IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 11 Ser.2 (November. 2020), PP 21-26
www.iosrjournals.org

Dynamic Torticollis Orthosis – A new design concept of Cervical Orthosis for children with Torticollis

Bhuyar L.R[1], Nirmal Prasad[2]
[1&2](Dept. of Prosthetics and Orthotics, AIIPMR, India)

Abstract:
Background:*Torticollis or Wry neck is a rare condition in which neck muscles contract, causing the head to tilt to one side. This causes painfully twisted and tilted neck. The top of the head generally tilts to one side while the chin to the other side. Torticollis is a 3 dimensional deformity where cervical flexion occurs in the sagittal plane, lateral flexion in the frontal plane and rotation of head in the transverse plane. Although there are cervical orthosis available, studies on a Dynamic Cervical Orthosis that can correct the above mentioned deformities of torticollis is less.*
Materials and Methods: *The Dynamic Torticollis Orthosisis fabricated mainly using low temperature thermoplastic (LTTP). After heating the LTTP in a hot water bath, it can be directly molded onto the patient's neck. Another method is by taking a cast of the patient's neck. Using the cast, a POP mold is made and on that the required modifications are done. After modification, draping can be done on the mold.*
Results: *The Dynamic Torticollis Orthosis applies two corrective forces; one below the chin and the other on the lateral side of head, above and slightly posterior to the ear. These corrective forces helps to bring the head back to its neutral position. The magnitude of force being applied can be altered by adjusting the turnbuckles.*
Conclusion: *Since the corrective forces applied can be increased and decreased manually, slow and gradual correction can be done in case of children with stiff torticollis, as the corrective forces can be gradually increased on a weekly basis.*
Key Words: *Torticollis, Cervical Orthosis, Turnbuckle*

Date of Submission: 28-10-2020 Date of Acceptance: 08-11-2020

I. Introduction

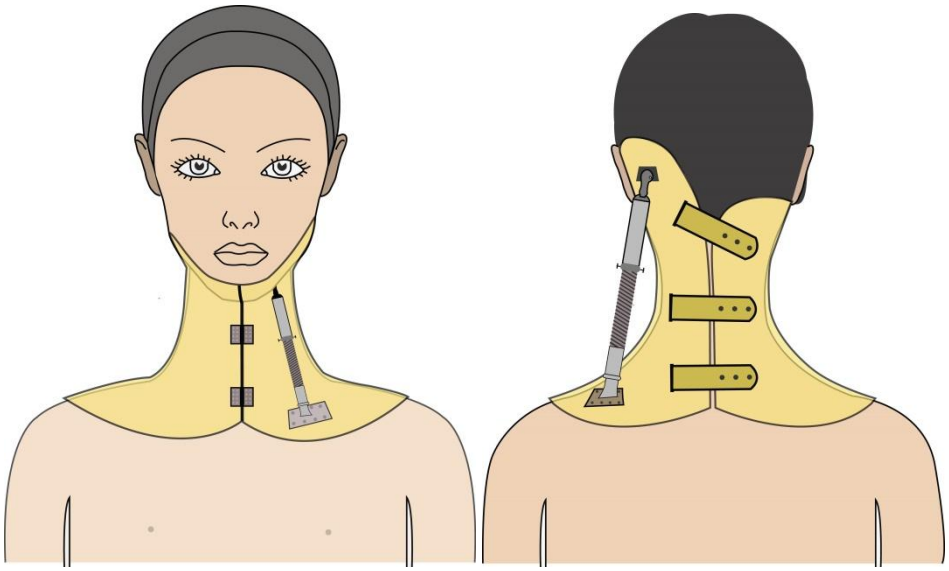
Torticollis or Wry neck is a rare condition in which neck muscles contract, causing the head to tilt to one side. This causes painfully twisted and tilted neck. The top of the head generally tilts to one side while the chin to the other side. Torticollis is a 3 dimensional deformity where cervical flexion occurs in the sagittal plane, lateral flexion in the frontal plane and rotation of head in the transverse plane. The DYNAMIC TORTICOLLIS ORTHOSIS design is a cervical orthosis, which helps to bring the head back to its neutral position by applying corrective forces which are applied with the help of its respective pressure pads. This design helps to change the magnitude of force being applied by turning the turnbuckles which are attached to the pressure pads.

II. Designs

There are two models which have been designed:
1. POSTERIOR OPENING DESIGN
2. SINGLE SHELL DESIGN

- The dynamic torticollis orthosis design uses two turnbuckle and pressure pads which apply corrective force. The magnitude corrective force applied can be manually increased or decreased by turning the turn buckle.
- The lower ends of the turnbuckles are attached to the plastic shell and the upper ends to the corrective pads. So, when the turnbuckles move upwards, the corrective pads will also move upwards to apply pressure.
- The first design I fabricated was the design with a posterior opening. It had hinges anteriorly to allow posterior opening. The drawback I faced in that design was it was a bit difficult to donn and lack of ventilation.
- To correct these drawbacks, a second design was fabricated. This design only has a single shell whichcontains both the corrective pads. The shell is placed on the affected side.

III. Posterior Opening Design



Anterior view **Lateral view**

- The posterior opening design was the primary design.
- It has two hinges places on the anterior side. These hinges help in posterior opening of this orthosis for donning and doffing.
- The corrective forces are applied by two pressure pads, one is places below the chin and the other is placed just above the occipital protuberance.
- The two pressure pads are attached to two turnbuckles. The turnbuckles help in increasing and decreasing the corrective force being applied manually.

Trimlines

- **Anterior Superior Margin:**

It covers the chin about 1 cm above.

- **Anterior Inferior Margin:**

Extends 2 to 3 cm below the sternal notch.

- **Lateral Superior Margin:**

Extends up to the inferior border of ear.

- **Lateral Inferior Margin:**

Extends about 1 cm proximal to the acromion process.

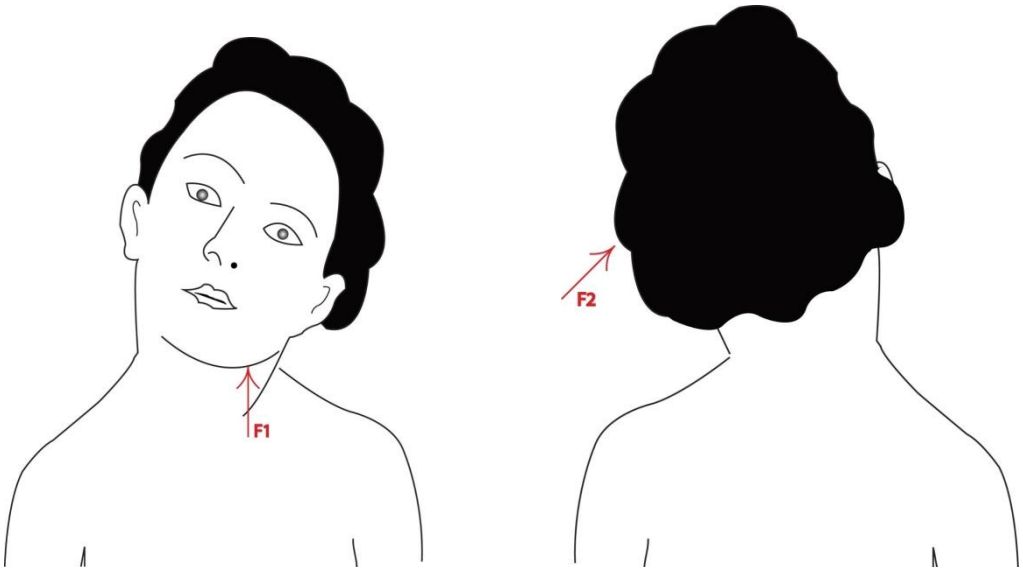
- **Posterior Superior Margin:**

The side containing the posterior pad extends high on the posterior side, above the occipital protuberance. The other side extends just below the occipital protuberance.

- **Posterior Inferior Margin:**

It follows the lateral inferior margin posteriorly.

Corrective Force System



F1: Superiorly directed force below the chin on the affected side. This force is applied by the anterior pressure pad. It raises the flexed head.
F2: Medial and superiorly directed force above the occipital protuberance which rotates the tilted head and brings it to neutral position.

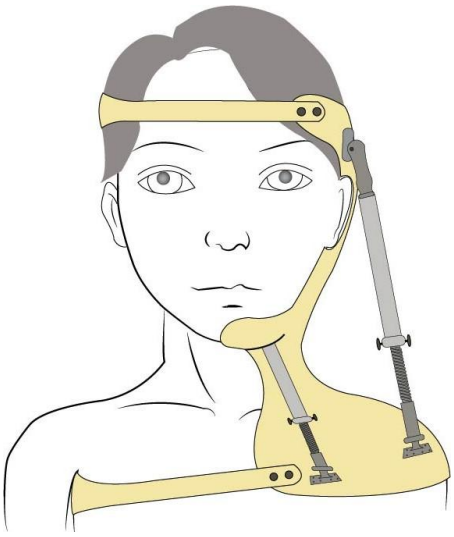
Issues Faced

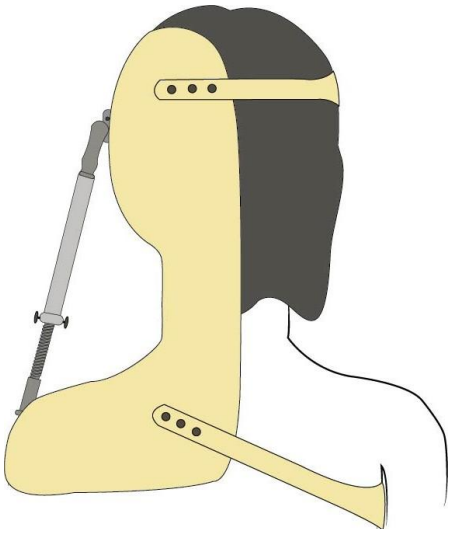
This is the design which was first fabricated. Trail on a patient was also done on his orthosis. While doing patient trail, a few issues were found.
The main issues of this design are:

- Even though this design allow posterior opening, donning this orthosis on to the patient was difficult.
- This design fully encircles the neck. Therefore, the ventilation provided is very less.

To correct these issues, a new design was fabricated. It is the Single Shell Design.

Ⅳ. Single Shell Design





Features
- It is custom made
- It is a dynamic orthosis
- It has only a single shell which is placed on the affected side.
- With the help of turnbuckles, the pressure pads will move and thereby increasing or decreasing the amount of pressure being applied.

Components
- Plastic shell
- Two turnbuckle
- Two pressure pads
- Two straps

Plastic Shell
- It is made up of LTTP.
- It only has a single shell which is placed on the affected side.

Turnbuckle
- It has two turnbuckles: anterior and lateral.
- Anterior turnbuckle is attached superiorly on the chin pad and inferiorly on the plastic shell at one third of clavicle.
- The lateral turnbuckle is attached superiorly on the lateral pad and inferiorly on the plastic shell just laterally to the acromion process.

Pressure Pads
- It is made up of LTTP.
- There are two pressure pads. One placed below the chin on the affected side and the other is placed laterally above the ear on the affected side.

- **Anterior Pressure Pad:**

It applies a superiorly directed force below the chin on the affected side. It raises the flexed head.

- **Lateral Pressure Pad**:

It applies a medially directed force above the ear on the affected side. It helps to bring the tilted head to normal position.

Trimlines
- **Anterior Superior Margin:**

It covers the half part of chin.
Then the trimline moves inferiorly through the midline of the body.

- **Anterior Inferior Margin:**

Extends about 5 cm below the sternal notch.

- **Lateral Superior Margin:**

The lateral border contours the border of ear and moves superiorly and anteriorly.

- **Lateral Inferior Margin:**

Extends about 2 to 3 cm distal to the acromion process.

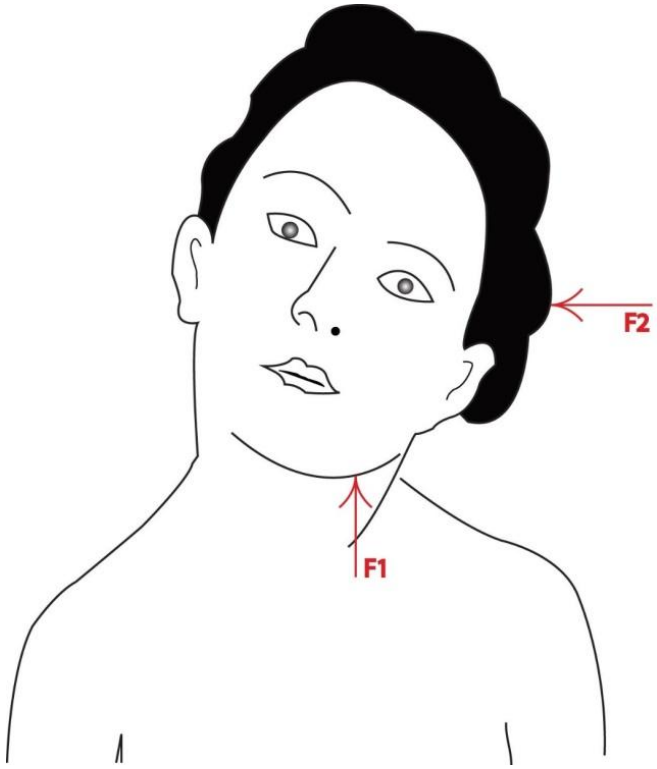
- **Posterior Superior Margin:**

It follows the lateral superior margin posteriorly.
Then the trimline comes down inferiorly through the midline of the body.

- **Posterior Inferior Margin:**

It follows the lateral inferior margin posteriorly till the midline of the body, from there it moves superiorly.

Corrective Force System



F1: Superiorly directed force below the chin on the affected side. This force is applied by the anterior pressure pad. It raises the flexed head.
F2: Medially directed force above the ear on the affected side. This force is applied by the lateral pressure pad. It helps to bring the tilted head to normal position.

IV. Fabrication Methods

The orthosis can be fabricated in two methods:

1. By molding directly over the patient's body.

The material used for fabrication of orthosis is LTTP. LTTP is strong and flexible at room temperature. It has a low melting point. So, it can be made soft using a hot water bath. Because of this property, it can be directly molded on the patient's body.
Before draping is done, the patient's head have to be brought to normal position with the help of another individual or by using Dacron straps made specifically for this purpose.

2. By draping over a POP model.

Another is method is by taking a cast covering the patient's head, neck and upper thorax.
Flap casting method is used for casting. While casting, the patient's head has to be kept in neutral position. Then the cast is modified properly by providing proper correction.
After the final model is obtained, draping is done on that model.

V. Advantage of Dynamic Torticollis Orthosis over traditional orthosis

- The dynamic orthosis allows to gradually increasing the corrective force applied by manually operating the turnbuckles.
- Dynamic orthosis is a single shell orthosis. So, it is much easier to donn and doff.
- Since it is a single shell orthosis, it increases ventilation and reduces perspiration.
- In case of children with stiff torticollis, dynamic orthosis can be molded in a semi-corrected position and the corrective force can be gradually increased using the turnbuckles. Thus, the child will be more comfortable.

References

[1]. AAOS, Atlas of Orthoses and Assistive Technology.
[2]. Stedman, Thomas Lathrop. Torticollis: Stedman's Medical Dictionary, 23 edn. 1976
[3]. H.C. Col, Mathur. Role of cephalo cervico thoracic dynamic splint in management of congenital torticollis. *Orthotics and Prosthetics.* 1985; 38(4), 54-57.
[4]. M. Jahanshahi, C.D. Marsden. Treatment of torticollis. *Journal of Neurology, Neurosurgery, Psychiatry.* 1989; 52(10), 1212-1220.
[5]. C.Y. Cheng, K.W. Ho, K.K Leung. Multi-adjustable post-operative orthosis for congenital muscular torticollis. *Prosthetics and Orthotics International,* 1993, 17, 115-119.
[6]. Manoj Shetty, Chethan Hegde, Jogeshwar Burman, Krishna D. Prasad, Piyush Tandan. Muscular torticollis- functional and esthetic rehabilitation with an indigenously designed neck stabilizing appliance. *The Journal of Indian Prosthodontic Society, March 2008, Vol. 8, Issue 1*.
[7]. Smita Nayak, Rajesh Kumar Das. Efficiency of dynamic brace on idiopathic spasmodic torticollis: A case study. *Indian Journal of Medicine and Health*care, 2014, Vol. 3(2), 337-340.
[8]. K. F. Hulbert, F.R.C.S. Torticollis. *Postgrad. Med. J.* (1965), 41, 699.
[9]. Antonios G Angoules, Eleni C Boutsikari, Eleni P Latanioti. Congenital Muscular Torticollis: An Overview. *J Gen Pract* 2013, 1:1.
[10]. Dres. Manuela Perez, Ximena Ortega F, Susana Lillo, Karia Moenne B, Juan Antonio Escaffi J, Carolina Perez S. Torticollis in children: A poctigraphic review.*Revista Chilena de Radiologia, 2013, Vol.* 19, 125-133.

Bhuyar L.R, et. al. "Dynamic Torticollis Orthosis – A new design concept of Cervical Orthosis for children with Torticollis." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(11), 2020, pp. 21-26.