

# A Review of Efficacy of various cervical orthoses in Congenital Muscular Torticollis

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*Abstract – Congenital muscular torticollis, also known as twisted neck, is a neck muscle spasm or contracture that causes the head to tilt to one side. It is accompanied by chin flexion and rotation to the opposing side. Torticollis is typically not a diagnosis but rather a symptom of several underlying diseases. It can be congenital or acquired. Anybody can experience it at any age, depending on the underlying cause. Congenital torticollis frequently appears a few weeks after birth. It frequently appears as a single illness. The diagnosis is based on the findings of the clinical examination. The mainstay of treatment is physical therapy protocols along with the appropriate orthoses. Surgical management is only an option if medical and physical treatments are unable to produce the desired results or are required for cosmetic reasons. Which sort of orthosis is better for CMT, meanwhile, remains unclear? This study's objective was to assess the effectiveness of various cervical orthoses in treating Congenital Muscular Torticollis. 36 papers from various information sources (Pubmed, Google scholar, science direct, as well as other information sources) were taken into consideration for this study based on the inclusion criteria. The findings of these clinical studies show that the most preferred orthosis for congenital muscular torticollis is the TOT collar (Tubular Orthosis for Torticollis), which is inexpensive, lightweight, and easy to use.*

**Keywords –** Congenital muscular torticollis, contracture, orthosis, physical therapy, spasm

## INTRODUCTION

The terminology "torticollis" is made up of two Latin terms. The words "torquere" and "collum" simply mean "wrapped" and "neck," respectively [3] The third most prevalent musculoskeletal disorder is congenital muscular torticollis (CMT). The first two most common musculoskeletal conditions are developmental dysplasia of hip and congenital talipes equinovarus [4]-[5] CMT is more common in males as compared to females by the ratio of 3:2 [5] It is more common on the right side of neck [6] The global incidence rate of congenital muscular torticollis ranges between 0.3% and 1.9%. CMT may be accompanied by hip dysplasia, plagiocephaly, craniofacial asymmetry and brachial plexus injury [7]-[11] CMT in traumatic deliveries has incidence rate about 2% and about 0.3 percent in non-traumatic deliveries [19]

Congenital muscular torticollis (CMT) is a postural musculoskeletal deformity occurring in infants and children. It is also known as twisted neck or wry neck evident at, or shortly after birth due to shortening of the sternocleidomastoid muscle. It presents as a head tilt to one side and chin rotation to the other side or lateral flexion of the head to the ipsilateral side with rotation to the contralateral side. It can be congenital or acquired

[1] The actual cause of congenital torticollis is unknown, however ischemia, trauma during delivery, and intrauterine malposition are the most common causes [19]

There are three types of CMT: Postural, Muscular, Mass CMT. Postural CMT is the mildest variant of CMT, in which the newborn has a postural preference but no muscular rigidity or restriction to passive range of motion. Muscular CMT presents with tightness of the sternocleidomastoid muscle and limitation of passive range of motion. Mass CMT which is the most serious subtype presents with thickening of the sternocleidomastoid muscle and restricted passive range of motion [2]

Diagnosis and appropriate interventions at an early stage are important. Clinical and physical examination findings are essential for the diagnosis [12] Conservative treatment of CMT involves parental education about environmental modification, positioning, home exercises, physical therapy techniques, orthosis, Botox and surgery [6] Untreated severe CMT can result in craniofacial asymmetry and cervical spine dysmorphism [13] Postural CMT that accounts for 20% of all the three types needs shorter

treatment as compared to mass CMT (50%) which may require longer invasive management [14]-[15]

Cervical orthoses come in a variety of styles that are used to treat congenital muscle torticollis. However, only a few research publications have examined the use and effectiveness of the cervical orthoses in CMT. The usefulness and efficacy of a cervical orthoses in CMT have been addressed in this review. Nevertheless, the important question proposed in this review was “Is there any difference between the performance and compliance of the different types of orthoses prescribed for CMT? Unfortunately, it is a matter of controversy which type of cervical orthosis is more suitable based on the severity of CMT and associated side effects.

### **OBJECTIVES OF THE STUDY**

The primary objective of this study is to evaluate the efficacy of various cervical orthoses in Congenital Muscular Torticollis.

### **MATERIALS AND METHODS**

This study is a review of papers published between 1965 to 2022 that can be accessed in several bibliographic databases, including Research Gate, Google Scholar, Science Direct, and Pudmed. Most of the publications were discovered by a mix of formal searches, which included manual searching of journals, electronic scanning of big repositories (using free-content, index keywords, and specified authors), reference tracking, and citation monitoring. The phrases muscle torticollis, cervical orthosis, cervical collars, and problems of orthosis were used in the literature search. Articles were chosen based on the presence of at least one key phrase and a publication date ranging from 1965 to 2022. A total of 36 studies on the efficacy of cervical collars in congenital muscular torticollis (CMT) were found through internet and repository searches. This study did not include information on vascular operations, physical therapy treatments or exercises, pharmacological tests, or drugs.

### **RESULTS AND DISCUSSION**

Several treatment approaches have been recommended for the treatment of CMT including surgery, physiotherapy, and cervical orthoses. 90% to 95% of children improve before the first year of life if appropriate treatment is provided to them. 97% of patients affected with CMT improve if treatment starts before the first six months [19].

Management protocols for CMT depends on many factors such as infant’s age, degree of severity of the CMT, and the ability of the parents to follow the recommended management programs. CMT is correctable with the combination of stretching and orthosis in about 90–95% of the cases [31]. If conservative treatment is not effective, Botox and operative options may be considered [32].

The treatment plan must be followed by the family and caregivers. Patients with severe ROM deficit and advanced age at the time of diagnosis are more expected to have a resistant torticollis. Before surgical intervention, some surgeons will prefer to utilize Botox injections to increase in ROM injection by allowing the muscles to relax [31], [33]-[35] The type of surgery used depends on the surgeon's inclination and the severity of the torticollis. It involves Z-lengthening, unipolar or bipolar lengthening, and endoscopic resection [31]. It has been advised to use a cervical collar, brace, bandage, or strapping to support the head and neck in the correct position after surgery, along with a prolonged series of active or passive cervical stretches. According to the research and the authors' own experience, carefully controlling the placement of the neck in the over-corrected position after surgery can enhance long-term outcomes and reduce recurrences.

Although various orthoses have been used for congenital muscular torticollis, it is debated which orthosis is more suitable to be used depends on the degree of severity. Furthermore, it was not cleared which orthoses have more ability to do correction and have fewer complications. Therefore, the aim of this study was to evaluate the efficiency of various cervical orthoses in CMT.

There are varieties of cervical orthoses that are used in the management of congenital muscular torticollis. Some of these are discussed in table 1. The table 1 shows that only eight researchers examined the efficacy of cervical orthoses in the management of CMT. In extreme cases of CMT, stretching alone may not be sufficient; thus, an orthosis may be included to the therapy plan. A cranial-remolding orthosis may be used to treat plagiocephaly caused by congenital muscular torticollis. The orthotic design controls cervical flexion, lateral flexion, and rotation. Parents and physiotherapists can remove the helmet for therapy regimens. They can reapply the helmet as needed to achieve their daily goals [24] However, it also showed that there were some small problems with the helmet's molding, such as pressure ulcers, rashes, skin erosions, infections, as well as poor fitting [37].

Table 1. Evidence for cervical orthoses in CMT

AUTHOR	PARTICIPANTS/ CONDITION/ PLACE	AGE/	CERVICAL ORTHOSIS USED	OUTCOME
Van Vlimmeren et al. [24]	Bernhoven Hospital, Infants at age of 7 weeks		Cranial-remolding orthosis	Treat plagiocephaly caused by congenital muscular torticollis
Cottril-Mosterman [25]	British Columbia Children’s Hospital, CMT		TOT collar	Less lateral head tilt
Karmel-Ross [26]	Children older than 4 months with head tilt of 5 degrees		Comparison between TOT collar and Soft Foam collar	The TOT collar enhances the head's vertical alignment when managing CMT. TOT collar is more dynamic than the foam collar as it causes mild discomfort on lateral head tilting.
Emery [27]	Children older than 4.5 months with head tilt of greater than 6 degrees		TOT collar used for 4.7 months	Less lateral head tilt and increased ROM
Keerthiga and Panda [28]	Patient for 10 weeks Case study		Static Progressive Cervical Orthosis	The lateral flexion contracture was reduced from 25° to 8° and cervical rotation was decreased from 30° to 10°
Cheng, Ho and Leung [29]	Twenty-five patients aged 1 to 22 for an average duration of 10 weeks CMT		Multi-Adjustable Post-Operative Orthosis	Maintain head and neck position in post-operative patient. In 23 cases, the orthosis was found to be in compliance. There were only a few minor issues recorded.
Skaggs and Lerman et al. [30]	Children aged 6 months to 16 years		Non- invasive Halo	Useful for postoperative immobilization in an overcorrected position
Stark and Ziegler [31]	CMT & Plagiocephaly		Fillauer Orthosis	Torticollis Retaining the head in any triplanar posture in post-surgical settings and older children

The most common orthosis used for congenital muscular torticollis is the Tubular Orthosis for Torticollis (TOT) collar. There are two short struts that are placed on either side of the trapezius crest on the affected side that reduces the lateral tilt and rotated position of the head. The TOT collar should be used only during waking hours under strict supervision and should not be used during sleeping. It should not be used for children with CMT younger than four months of age. The TOT collar has many advantages such as inexpensive, light in weight and easy to fit. However, some parents may find difficulty in adjustment of TOT collar and setting the maximum amount of stretching [32].

The TOT orthosis successfully decreased lateral head tilt in babies at the British Columbia Children's Hospital, according to the findings of the Cottril-Mosterman trial [25] Emery conducted another research that backed the TOT collar. Emery stated that 99 out of the total 100 children’s experienced complete recovery while wearing a TOT collar. They didn't require any more care once they had achieved full passive range of motion with the TOT collar and kept up the manual stretching and positioning routine [27] However, According to Karmel-Ross, TOT

collars are also efficient in enhancing the infant's capacity to maintain his or her head in the midline and are well-tolerated by both parents and newborns. She further said that that the TOT collar is more dynamic than the foam collar since it hurts a little when your head tilts to the side [26]

Keerthiga and Panda claim that because a static progressive cervical orthosis covers a smaller surface area than a TOT collar, it is more successful at progressively expanding the patient's range of motion in the transverse and frontal planes. However, it is heavier and less aesthetically appealing [28] The majority of the investigations, as can be seen from the studies listed above, focused on the use of the TOT orthosis for progressive CMT correction.

Orthotists utilize a multi-adjustable post-operative orthosis rather than a Lerman Non-Invasive Halo or a Fillauer torticollis orthosis in older adults or postsurgical settings because it is adjustable in numerous planes and causes only minimal skin irritation. According to Cheng, Ho, and Leung, the use of a multi-adjustable post-operative orthosis can assist maintain the head and neck in the ideal posture after surgery. According to Stark and

Ziegler, congenital muscular torticollis can also be treated using the custom molded Fillauer torticollis orthosis. It has the advantage of keeping the head in any triplanar position, which is advantageous in post-surgical situations and with older children. However, it is more costly, requires a head impression, and covers a bigger surface area than a TOT collar [31] According to Skaggs and Lerman, many medical professionals decide to immobilize the head in an overcorrected position following surgery by using the non-invasive halo orthosis. However, Grippi et al. recorded two instances of young children who developed skin breakdown and facial edoema after utilizing an older non-invasive halo device. A more modern Halo orthosis with skin-adhering, permeable pads has eliminated the issue [37]

The use of the cervical orthoses in congenital muscle torticollis is a good and successful alternative to surgery, according to the research mentioned above. The TOT orthosis appears to be more effective than other existing orthoses. It can be concluded that the TOT orthosis is a good alternative to surgery for gradual correction in infants with CMT as it is inexpensive, light in weight and easy to fit.

However, the research did contain few limitations. The first limitation was the small number of earlier research studies available to examine the efficacy of cervical orthosis in CMT. Most studies done on the efficiency of cervical orthoses in congenital muscular torticollis were based on TOT orthoses. There is a lack of research evaluating the effectiveness of cervical orthoses other than TOT collars. Insufficient sample size for statistical measurements is another limitation of this research. While mostly research is based on infants and few data is available on older adults. Despite the small sample size, it is uncommon for untreated congenital muscle torticollis to become apparent in adults.

#### CONCLUSION AND RECOMMENDATION

The results of this review study showed that that the most preferred orthosis for congenital muscular torticollis is the TOT collar (Tubular Orthosis for Torticollis), which is inexpensive, lightweight, and easy to use. There is a lack of research evaluating the effectiveness of cervical orthoses other than TOT collar. Future studies should be necessary to assess the effectiveness of alternative cervical orthoses in the treatment of CMT, and they should involve a large sample size.

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