Case Report

The Effect of a Novel Eclectic Dysphagia Intervention for Head and Neck Cancer Survivors

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Abstract

Introduction: The purpose was to report the effect of a novel eclectic dysphagia intervention for head and neck cancer (HNC) survivors suffering with late effects of radiation. Two HNC patients completed the eclectic dysphagia protocol.

Method: The protocol incorporated the McNeill Dysphagia Therapy Program (MDTP), visual and tactile biofeedback, muscle strengthening, and muscle stretching.

Results: At time of data collection, both patients sustained adequate hydration and nutrition orally.

Discussion: An eclectic dysphagia protocol was successful in promoting improved swallow function, muscle strength, range of motion, and oral-pharyngeal sensation. Quality of life was positively impacted.

ABBREVIATIONS


INTRODUCTION

Head and neck cancer (HNC) surgeries (and therapies) have improved in recent years; however, the associated oral-pharyngeal anatomical and physiological deviations continue to adversely affect the biomechanics of the swallowing mechanism. HNC surgery is often combined with chemotheraphy or radiation therapy, or surgery with both chemotheraphy and radiation therapy. It is estimated that more than 60% of HNC patients are likely to have some degree of dysphagia following treatment [1, 2].

CASE PRESENTATIONS

Case 1

A 55-year-old female was diagnosed and surgically treated for right lateral base of tongue squamous cell carcinoma in 10/2010. She underwent right neck dissection of levels 1-4. Subsequent to surgery, she underwent 66 GY radiation therapy sessions to the right tongue and upper neck. During this period, she was placed with a percutaneous endoscopic gastrostomy tube (PEG) secondary to severe pain, trismus, sores in the oral cavity, and an inability to maintain adequate oral nutrition and hydration. No dysphagia therapy was recommended or received. In 2015, a secondary surgical procedure was performed which included hemi-glossectomy, radical tonsillectomy, partial oropharyngectomy, hyoid resection, and radial forearm free flap reconstruction (at a medical university).

Subsequent to second surgery, patient was referred for home health therapy without an instrumental examination. Upon further review, it was found that previous home health speech therapy focused on dysarthria rather than swallow function. Dysarthria therapy was discontinued after four weeks. Patient returned to the medical university where a fiberoptic endoscopic swallow study (FEES) was completed in 2/16.

The FEES revealed velopharyngeal dysfunction, premature spillage at base of tongue with delayed pharyngeal onset of swallow and decreased pharyngeal constriction leading to post swallow pharyngeal residue and aspiration. The speech-language pathologist recommended unrestricted liquids and recreational purees with enteral feeding. The patient was referred for dysphagia therapy in an outpatient clinic at a different medical university closer to home.

Taking into consideration the FEES evaluation and a chairside clinical assessment, the patient was judged to be a level two on the Functional Oral Intake Scale for Dysphagia (FOIS). The Mann Assessment of Swallowing Ability (MASA) indicated a score of 157/200(moderate-severe dysphagia). The patient reported an
inability to taste or smell foods and liquids. A clinician scored oral-pharyngeal taste sensation rating was completed using a 4-point scale where 0 = "normal sensation", 1 = "mild-sensation impairment", 2 = "moderate-sensation impairment", 3 = "severe sensation impairment", 4 = "no sensation". The patient received a rating of a "4" of 4. Additionally, the patient complained of an inability to sense temperature in the oral-pharyngeal tract. A clinician scored a temperature sensation rating using a 4-point scale where 0 = "normal sensation", 1 = "mild-sensation impairment", 2 = "moderate-sensation impairment", 3 = "severe sensation impairment", 4 = "no sensation". Patient received a rating of “4” of 4. An absent gag reflex was noted. The FEES evaluation suggested the patient’s clinical indicator for aspiration was a cough after the swallow. Treatment consisted of 27 swallow treatments. The patient was discharged with an FOIS level 6; a MASA score of 184/200 (no abnormality detected), and the PEG tube was removed. The patient was discharged on a modified soft diet with unrestricted liquids. The oral-pharyngeal taste sensation rating was completed and the patient received a rating of a “2” of 4 post treatment. The temperature sensation rating was completed and the patient received a rating of “1” of 4 post treatment.

Case 2

A 77-year old male was diagnosed with Stage IV squamous cell carcinoma of base of tongue. This was resected in 10/2006 at a medical center. The patient underwent 46 chemo-radiation therapy sessions. A percutaneous endoscopic gastrostomy tube (PEG) was placed in 12/2006 secondary to pain, mouth sores, and an inability to maintain adequate oral nutrition and hydration. In 1/2008 the PEG tube was removed. No skilled intervention for dysphagia was recommended or received. In 1/2016, patient was referred for modified barium swallows study (MBSS) and upper GI due to complaints of coughing and choking. The MBSS revealed frank silent aspiration and the upper GI revealed poor stripping of the esophagus. The patient was referred to an outpatient medical university on 5/2016 for a full comprehensive dysphagia evaluation.

The FEES examination revealed severe oropharyngeal dysphagia with no posterior base of tongue movement, incomplete epiglottis cetroflexion with frank silent aspiration, and UES achalasia with ascending aspiration after the swallow. The PEG tube was replaced with NPO orders.

A chairside clinical evaluation revealed an FOIS level 1 and a MASA score of 190/200 both indicating severe dysphagia. Additional salient findings were a hypersensitivity to the sweet taste but the patient reported basically all foods tasted the same. A clinician completed the same oral-pharyngeal taste sensation rating scale as stated in case one. The patient received a rating of a “2” of 4 (moderate-impairment). The patient reported anosmia but could sense when foods or liquids were hot or cold. A clinician completed the same temperature sensation rating scale as stated in case one. The patient received a rating of “2” of 4 (moderate-impairment). The patient presented with a diminished and delayed gag response. FEES evaluation suggested the patient’s clinical indicator for aspiration was a cough before and after the swallow.

Treatment consisted of 35 swallow treatments with one significant illness and hospitalization that interfered with progress. At the time of data collection, the patient’s PEG tube was still in place but had not been used for nutrition for several weeks. The patient weighed about 175 pounds and reported in a journal, an oral intake of approximately 3,500 calories per day. Patient reported he was trying to gain weight. The patient was rated a FOIS level 4; and received a MASA score of 177/200 (Mild Abnormality) An oral-pharyngeal taste sensation rating was scored and the patient received a rating of “1” of 4 (mild-impairment) post treatment. The patient reported he was able to taste many different foods he had not “tasted” in years. The temperature sensation rating was scored and the patient received a rating of “1” of 4 (mild-impairment) post treatments. At time of data collection, patient’s oral intake consisted of purees with nectar and honey thick liquids. The patient continues to have difficulty swallowing thin liquids and masticated food consistencies, and continued with ongoing dysphagia therapy.

METHOD

A novel eclectic dysphagia protocol was implemented for both patients. Therapy combined the McNeill Dysphagia Protocol (MDTP) [3], with adjunctive surface electromyography (sEMG) for visual feedback. Each patient’s starting bolus in treatment was identified during FEES exam per MDTP Program. Effortful swallows and systematic progression of bolus consistency and volume were executed as recommended by the MDTP protocol. The previously identified clinical indicator was used as the threshold for progression safety (cough after swallow).

Adjunctive sEMG work/rest visualization was utilized during each session. The work/rest cycles were set for 7 second work cycles and 10 second rest cycles. The patient was instructed to “swallow hard and be done.” A decrease in subsequent swallows and a reduction in number of coughs were measured.

Both patients struggled initially with the mcNeil Program therefore, it was modified slightly to accommodate the patients. The modifications included a reduction of total swallows expected per session and the addition of proprioceptive cues (tactile feedback), strength, and stretching exercise. Both proprioceptive and strength exercises were introduced as the patient’s sEMG traces showed signs of disorganization but prior to the incidence of the patient’s clinical indicator. Both exercises were implemented to “give the patient a break” from the rigors of swallowing without compromising maximal movement during the one-hour session.

The proprioceptive cues were fifteen repetitions of posterior to anterior vibratory lingual strokes and fifteen secondary palatal vibratory probes. The strokes and probes were delivered manually via a z-vibe and small pointy tip (yellow). The patient was instructed to move the tongue toward the palatal vibration and use sEMG visualization to form a tongue based retraction sEMG pattern [An illustration was shown to the patient]. While the patient was learning the tongue based retraction task, the bar graph sEMG visualization was used as feedback. Once tongue movement and adequate patterns were achieved, the visualization was changed to the work/rest cycles and set for 30 seconds work and 10 seconds rest. The patient was instructed to
“pull your tongue back, hard”. With each repetition, the patient was asked to attempt to increase microvolt amplitudes. Two sets of fifteen tongue based retractions were achieved in each session. Functional tongue based retraction was achieved after several sessions.

The strength exercises were delivered as a resistive isometric tongue hold. The patient completed resistive isometric tongue hold by sticking the tongue in between their front teeth and actively attempting to swallow (Masako maneuver). The patient was instructed to progressively attempt to increase sEMG microvolt amplitude with each repetition. The patient accomplished this by progressively pushing the tongue further and further outside the oral cavity and using the sEMG visualization as feedback. Eventually the patient was able to hold the tongue near mid-point between the teeth. Increased microvolt amplitudes were reported. sEMG visualizations were used as motivation within the sessions. Increased isometric tongue hold durations were also reported over several sessions.

**DISCUSSION**

Both patients presented with long term chronic dysphagia accentuated by suspected late effect radiation. Dysphagia is recognized as a common, multifactorial debilitating sequela for HNC patients undergoing chemo-radiation therapy [4]. In this case series, both patients presented at least five years post chemo-radiation therapy with a significant impact on swallow efficiency and effectiveness. Two HNC survivors with chronic dysphagia have indicated that the eclectic dysphagia protocol they received has positively impacted their quality of life.

In this case series, an eclectic dysphagia protocol was designed to incorporate several established therapy techniques. The successful outcomes were attributed to simply manipulating the swallow mechanism to do what it has always known to do…move. The McNeil Dysphagia Therapy Program is an excellent program to facilitate functional swallow movement. It is a systematic exercise-based rehabilitation protocol that stresses the importance of functionality coupled with neuromotor and exercise physiology principles [3].

Adjunctive surface electromyography (sEMG) is a non-invasive visual and auditory biofeedback tool that measures electrical muscle activity by way of self-adhesive hydrogel electrodes. The electrodes are applied to the skin over the muscles of interest and muscle activity is captured by the electrodes, and transmitted to a computer. The computer processes the transmitted information into visualizations of muscle activity. In this case series, the sEMG was used to help the patient visualize their muscle movement, learn new tasks, and provide incentive to work harder and challenged the patient to produce higher amplitudes during different exercise regimes.

The vibratory proprioceptive cues were used as a tactile biofeedback to improve anterior to posterior propulsion of the tongue for improved oral transit of the bolus. The lingual strokes from posterior to anterior were purposeful as to use the tongue’s reflexive response to stimulate movement posteriorly. The literature suggests vibration has been used in conjunction with oral motor exercise [5]. In this case series, it is suspected that the vibration in combination with the exercise and stretching inadvertently stimulated the somatosensory system. In both cases, gustatory, olfactory, and thermo-reception improved significantly. After therapy, both patients reported an improvement overall, but specifically reported they could taste sour foods, and were more sensitive to hot and cold temperatures. One patient indicated she could feel her chin and skin on the surgical side for the first time in years.

Studies suggest stretch and strengthening exercise for patient’s two years post chemo-radiation therapy. The suggested exercises include tongue-base strengthening, range of motion and retraction exercises [1,5]. Isometric hold, tongue retraction exercise, and the tongue hold (Masako maneuver) were used not only as a resistive strengthening exercise but as a stretch exercise.

An eclectic dysphagia protocol that incorporates principles of neuromusculature, visual biofeedback, muscle strengthening, muscle stretching, and tactile sensory stimulation made a significant impact on swallow efficiency and effectiveness. Two HNC survivors with chronic dysphagia have indicated that the eclectic dysphagia protocol they received has positively impacted their quality of life.

**REFERENCES**