

Recent Treatment of Motor Speech Disorders

Essay

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By

Rabab Ragab Abd El-Hakeem

(M.B.B.CH)

Resident of Phoniatics
Manshyet El- Bakery Hospital

Supervised by

Prof. Dr. Samia El-Sayed Bassiouny

Professor & Head of department
of Phoniatics
Faculty of Medicine -Ain Shams University

Dr. Ahmed Nabil Khattab

Lecturer of Phoniatics
Faculty of Medicine -Ain Shams University

**Faculty of Medicine
Ain Shams University
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا
إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

صدق الله

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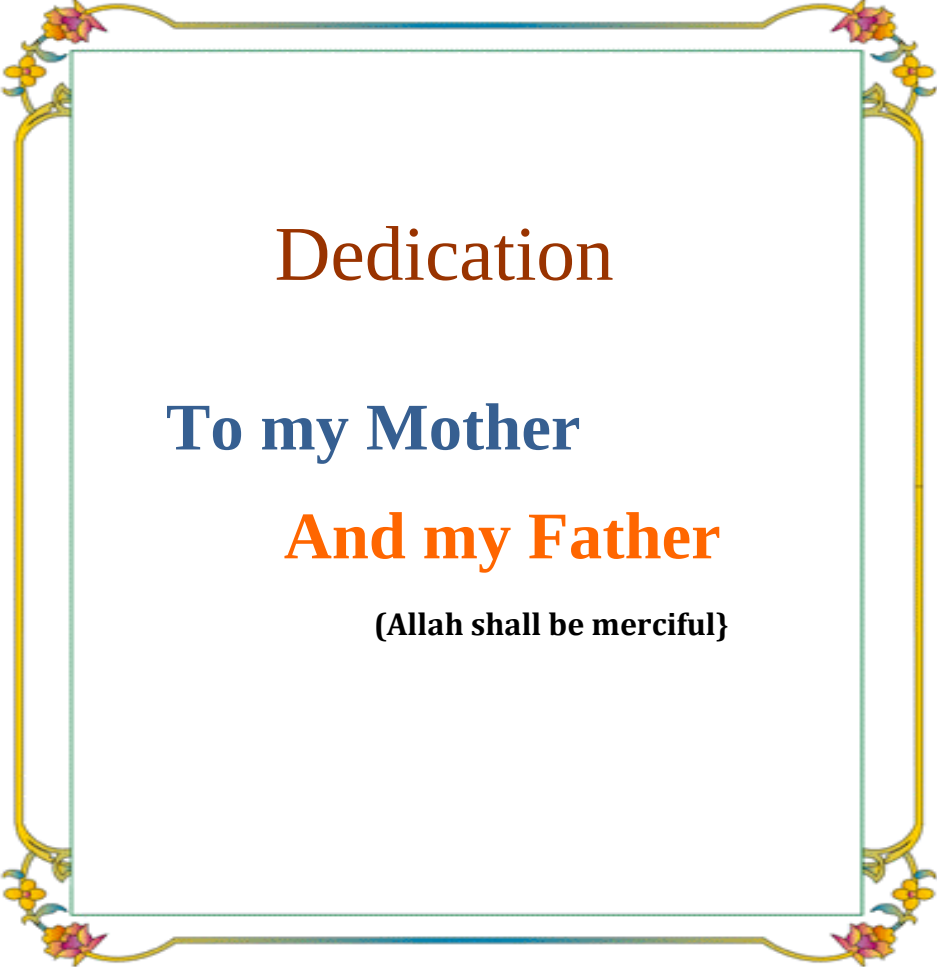
*Before all, Thanks to Allah, The Most Kind
and The Most Merciful.*

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 **Rabab Ragab**



Dedication

To my Mother

And my Father

{Allah shall be merciful}

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List of Abbreviations

Abb.	Mean
α-MN	Alpha motor neurons
β-MNs	Beta motor neurons
γ-MNs	Gamma motor neurons
AAC	Alternative and augmentative communication
AAF	Altered auditory feedback
AAS	Acquired apraxia of speech
ABA-2	Apraxia battery for adults second edition
ADHD	Attention deficit hyperactivity disorders
ALS	Amyotrophic lateral sclerosis
AM	Accent method
ANCDS	Academy of neurologic communication disorders and sciences
AOS	Apraxia of speech
ASHA	American Speech- Language Hearing Association
BDMH	Brain damage motor handicap
CAS	Childhood apraxia of speech
CBT	Cognitive behavioral therapy
CLASP	Cluttering assessment program
CNS	Central nervous system
CSL	Computerized speech lab
CVA	Cerebro-vascular accident
DAF	Delayed auditory feedback
EMA	Electromagnetic articulography
EMG	Electromyogram
EPG	Electropalatography
FAF	Frequency auditory feedback

Abb.	Mean
GABA	Gamma butyric acid
H/N	Harmonic to noise ratio
LMN	Lower motor neurons
LMNL	Lower motor neuron lesions
MAF	Masking auditory feedback
MAMS	Movements, articulation, mandibular and sensory awareness
MFR	Mean flow rate
MIOVAS	Motivation, identification, desensitization, variation, approximation and stabilization
MIPT	Multiple input phoneme therapy
MMS	Memphis speech solutions
MPT	Maximum phonation time
MS	Multiple sclerosis
MSAP	Madison speech assessment protocol
NIDCD	National institute on deafness and other communication disorders
NM	Negative myoclonus
OA	Oral apraxia
OMAS	Oral motor assessment scale
PCI	Predictive cluttering inventory
PNS	Peripheral nervous system
PROMPT	Prompts for restructuring oral muscular phonetic
PSI	Perceptions of stuttering inventory
PWS	Persons who stutter
RB	Regulated breathing
SFA	Stuttering foundation of America
SPT	Sound production treatment
SSI	Stuttering severity instrument

Abb.	Mean
SSRI	Selective serotonin reuptake inhibitors
STCDA	Screening test for developmental apraxia
STDAS	Screening test for developmental apraxia of speech
TBI	Traumatic brain injury
UMN	Upper motor neuron
VC	Vital capacity
VOT	Voice onset time
WASSP	Wright and ayre stuttering self rating profile
WHO	World Health Organization

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Introduction

Speech is the final expression of concepts and emotions translated through linguistic pathways that involve lexical, syntactic, phonological, phonetic and prosody stages (*Levelt, 1989*).

Speech production is a complex motor act, involving rapid sequential motor movements that often extend over many seconds before a pause (*Guenther et al., 2006; Golfinopoulos et al., 2010*).

Speech production requires integration of diverse information sources in order to generate the intricate pattern of muscle activations required for fluency (*Guenther et al., 2006*).

Speech as a mean of communication requires the smooth sequencing and co-ordination of three basic processes:

1. The organization of concepts and their symbolic formulation and expression
2. The externalization of thought in speech through the concurrent motor functions of respiration, phonation, resonance, articulation and prosody.
3. The programming of these motor skills in the volitional production of individual speech sounds and their combination into sequences to form words.

Impairment of any of these three processes results in a distinctive communication disorder (*Darley et al., 1975*).

Language is a human system of communication that uses arbitrary signals, such as voice, sounds, gestures, or written symbols. The study of language is called linguistics. A language is a system of arbitrary vocal symbols by means of which a social group cooperates (*George, 2010*).

Language is a purely human method of communicating ideas, emotions and desires by means of voluntarily produced symbols (*Pushpinder & Jindal, 2008*).

Difference between speech and language:

Speech is the production of sounds that make up words and sentences. It involves the coordination of the jaw, lips, tongue, vocal cords, vocal tract and respiration. There are three divisions to speech: articulation, voice and fluency. While, language refers to how we use words and sentences to communicate ideas. Speaking, gesture use, writing, understanding verbal conversation and understanding written words are all language related (*Vicki, 2011*).

Motor speech disorders include: Dysarthria, apraxia or dyspraxia of speech, developmental dyspraxia, developmental stuttering, Stuttering and cluttering (*Duffy, 1995*).

Dysarthria ('dys' meaning abnormal or difficult; 'arthr' meaning articulating) is a motor speech disorder resulting from neurological injury of the motor component of the motor-speech system (*Duffy, 2005*).

Dysarthria is a condition in which problems occur with the muscles of speech, making it very difficult to pronounce words. Any of the speech subsystems (respiration, phonation, resonance, prosody, and articulation) can be affected, leading to impairments in intelligibility, audibility, naturalness, and efficiency of vocal communication (*MacKenzie, 2011*).

Dysarthria that has progressed to or presents as a total loss of speech may be referred to as anarthria. Neurological injury due to damage in the central or peripheral nervous system may result in weakness, paralysis, or a lack of coordination of the motor-speech system, producing dysarthria (*O'sullivan et al., 2007*).

Classification of dysarthria:

Classification varies and may be classified according to:

1. **According to age of onset:** (Congenital, Acquired).
2. **According to etiology:** (Traumatic, Inflammatory, Vascular, Neoplastic).
3. **According to cranial nerve involvement:** (5th, 7th, 9th, 10th, 12th cranial nerves).

4. According to impaired neuroanatomical area:
(Cerebral, Brain stem, Cerebellar).

5. According to involved speech process: (Respiration, Phonation, Articulation, Resonation, Prosody).

6. According to site of lesion:

- **Bulbar (flaccid) dysarthria:** caused by damage to the nerves or their nuclei.
- **Suprabulbar (spastic) dysarthria:** results from the spasticity of the peripheral speech musculature because of bilateral upper motor neuron lesion.
- **Ataxic (cerebellar) dysarthria:** due to muscular incoordination from a lesion in the cerebellum.
- **Hypokinetic (Parkinson's disease) dysarthria:** results from the rigidity of the peripheral speech musculature as a result of breakdown in the basal ganglion.
- **Dyskinetic (hyperkinetic) dysarthria:** It may be due to chorea, dystonia or myoclonus.
- **Mixed dysarthria:** results from a mixture of different types of dysarthria, as in multiple sclerosis.

(Yorkston & Beukelman, 1990)

Causes of dysarthria:

Dysarthria may be the result of a brain damage due to:

- Brain tumor.
- Dementia.
- Stroke.
- Traumatic brain injury.

Dysarthria may result from damage to the nerves that supply the muscles of articulation, or to the muscles themselves from:

- Face or neck trauma.
- Surgery for head and neck cancer.

Dysarthria may be caused by diseases that affect nerves and muscles (neuromuscular diseases):

- Cerebral palsy.
- Multiple sclerosis.
- Muscular dystrophy.
- Myasthenia gravis.
- Parkinson's disease.

(Swanberg et al., 2007)