Cervicothoracic Orthoses

Cervicothoracic orthoses (CTOs) provide greater motion restriction in the middle to lower cervical spine from the added pressure on the body. The upper cervical spine has less motion restriction. CTOs are used in minimally unstable fractures.

Sternal-occipital-mandibular immobilizer

The sternal-occipital-mandibular immobilizer (SOMI), shown below, is a rigid, 3-poster CTO that has an anterior chest plate extending to the xiphoid process, as well as metal or plastic bars that curve over the shoulder. Straps from the metal bars go over the shoulder and cross to the opposite side of the anterior plate for fixation. A removable chin piece attaches to the chest plate with an optional headpiece that can be used when the chin piece is removed for eating. The 2-poster CTOs start from the chest plate and attach to the occipital component. The SOMI is ideal for bedridden patients because it has no posterior rods.

Sternal-occipital-mandibular immobilizer (SOMI) brace.

The SOMI is relatively comfortable to wear. Proper adjustment is crucial for motion restriction,

which may be minimal if the orthosis is incorrectly applied. The SOMI controls extension less effectively than the other braces do, but it very effectively controls flexion at the atlantoaxial and C2-C3 segments. The SOMI controls flexion in the C1-C3 segments better than does the cervicothoracic brace. The average cost of a SOMI is $480.

Indications for immobilization with the SOMI include the following:

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Atlantoaxial instability caused by rheumatoid arthritis (Note that ligamentous disruption in rheumatoid arthritis affects flexion more than extension, because extension is held in check by the intact dens.)

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Neural arch fractures of C2, because flexion causes instability

Motion restrictions associated with the SOMI include the following:

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Cervical flexion and extension are limited by 70%-75%

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Lateral bending is limited by 35%

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Rotation is limited by 60-65%

Yale brace

The Yale orthosis is a modified Philadelphia collar. It has fiberglass thoracic extensions that extend anteriorly and posteriorly, with midthoracic straps on the sides connecting them. The thoracic component helps to treat C6-T2 injuries. The occipital piece extends higher up on the skull posteriorly. An increased contact surface area improves the stability of the brace. Patients find the Yale orthosis comfortable to wear. The brace is easy to fabricate and costs approximately $320.

Indications for immobilization with the Yale orthosis include the following:

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C1 fractures with an intact transverse ligament

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Surgical fixation of dens type III fractures - Postoperative

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Dens type I fractures

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Hangman fractures (traumatic spondylolisthesis of C2)

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Jefferson fractures (multiple fractures of the C1 ring with spreading caused by axial loading)

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Immobilization to postoperative fixation

Motion restrictions associated with the Yale orthosis include the following:

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Flexion and extension are limited by 85%

-

Rotation is limited by 70-75%

-

Lateral bending is limited by 60%

4-poster brace

The 4-poster brace is a rigid orthosis with anterior and posterior chest pads connected by a leather strap. Molded occipital and mandibular support pieces, attached to each other with straps, connect to the chest pads and have adjustable struts. The mandibular plate can interfere with eating. This brace uses shoulder straps, but it has no underarm support. The open design allows heat loss from the neck. The brace is as effective as the cervicothoracic brace (and better than the Philadelphia collar) in controlling flexion in the midcervical area. The 4-poster design limits lateral bending and rotation better than does the 2-poster brace. The 4-poster brace costs approximately $515.

Motion restrictions associated with the 4-poster orthosis include the following:

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Flexion and extension are limited by 80%.

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Lateral bending is limited by 55%-80%.

-

Rotation is limited by 70%.

Guilford brace

The Guilford brace is a rigid CTO with a 2-poster design. It features anterior and posterior chest plates that are connected by shoulder straps, along with a chin plate and an occipital piece that connect to anterior and posterior struts. Underarm straps circle the lower chest wall for stability. The brace has poor control of flexion, extension, rotation, and lateral bending at C1-C2. The Guilford brace costs approximately $610.

Motion restrictions afforded by the Guilford brace include the limitation of flexion and extension from C3-T2.

Indications for the use of a Guilford brace include the following:

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Minimally unstable fractures from C3-T2

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Internal fixation from C3-T2 - Postoperative

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