Role Of Vitalstim® In The Management Of Patients With Dysphagia: A Mini-Review

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Abstract

Dysphagia defined as difficulty in swallowing, can result from multiple causes including, Stroke, head injury, Alzheimer, Dementia, Muscular dystrophy, Cerebral Palsy etc. It is associated with neuro-muscular impairments in different age groups. VitalStim® therapy is a relatively new approach to treat dysphagia. It provides neuromuscular electrical stimulation (NMES) of the involved muscles to improve the function of swallowing. This review summarizes the usefulness of VitalStim® in dysphagia, and barriers in its use in Pakistan.

Keywords: VitalStim®, dysphagia, neuromuscular stimulation, swallowing, recent updates

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Introduction

Dysphagia is a swallowing disorder involving difficulty in the movement of bolus from the oral cavity to the stomach. This can occur in any area or junctions including the oral cavity, the pharyngeal cavity, the esophagus and the gastro-esophageal section. It can result from various neurological conditions such as stroke, Parkinson's disease, brain injury, Myopathies, Rheumatologic, Iatrogenic and neuro-developmental disorders etc. Dysphagia impairs the nutritional requirement of the body and may lead to dehydration, malnourishment, aspiration pneumonia; chronic lung disease or even death.[1] Dysphagia is associated with severity of existing motor impairment in adults and children. It is estimated that one in 25 adults experience swallowing disorders every year[2]. Data from the US suggests that majority of the children with cerebral palsy and developmental disabilities have dysphagia[3]. Therefore, it is important to screen patients with neurological disorders for dysphagia.

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Treatment Option for Dysphagia

Dysphagia can be managed by two approaches. First is restorative which aims at restoring the normal function of swallowing and the second is the development of compensatory strategies for swallowing, with goals to prevent choking, aspiration, or pneumonia and to achieve functional swallowing. Traditional treatments for dysphagia include use of medicines, thermal stimulation, oral motor exercises, compensatory swallowing maneuvers, dietary modifications and behavioural training of the patient. These techniques aim to improve sensory feedback from the oropharynx to the brain, and strengthen the oro-pharyngeal musculature in order to prevent dysphagia [4]

In recent years, some noninvasive treatment options have been used for dysphagia. These include "repetitive Trans-cranial Magnetic Stimulation (rTMS), Trans-cranial Direct Current Stimulation (tDCS), Pharyngeal Electrical Stimulation (PES) and surface Neuro-Muscular Electrical Stimulation (sNMES)". rTMS uses magnetic field to stimulate nerve cells by placing electro-magnetic coil on the head to stimulate specific areas of the brain. This may be useful in treating post stroke dysphagia[5]. tDCS; uses low intensity electrical current to stimulate the specific areas of the brain through two electrodes placed on the head. It has shown to be effective in post stroke dysphagia[6].

PES stimulates the pharynx by catheters placed on specific location. It is safe and shown promising results[7]. NMES is being used in treatments for strengthening the affected muscles and recovering their sensory motor functions. It works by stimulating the muscles to contract and activating the sensory pathway by providing electrical stimulations through electrodes.

VitalStim® Therapy

VitalStim® helps in the management of dysphagia by NMES of cervical muscles. It was approved by Food and Drug Administration of United States in 2001 and the study had claimed a success rate of 97.5%[8].

The VitalStim® Plus Electrotherapy System is a 2 or 4 Channel electrotherapy system used in treating patients with oral-pharyngeal dysfunctions (dysphagia) and

disorders of the head and neck. The session begins the SLP cleansing the skin with a special alcohol swab. Sometimes, moist heat and massage may be used to improve the effects of the treatment.

The SLP attaches the electrodes to the targetted muscles of the neck. Six groups of muscles are targeted; in the first group, the facial muscles (Orbicularis Oris, Buccinators and Superior Pharyngeal) are targeted- forming an oral sling. These patients have problems in the oral transit, as a delayed swallowing reflex, vallecular residual or any issues of tongue. The 2nd group targets both intrinsic and extrinsic muscles of the tongue, and superior pharyngeal constrictor. Electrodes are placed at the position which targets these muscles. The third group of muscles are related to the velo-pharyngeal seal and to overcome the deficits in these cases, electrodes are placed bilaterally. These muscles play a crucial role in laryngeal elevation and protection during the swallowing mechanism. The fourth group of muscles targets the Laryngeal extrinsic and the Suprahyoid muscles, which are involved in hyolaryngeal excursion .The fifth, group of muscles are the Pharyngeal constrictors and the sixth group of muscles form the upper esophageal sphincter seal. Once turned on, the VitalStim® device provides stimulation to these muscles. At this time, the therapist will coach the patient through active swallowing exercises that include: "Swallow hard" "swallow fast" and "swallow in a single contraction". These swallows will include food and liquids that are deemed appropriate by a SLP.

Precautions

The VitalStim® Therapy System should not be used directly over an active neoplasm or area of infection. It should be used with caution in patients with seizure disorders and those with implanted electronics (e.g., pacemakers, implantable defibrillators, deep brain stimulators). Some patients may not respond well to VitalStim®. This may include patients with significant lower motor neuron damage or those with severely impaired cognition. Only a certified and trained SLP having adequate expertise can apply and provide this therapeutic intervention.

Role of VitalStim® in the Rehabilitation of Dysphagia Patients

Research indicates that NMES is superior to traditional dysphagia therapy alone among individuals in a long-term acute care facility[9]. It offers a new possibility for the management of tube-fed patients who are refractory to traditional therapy[10]. A RCT done in 2015 demonstrated that patients with oro-pharyngeal dysphagia due to acquired brain injury had a significant increase in the pharyngeal contractions at the end of one month of treatment with NMES[11].

In a 6-week single-blind, RCT of post stroke patients with dysphagia showed a significant increase in anterior and superior hyoid bone movement and the pharyngeal phase of the swallowing function.[12]

Four types of noninvasive neuro-stimulation therapies - rTMS, tDCS, NMES, and PES or the management of acute and subacute post stroke dysphagia were compared in a meta-analysis of nineteen RCTs. The results suggested that NMES was the most effective treating for post-stroke dysphagia.[13]

A systematic review of 11 RCTs on the efficacy of NMES on swallowing function of post stroke patients with dysphagia, concluded that NMES with traditional swallowing therapy could be an elective therapy in improving swallowing functions after stroke [4].

Another systematic review and meta-analysis of 27 published and unpublished RCTs with 914 stroke patients "showed that compared with the control group, noninvasive neurostimulation therapies, rTMS, tDCS, NMES or PES had a better effect".[14]

Yuan et al reported the first case of dysphagia rehabilitation in which electromagnetic interference risk was handled using mode change of pacemaker with magnet. A 72-year-old male with swallowing disorder due to pure motor lacunar syndrome, had a cardiac pacemaker. NMES was used and Levin tube was removed four months after the initial symptoms Dysphagia had not been noted during two-year follow-up period.[15]

The use of VitalStim® therapy in Pakistan

Very few hospitals in Pakistan are providing VitalStim® dysphagia therapy According to the Department of Speech and Language Therapy Ziauddin Hospital Karachi, only four SLP were certified for VitalStim® as of April 2017.

In Pakistan, experts report that the perceived benefits are thought to be less than its disadvantages. Majority also indicates ambiguity on the impact and outcome of the therapy and whether there is significant evidence in favour of it. Thus the barriers to the adoption of this technique are related to beliefs about the efficacy of treatment, lack of availability of trained professionals as well as of resources; both professional and personal. These misconceptions have clinical implications and highlight the decision-making process in relation to evidence-based practice in the provision of this treatment.

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