



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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# Evaluation of Outcome of Different Neurosurgical Modalities in Management of Cervical Dystonia

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا

مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ

الْحَكِيمُ﴾

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# List of Abbreviations

Abbreviation	Full Term
<b>AARS</b>	Atlanto-Axial Rotatory Subluxation
<b>Ach</b>	Acetylcholine
<b>ACOM</b>	Anterior communicating artery aneurysm
<b>AD</b>	Autosomal dominant
<b>AR</b>	Autosomal recessive
<b>AVM</b>	Arteriovenous malformation
<b>BGTC</b>	Basal ganglia thalamocortical
<b>BTX</b>	Botulinum toxin
<b>CD</b>	Cervical dystonia
<b>DA</b>	Dopamine
<b>DRD</b>	Dopa responsive dystonia
<b>EEG</b>	Electroencephalography
<b>EMG</b>	Electromyography
<b>fMRI</b>	Functional MRI
<b>GABA</b>	Gamma aminobutyric acid
<b>GPe</b>	Globus pallidus externa
<b>GPI</b>	Globus pallidus interna
<b>HIV</b>	Human immunodeficiency virus
<b>L-dopa</b>	L-dihydroxyphenylalanine
<b>LTD</b>	Long term depression

<b>LTP</b>	Long term potentiation
<b>PET</b>	Positron emission tomography
<b>PPN</b>	Pedunculopontine tegmental nucleus
<b>RDP</b>	Rapid-onset dystonia–parkinsonism
<b>SNc</b>	Substantia nigra compacta
<b>SNr</b>	Substantia nigra reticularis
<b>STN</b>	Subthalamic nucleus
<b>TMS</b>	Transcranial magnetic stimulation
<b>TWSTRS</b>	Toronto Western Spasmodic Torticollis Rating Scale
<b>VA/VL</b>	Ventral anterior and ventral lateral nuclei of the thalamus

# Introduction

Focal dystonia affects a single body part, where dystonia involving the neck muscles is called “cervical dystonia” (1).

The older term used for this condition is “torticollis” or “spasmodic torticollis. These terms can be misleading, because “torticollis” implies an impairment that is purely rotatory, whereas patients often have combined postures associated with flexion, extension, or side bending. Additionally, the term “spasmodic” is applied to describe movements that are intermittent or clonic and tremulous (2).

Cervical dystonia (CD) is the most common type of the focal, idiopathic, adult-onset dystonia encountered in a movement disorder clinic (3, 4). In cervical dystonia, painful sustained or intermittent tonic contractions of the sternocleidomastoid, trapezius, and deeper neck muscles occur, often unilaterally, and cause abnormal head positions. The involved neck muscles are often hypertrophied. Sternocleidomastoid muscle contraction causes rotation of the head and lifting of the chin to the contralateral side and lateral bending (tilt) to the ipsilateral side. Rotation may involve any plane but almost always has a horizontal component (1).

CD is often associated with significant disability and pain which affects patient’s quality of life (5, 6).

Therapy for CD is mainly symptomatic (7). It includes supportive therapy and counseling, physical therapy, pharmacotherapy, chemo-denervation (botulinum toxin, phenol, alcohol), and central and peripheral surgical therapy. Although the most widely used and accepted therapy for CD is local intramuscular botulinum toxin injection, up to one-third experience an inadequate response to this treatment (8, 9). Pharmacotherapy, including anticholinergics,

dopaminergic drugs, and muscle relaxants can be used alone or in combination with other therapeutic interventions (10).

Surgery is usually indicated for patients with CD in whom there is failure of maximal medical management either due to poor response or occurrence of intolerable side effects, significant disability that significantly impact quality of life, patient should have no cognitive or psychiatric impairment and should be able to fully cooperate with the procedure and long-term follow-up and has no medical contraindications to surgery (1, 11-13).

# **Aim of the Work**

Assessment of patients with cervical dystonia after different neurosurgical procedure used for management using reliable outcome measurement scores (Toronto Western Spasmodic Torticollis Rating Scale and Tsui score) and possible complications after different neurosurgical procedure used for management (Selective peripheral denervation techniques, pallidotomy, or bilateral globus pallidus internus deep brain stimulation).