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# Facial asymmetry in ocular torticollis

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**Abstract**

Torticollis can arise from nonocular (usually musculoskeletal) and ocular conditions. Some facial asymmetries are correlated with a history of early onset ocular torticollis supported by the presence of torticollis on reviewing childhood photographs. When present in an adult, this type of facial asymmetry with an origin of ocular torticollis should help to confirm the chronicity of the defect and prevent unnecessary neurologic evaluation in patients with an uncertain history. Assessment of facial asymmetry consists of a patient history, physical examination, and medical imaging. Medical imaging and facial morphometry are helpful for objective diagnosis and measurement of the facial asymmetry, as well as for treatment planning. The facial asymmetry in congenital superior oblique palsy is typically manifested by midfacial hemihypoplasia on the side opposite the palsied muscle, with deviation of the nose and mouth toward the hypoplastic side. Correcting torticollis through strabismus surgery before a critical developmental age may prevent the development of irreversible facial asymmetry. Mild facial asymmetry associated with congenital torticollis has been reported to resolve with continued growth after early surgery, but if asymmetry is severe or is not treated in the appropriate time, it might remain even with continued growth after surgery.


*Keywords:* Facial asymmetry; Ocular torticollis; Superior oblique palsy

## Introduction

Facial asymmetry is a condition in which the two sides of the face are not completely alike and similar.[1] Facial asymmetry is not necessarily an abnormality, as different degrees of asymmetry can be recognized in a normal population. There are different causes for facial asymmetry including trauma, facial muscles palsy, facial microsomia, craniosynostosis, phakomatosis, and progressive facial atrophy.[2] During the developmental stages of children, congenital muscular torticollis, with a prevalence of 0.3–2%, is the most important cause of the development and progression of facial asymmetry.[3,4] The importance of this type of torticollis is that it is the most common cause of torticollis in children,[5] and its effect on the development and progression of facial asymmetry in children is very similar to ocular torticollis.[6,7] Therefore, it is necessary to be familiar with the nature and causes of congenital muscular torticollis to differentiate it from facial asymmetry due to ocular torticollis. Congenital torticollis is a condition in which the baby draws his or her head to the side of the involved and damaged muscle with the chin pointing in the opposite direction. In most cases, congenital torticollis is developed following trauma to one of the sternocleidomastoid muscles. It is one of the most important muscles in torticollis with an ocular origin and is majorly responsible for head tilt or turn Fig. 1.[8]

The sternocleidomastoid muscle is a paired large muscle in the front of the neck. It is attached to the sternum from one end and to the mastoid process from the other end, with no attachment to facial muscles. Neck traumas during labor are

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Fig. 1. Torticollis to the Right side.

the most common causes of SCM abnormality with a prevalence of 1 in 300 babies. In this condition, the baby shows some degrees of congenital torticollis. About 50–70% of the abnormalities of SCM resolve within the first year of life without requiring any special treatment; therefore, the best age for surgical treatment is between 1 and 4 years of age.[9]

The presence of torticollis during sleep or despite closing one eye is the most important finding used for the detection of non-ocular origins of torticollis since in torticollis, with an ocular origin, there is no preference to sleep on one side, and on the other hand, the head returns to its natural position upon closing one eye. In addition, in congenital muscular torticollis, some limitations in the neck movement and loosening of the neck on the affected side are noted while neck and muscular movements are perfectly normal in ocular torticollis.[10]

In the absence of appropriate and timely treatment, congenital muscular torticollis results in the development and progression of facial asymmetry in the children. The signs of facial asymmetry in this type of torticollis are identical to ocular torticollis and limit the face on the torticollis side vertically. Unilateral contractions of the SCM result in the rotation of the head and its bilateral contractions results in the flexion of the head and neck. The extent of head tilt or turn is related to the activity of this muscle. Bone abnormalities, plagiocephalic syndromes, and unilateral hearing loss are other causes of facial asymmetry.[11,12]

## Facial asymmetry and ocular torticollis

In ocular sciences, asymmetry is defined as any lack of symmetry and uniformity of the two sides of the face as a result of an abnormal head position caused by the palsy of cyclovertical muscles. It should be noted that although the highest amount of facial asymmetry is observed in torticollis due to cyclovertical muscles palsy, it does not necessarily mean that other causes of ocular torticollis like nystagmus, DVD, uncorrected astigmatism, sixth nerve palsy, Duane syndrome, etc. cannot cause facial asymmetry.[13] The highest amount of cyclovertical muscle palsy is observed in congenital palsy of the superior oblique muscle and forth cranial nerve palsy, which is one of the reasons for more reports of facial asymmetry in superior oblique muscle palsy. On the other hand, the lower the age is at the onset of torticollis, the higher the odds of development and progression of facial asymmetry. Therefore, the higher prevalence of the congenital palsy of the superior oblique muscle versus the sixth cranial nerve palsy, DVD after two years of age, the low prevalence of torticollis following non correction of astigmatism when compared to torticollis in the superior oblique muscle palsy, etc. all indicate the higher importance of facial asymmetry in patients with superior oblique palsy.[7]

When evaluating ocular asymmetry following ocular torticollis, it should be kept in mind that every congenital torticollis cannot cause facial asymmetry. For example, patients who only have chin up and down (without head tilt or turn) should be excluded in the evaluation of facial asymmetry since this type of torticollis has a similar effect on the left and right side of the face.[13]

## Facial asymmetry in the normal population

The presence of facial asymmetry does not necessarily indicate an abnormality, as different levels of facial asymmetry are observed in the normal population.[6]

In an evaluation performed by Huang et al on Chinese individuals with a negative history of torticollis, plagiocephaly syndromes, and trauma, some degrees of asymmetry were noted in the normal population. The highest amount of asymmetry was seen in mouth angles followed by the sides of the nostrils.[14] Some studies have even reported that some degrees of asymmetry are quite normal and help the face to look more attractive.[15]

## Ocular plagiocephaly

Plagiocephaly is a general term for facial and skull asymmetry. It originates from the Greek word *plagios*, meaning oblique, and *kephale*, meaning the head.[6]

The concept of ocular plagiocephaly, which is caused by imbalance in one of the ocular muscles, can be defined through careful evaluation of ocular torticollis. Other forms of plagiocephaly include deformation and craniosynostosis plagiocephaly, in which bone abnormalities and muscular changes are accompanied by a compensatory torticollis early after birth, like primary musculoskeletal abnormalities that can cause plagiocephaly, torticollis, or both. In ``ocular plagiocephaly", although bones and muscles are normal at birth, the presence of tilt or turn is the main sensory neural cause for an ocular plagiocephaly, indicating the effect of a long-term torticollis on the growth of facial muscles.[16,17]

In deformation plagiocephaly, the occipital bone, forehead, and whole face are deformed due to the conditions of one side of the head in the uterus or after birth. Some researchers claim