis and Diagnosis of Treacher Collins Syndrome

People with this disease, unlike other congenital syndromes, usually do not have a mental or skeletal problem and can be effective people in the community. Meanwhile, the presence of congenital heart disorders and their timely diagnosis and treatment are more important than the diagnosis and treatment of these disorders in patients with other syndromes. Although physical abnormalities cause psychological problems at school and puberty for these patients, studies have shown that most of these patients become accustomed to these abnormalities with or without the help of reconstructive surgery. They merge. Treacher-Collins syndrome uses characteristic findings and molecular genetic testing for the TCOF1 gene to investigate possible mutations [1,5,6].

Treatment of Treacher Collins Syndrome

Treatment of patients includes respiratory and nutritional disorders in infants and toddlers, as well as timely treatment of hearing disorders with hearing aids. Treatment includes methods to improve breathing and improve airway function. Treatment and repair of the oral roof is usually done at the age of 1-2 years. Jaw and eye treatment is often done at the age of 5-7 years. Ear correction is usually treated after age 6, and jaw displacement is usually treated before age 16. Of course, there are other treatments whose scientific results have not yet been confirmed. Including: Treatment of Treacher-Collins syndrome in the mother's uterus by manipulating a gene called p53. Adding stem cells to bone and cartilage to improve surgical outcomes, treat skull and facial problems [1,7,8].



Figure 4: Image of a baby with Treacher-Collins syndrome with related disorders. [1]

Discussion and Conclusion

Trichter Collins Syndrome is a genetic disease that affects the bones and other tissues of the face and causes disorders in the head, face and ears. Most abnormalities of this syndrome are limited to the head and neck [1,9].

Characteristics of this syndrome include: slanted eyes, difficulty swallowing, deafness, and deformity of the upper and lower jaw and ears [1,9].

Appearance symptoms also include a long face, a bird-like nose, a sunken chin, and an overgrowth of the upper and lower jaws [1,9].

People with Treacher-Collins syndrome usually do not have mental and skeletal problems and can be effective people in the community. People with this disease, unlike other congenital syndromes, usually do not have a mental or skeletal problem and can be effective people in the community. Meanwhile, the presence of congenital heart disorders and their timely diagnosis and treatment are more important than the diagnosis and treatment of these disorders in patients with other syndromes. Although physical abnormalities cause psychological problems at school and puberty for these patients, studies have shown that most of these patients become accustomed to these abnormalities with or without the help of reconstructive surgery. They merge. Treacher-Collins syndrome uses characteristic findings and molecular genetic testing for the TCOF1 gene to investigate possible mutations. No cure has been found for Treacher-Collins syndrome. As mentioned, people with Treacher Collins Syndrome do not have any problems in terms of learning and education, and there are even doctors and surgeons who have Treacher Collins Syndrome [1,10].

The only treatment is plastic surgery on the skin of the face of people with Treacher Collins syndrome, to alleviate the suffering of these patients. It is hoped that in the near future, molecular genetic techniques, especially gene therapy, can be used to treat this genetic disorder, and if such a technique works, it should be treated in the womb during pregnancy or in the womb. In other words, the fetus has Treacher-Collins syndrome, but the newborn will be healthy. Genetic counseling is also necessary for parents who want a healthy child. It was named after the English surgeon and ophthalmologist Edward Treacher Collins after it was discovered in 1900. In 1949, Adolf Franceschi and David Klein, in their observations,

named it Mandibulo Facial Dysostosis, which describes most of its clinical features [1,10].

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